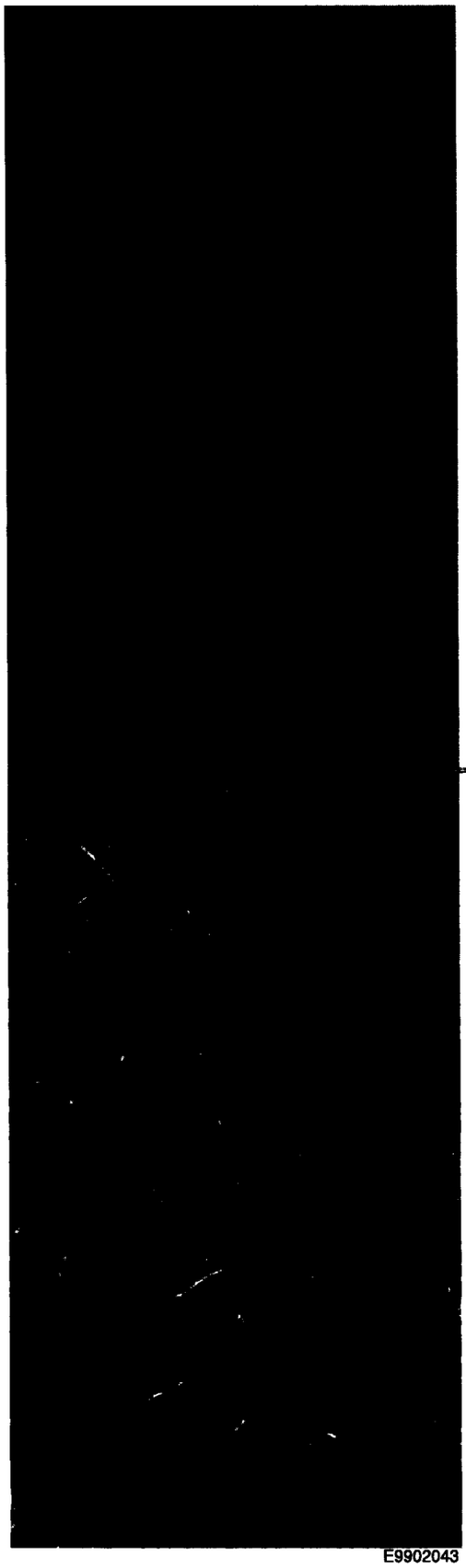

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Revised Draft Hanford Remedial Action Environmental Impact Statement and Comprehensive Land-Use Plan

Executive Summary

U.S. Department of Energy
April 1999

Cover Sheet

Lead Federal Agency: U.S. Department of Energy (DOE)

Cooperating Agencies: U.S. Department of the Interior (Bureau of Land Management, Bureau of Reclamation, and U.S. Fish and Wildlife Service); Benton, Franklin, and Grant counties; and the City of Richland

Consulting Tribal Governments: Nez Perce Tribe Department of Environmental Restoration and Waste Management and the Confederated Tribes of the Umatilla Indian Reservation

Title: *Revised Draft Hanford Remedial Action Environmental Impact Statement and Comprehensive Land-Use Plan* (HRA-EIS), Hanford Site, Richland, Washington

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Abstract: The DOE prepared this *Revised Draft Hanford Remedial Action Environmental Impact Statement and Comprehensive Land-Use Plan* (HRA-EIS) to evaluate the potential environmental impacts associated with implementing a comprehensive land-use plan for the Hanford Site for at least the next 50 years. With the exception of the required No-Action Alternative, each of the six alternatives presented represents a Tribal, Federal, state, or local agency's Preferred Alternative. Each alternative is presented separately. The DOE's Preferred Alternative anticipates multiple uses of the Hanford Site, including: consolidating waste management operations in the Central Plateau, allowing industrial development in the eastern and southern portions of the site, increasing recreational access to the Columbia River, and expanding the Saddle Mountain National Wildlife Refuge to include all of the Wahluke Slope (managed by the U.S. Fish and Wildlife Service).

The Hanford Site occupies 1,517 square kilometers (km^2) (586 square miles [mi^2]) in southeastern Washington. Today, the Hanford Site has diverse missions associated with environmental restoration, waste management, and science and technology. These missions have resulted in the growing need for a comprehensive, long-term approach to planning and development for the Site.

Public Comments: The Revised Draft HRA-EIS is available for review and comment on the Internet at **http://www.hanford.gov/eis/hraeis/hraeis.htm**. Written comments on the Revised Draft HRA-EIS will be accepted from April 23 to June 7, 1999, at the Washington State address or Internet address provided above. The date and location of the public hearing will be announced in May of 1999. The DOE will consider public comments in preparing the Final EIS and Record of Decision (ROD).

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Foreword

Objective of the EIS

This Revised Draft HRA-EIS will be used by the Department of Energy (DOE) and its nine cooperating and consulting agencies to develop a comprehensive land-use plan (CLUP) for the Hanford Site. Public comment on this Revised Draft will be considered in completing a Final EIS, followed by DOE's issuance of a Record of Decision (ROD). While development of the CLUP will be complete with release of the HRA-EIS ROD, full implementation of the CLUP is expected to take at least 50 years.

Implementation of the CLUP will begin a more detailed planning process for land-use and facility-use decisions at the Hanford Site. The DOE will use the CLUP to screen proposals. Eventually, management of Hanford Site areas will move toward the CLUP land-use goals. This CLUP process could take more than 50 years to fully achieve the land-use goals.

The final CLUP will consist of the following:

A final Land-Use Map, depicting the desired future patterns of land use on the Hanford Site. This map will be one of the alternative land-use maps presented in the EIS, or a map that combines features of several of the alternatives maps based on public comment.

Land-Use Definitions, describing the purpose, intent, and principal use(s) of each land-use designation on the final CLUP map.

Land-Use Policies, directing land-use actions. These policies ensure that individual actions of successive administrations shall collectively advance the adopted CLUP map, goals, and objectives.

Land-Use Implementing Procedures, including:

- Administrative procedures for reviewing and approving requests for use of Hanford Site lands.

- A Site Planning Advisory Board (SPAB), consisting of representatives from the cooperating agencies and the affected Tribes, to evaluate and make recommendations on development proposals and land-use requests. It is anticipated that some requested activities will be permitted under the plan, but that others will need to be modified or required to incorporate mitigation to reduce potential impacts.

- New or revised "area" and "resources" management plans for the Site aligned and coordinated with the new land-use map, policies and implementing procedures of the adopted CLUP.

Integration of the CLUP

The process described above would be integrated with existing DOE land-use review procedures (e.g., the draft *Biological Resources Management Plan* and the draft *Cultural Resources Management Plan*). The final CLUP map, policies and implementing procedures

would be integrated with and addressed at the threshold decision points of all authorizations, operational plans, and actions, including contracts and budget proposals that directly or indirectly affect land use so that they would not create unintentional conflicts with the CLUP, or fail to forward CLUP objectives where the opportunity and ability to do so exists.

The DOE would have the final approval of all land-use decisions taking place on the Hanford Site while under DOE responsibility. The DOE Richland Operations Office would coordinate review of Hanford land development and land-use requests, and determine, with input from the SPAB, whether a request represents an *allowable use* or, *special use*, or whether the request would require an *amendment* to the CLUP.

Cooperating Agencies and Consulting Tribal Governments

The nine cooperating agencies and consulting Tribal governments that participated in the preparation of this Revised Draft HRA-EIS are: the U.S. Department of the Interior (Bureau of Land Management [BLM], Bureau of Reclamation [BoR], and the U.S. Fish and Wildlife Service [USFWS]); the City of Richland, WA; Benton, Franklin, and Grant counties; the Nez Perce Tribe, Department of Environmental Restoration and Waste Management; and the Confederated Tribes of the Umatilla Indian Reservation (CTUIR).

Preamble

The U.S. Department of Energy (DOE) is considering changing the name of this environmental impact statement (EIS) from the *Hanford Remedial Action Environmental Impact Statement and Comprehensive Land-Use Plan* (HRA-EIS) to the **Hanford Comprehensive Land-Use EIS**. In the Notice of Intent in 1992, establishing future land uses was listed as one of the HRA-EIS objectives. Since that time, various considerations have led to this Revised Draft HRA-EIS in which future land use is now the EIS's focus. To reflect this reduction in scope from the 1996 Draft HRA-EIS, DOE is soliciting comments on the proposed name change as well as the contents.

Originally, this EIS was intended to provide an environmental review under the *National Environmental Policy Act of 1969* (NEPA) for all aspects of the developing Hanford Environmental Restoration Project. The document, however, no longer directly considers remediation issues. Instead, remediation issues are now integrated into specific Tri-Party Agreement-remediation decision documents. Remediation decisions are made by the U.S. Environmental Protection Agency and the State of Washington, as lead regulatory agencies, and DOE as lead implementing agency. DOE does expect that the EIS process will assist Hanford remediation efforts by determining reasonably foreseeable land uses and establishing land-use decision-making processes to ensure the viability of any future institutional control that might be required.

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Acronyms and Initialisms

ac	acres
AEA	Atomic Energy Act
AEC	Atomic Energy Commission
AMP	area management plan
ATG	Allied Technology Group
BLM	Bureau of Land Management
BoR	Bureau of Reclamation
BPA	Bonneville Power Administration
BRMaP	Biological Resources Management Plan
BRMiS	Biological Resources Mitigation Strategy
CAA	*Clean Air Act of 1970*
CAAA	*Clean Air Act Amendments of 1990*
CBC	Columbia Basin College
CBRP	Columbia Basin Reclamation Project
CCP	Comprehensive Conservation Plan
CEQ	Council on Environmental Quality
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CLUP	comprehensive land-use plan
CRADA	Cooperative Research & Development Agreement
CRMP	Cultural Resources Management Plan
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
D&D	Decontamination and Decommissioning
DOE	U.S. Department of Energy
DOH	Department of Health
DOI	U.S. Department of Interior
DSTs	double-shell tanks
EA	environmental assessment
Ecology	Washington State Department of Ecology
EIS	environmental impact statement
EM	Environmental Management
EMSL	Environmental Molecular Sciences Laboratory
Energy Northwest	formerly known as the Washington Public Power Supply System (WPPSS)
EPA	U.S. Environmental Protection Agency
EPZ	emergency planning zone
ERDF	Environmental Restoration Disposal Facility
ESU	Evolutionary Significant Units
EUZ	exclusive use zone

FFCA	*Federal Facilities Compliance Act of 1992*
FFTF	Fast Flux Test Facility
RI/FS	Remedial Investigation/Feasibility Study
FONSI	Finding of No Significant Impact
Working Group	Future Site Uses Working Group
GIS	Geographic Information System
GMA	Growth Management Act
GSA	General Services Administration
HAB	Hanford Advisory Board
HAMMER	Hazardous Materials Management and Emergency Response
HAP	hazardous air pollutants
ha	hectares
HCRL	Hanford Cultural Resources Laboratory
HEAL	Hanford Education Action League
HEHF	Hanford Environmental Health Foundation
HGIS	Hanford Geographic Information System (database)
HMS	Hanford Meteorological Station
HRA-EIS	*Hanford Remedial Action Environmental Impact Statement and Comprehensive Land-Use Plan*
I&I	irreversible and irretrievable
ICBEMP	Interior Columbia Basin Ecosystem Management Project
ILCR	incremental lifetime cancer rate
INEEL	Idaho National Engineering and Environmental Laboratory
km^2	square kilometers
LIGO	Laser Interferometer Gravitational-Wave Observatory
MEI	maximally exposed individual
mi^2	square miles
MMI	Modified Mercalli Intensity
MOA	Memorandum of Agreement
MOX	mixed oxide
NAAQS	National Ambient Air Quality Standards
NARM	naturally occurring and accelerator-produced radioactive materials
NCO	NEPA Compliance Officer
NCP	National Contingency Plan
NEPA	*National Environmental Policy Act of 1969*
NERP	National Environmental Research Park
NOA	Notice of Availability
NOI	Notice of Intent
NPA	*Northwest Power Act*
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPPC	Northwest Power Planning Council
NPS	U.S. National Park Service
NWR	National Wildlife Refuge
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PFP	Plutonium Finishing Plant

PSD	Prevention of Significant Deterioration
PUD	Public Utility District
PUREX	Plutonium-Uranium Extraction
R&D	research and development
RCRA	*Resource Conservation and Recovery Act of 1976*
RCW	Revised Code of Washington
REO	Real Estate Officer
RL	(Department of Energy) Richland Operations Office
RMP	Resource Management Plan
ROD	Record of Decision
SALDS	state-approved land disposal structure
SARA	*Superfund Amendments and Reauthorization Act of 1986*
SDWA	*Safe Drinking Water Act of 1974*
SEPA	*State Environmental Policy Act of 1971*
SHPO	State Historic Preservation Office
SMB	Site Management Board
SPAB	Site Planning Advisory Board
SRS	Savannah River Site
SSTs	single-shell tanks
TAP	toxic air pollutants
TRIDEC	Tri-City Industrial Development Council
TSCA	*Toxic Substances Control Act of 1976*
TSD	Treatment, Storage and Disposal
TSP	total suspended particulates
TWRS	Tank Waste Remediation System
UBC	Uniform Building Code
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compounds
WAC	Washington Administrative Code
WCAA	*Washington Clean Air Act of 1991*
WDFW	Washington Department of Fish and Wildlife
WNP-2	Washington Nuclear Plant Number 2
WSU-TC	Washington State University - Tri-Cities
WIDS	Waste Information Data System database

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ES1.0 Introduction

Coordinated land-use planning is one of the many trustee responsibilities the U.S. Department of Energy (DOE) has as a Federal agency holding Federal assets. This *Revised Draft Hanford Remedial Action Environmental Impact Statement and Comprehensive Land-Use Plan* (HRA-EIS) considers several land uses for the Hanford Site planned over the next half-century. As Hanford clean-up progresses through the next 40 years, cleanup Records of Decision (RODs) issued under the *Comprehensive Environmental Response and Recovery Act of 1976* (CERCLA) and the *Resource Conservation and Recovery Act of 1976* (RCRA) will impact some areas within the proposed land uses. Likewise, other DOE missions, such as research and development, might be collocated at Hanford because of DOE's continued Federal presence as the long-term caretaker of CERCLA/RCRA or low-level waste disposal sites. Other DOE missions such as economic development or even other Federal mandates such as natural resource protection could also impact Hanford land uses.

As with all Federal activities, where, when, and how quickly Hanford waste sites are remediated and proposed land uses are achieved depends on Congressional funding. The Tri-Party Agreement, which defines the schedule for clean-up activities at the Hanford Site, is itself dependent on Congressional funding. These clean-up activities are an important factor in determining when, or even if, a proposed land use might be fulfilled.

The Hanford Site occupies 1,517 square kilometers (km^2) (586 square miles [mi^2]) in southeastern Washington (Figure ES-1). For more than 40 years, the primary mission at Hanford was the production of nuclear materials for national defense. The DOE developed infrastructure and facility complexes to accomplish this work, but large tracts of land used as protective buffer zones for safety and security purposes remained undisturbed. These buffer zones preserved a biological and cultural resource setting unique in the Columbia Basin region. In the late 1980s, the primary DOE mission changed from defense production to environmental restoration.

Today, the Hanford Site has a diverse set of missions associated with environmental restoration, waste management, and science and technology. These missions have resulted in the growing need for a comprehensive, long-term approach to planning and development for the Site.

The DOE has prepared this HRA-EIS to evaluate the potential environmental impacts associated with implementing a comprehensive land-use plan (CLUP) for the Hanford Site for at least the next 50 years. Working with cooperating agencies and consulting Tribal governments, DOE developed several land-use alternatives. The cooperating agencies are the U.S. Department of the Interior (DOI), consisting of the Bureau of Land Management (BLM), Bureau of Reclamation (BoR), and U.S. Fish and Wildlife Service (USFWS); Benton, Franklin, and Grant counties; and the City of Richland. The consulting Tribal governments are the Nez Perce Tribe Department of Environmental Restoration and Waste Management, and the Confederated Tribes of the Umatilla Indian Reservation. With the exception of the required No-Action Alternative, each alternative presented represents a Tribal, Federal, state, or local agency's Preferred Alternative. Each alternative is presented separately. Effort was taken to present each alternative with equal measure to encourage public comment.

Figure ES-1. Hanford Site Location and Landmarks.

ES1.1 The National Environmental Policy Act

The *National Environmental Policy Act of 1969* (NEPA) requires consideration of potential environmental impacts associated with Federal agency actions, and provides opportunities for public involvement in the decision-making process.

In August 1996, DOE published the *Draft Hanford Remedial Action Environmental Impact Statement and Comprehensive Land Use Plan* for public review. In response to comments received on the Draft HRA-EIS (see Appendix F of EIS), DOE decided to reduce the scope and issue a Revised Draft. Because the original EIS provided for consideration of land use, no further scoping meetings were required, and; as Implementation Plans were no longer required by DOE, the Implementation Plan was not reissued.

The Revised Draft HRA-EIS evaluates the potential environmental impacts associated with establishing land uses at the Hanford Site for at least the next 50 years, defers the evaluation of impacts associated with remedial actions to Tri-Party Agreement documents, and includes the entire Hanford Site within the scope of the document. The major differences between this Revised Draft HRA-EIS, and the August 1996 Draft HRA-EIS are as follows:

- The Revised Draft HRA-EIS focuses on land-use impacts and decisions rather than potential remediation impacts.

- Each alternative in the Revised Draft HRA-EIS features a site-wide map designating land uses, whereas alternatives in the August 1996 Draft HRA-EIS focused on individual geographic areas.

- The Revised Draft HRA-EIS includes DOE's Preferred Alternative as well as new land-use alternatives developed by the cooperating agencies and consulting Tribal governments.

- The Revised Draft HRA-EIS contains proposed land-use policies and implementing procedures that would be integrated into the Hanford CLUP (see Chapter ES-6).

Refocusing the HRA-EIS is consistent with 42 USC 7274k (Public Law 104-201, Section 3153 [as amended]), which requires the development of a future-use plan for the Hanford Site; and is responsive to public comments received during scoping and during the public comment period on the original draft (see DEIS, Appendix F). Refocusing the EIS also provides a basis for considering potential future proposals regarding transferring ownership and control of some or all of the Hanford Site. As the original EIS provided for consideration of land use, no additional scoping meetings were required.

Since March 1997, DOE has worked with the cooperating agencies and consulting Tribal governments to establish a framework for the environmental analyses presented in this Revised Draft HRA-EIS. Substantial agreement was reached among the cooperating agencies and consulting Tribal governments on the development of land-use designations and on the format for determining the potential environmental impacts associated with the land uses carried forward in this EIS. The cooperating agencies and consulting Tribal governments also worked together to develop the proposed CLUP policies and implementing procedures.

ES1.2 National Environmental Policy Act and Other Environmental Reviews

Past land-use commitments based on other NEPA documents, as well as CERCLA RODs addressing remediation, have had a direct impact on the development of the land-use alternatives presented in the Revised Draft HRA-EIS. These documents are listed in the following sections.

ES1.2.1 NEPA Reviews Affecting the Hanford Site

- *Waste Management Operations, Hanford Reservation, Richland, Washington* (ERDA-1538, December 1975)
- *Double-Shell Tanks for Defense High-Level Radioactive Waste Storage, Hanford Site, Richland, Washington* (DOE/EIS-0062, April 1980)
- *Decommissioning of the Shippingport Atomic Power Station, Hanford Site, Richland, Washington* (DOE/EIS-0080, May 1982)
- *Operation of PUREX and Uranium Oxide Plant Facilities, Hanford Site, Richland, Washington* (DOE/EIS-0089, February 1983)
- *Disposal and Decommissioning, Defueled Naval Submarine Reactor Plants* (Lead Agency - Department of the Navy; DOE was a Cooperating Agency) (No document no., May 1984)
- *Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes, Hanford Site, Richland, Washington* (DOE/EIS-0113, December 1987)
- *Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington* (DOE/EIS-0119, December 1991)
- *Tank Waste Remediation System, Hanford Site, Richland, Washington* (DOE/EIS-0189, August 1996)
- *Waste Management Programmatic Environmental Impact Statement (*DOE/EIS-0200, May 1997)
- *Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs* (DOE/EIS-0203, April 1995)
- *Safe Retrieval, Transfer and Interim Storage of Hanford Tank Wastes, Hanford Site, Richland, Washington* (DOE/EIS-0212, October 1995)
- *Plutonium Finishing Plant Stabilization Environmental Impact Statement* (DOE/EIS-0244, May 1996)
- *Management of Spent Nuclear Fuel from the K Basins Hanford Site, Richland, Washington* (DOE/EIS-0245, January 1996)

- *Disposal of Decommissioned, Defueled Cruiser, Ohio Class, and Los Angeles Class Naval Reactor Plants Environmental Impact Statement* (Adopted by DOE as DOE/EIS-0259, April 1996)

- *Hanford Reach of the Columbia River, Comprehensive River Conservation Study and Final Environmental Impact Statement* (Hanford Reach EIS) (National Park Service, June 1994)

- *Storage and Disposition of Weapons-Usable Fissile Materials Programmatic Environmental Impact Statement* (DOE/EIS-0229, November 1996)

- *Surplus Plutonium Disposition Environmental Impact Statement* (DOE/EIS-0283)

- *Columbia River System Operation Review Environmental Impact Statement* (DOE/EIS-0170, November 1995)

- *Environmental Impact Statement for the Geologic Repository for the Disposal of Spent Nuclear Fuel and High Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0250) – in preparation.

- *Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement* (DOE/EIS-0286) – in preparation.

- *Proposed Production of Plutonium-238 (Pu-238) for Use in Advanced Radioisotope Power Systems (RPS) for Space Missions* (DOE/EIS-0299) – in preparation.

- *Transfer of the Heat Source/Radioisotope Thermoelectric Generator Assembly and Test Operations From Mound Site* (DOE/EIS-0302) – in preparation.

ES1.2.2 State Environmental Policy Act (SEPA) Reviews Affecting the Hanford Site

- Commercial Low-Level Radioactive Waste Disposal Site (U.S. Ecology) on the Hanford Site Environmental Impact Statement – in preparation.

- City of Richland Comprehensive Plan/Environmental Impact Statement (August 1997).

- SEPA EIS on Treatment of Low-Level Mixed Wastes (Allied Technology Group) City of Richland EIS (EA6-97, March 1998).

- Draft Benton County Comprehensive Plan (SEPA EIS Addendum) (September 1997)

ES1.2.3 CERCLA Reviews Affecting the Hanford Site

- 1100 Area Remediation – 1100-EM-1, 1100-EM-2, 1100-EM-3, and 1100-IU-1. Final Record of Decision (ROD) issued September 24, 1993; certified remedial action - July 1996; delisted from National Priorities List (NPL).

- 300 Area Remediation – 300-FF-1, 300-FF-5. Final ROD issued July 17, 1996. Remedial Investigation/Feasibility Study (RI/FS) for NPL Site - to be completed after all operable units are addressed.

- 100 Area Remediation – 100-BC-1, 100-HR-1, and 100-DR-1. Interim ROD for 37 high-priority waste sites issued September 1995. The ROD was amended May 14, 1997, to include additional waste sites.

- 100-HR-3/100-KR-4 (groundwater operable units). Interim ROD issued April 1, 1996.

- 100-IU-1, 100-IU-3, 100-IU-4, 100-IU-5. Interim ROD issued February 12, 1996.

  RI/FS for NPL Site – to be completed after all operable units are addressed.

- 200 Area Remediation – Environmental Restoration Disposal Facility - Final ROD issued January 1995.

  200-ZP-1 (groundwater operable unit). Interim ROD issued June 5, 1995.

  200-UP-1 (groundwater operable unit). Interim ROD issued February 24, 1997.

  RI/FS for NPL site – to be completed after all operable units are addressed.

Just as the restrictions posed by approved CERCLA RODs were taken into consideration in the development of the land-use alternatives in this Revised Draft HRA-EIS, in the future, the U.S. Environmental Protection Agency (EPA), Washington State Department of Ecology (Ecology), and DOE are expected to consider the land-use plan for a given area when determining cleanup levels. Remediation is conducted under CERCLA/RCRA authority. If the remediation process cannot support the proposed land use within the National Contingency Plan's (NCP) 10^{-4} to 10^{-6} risk range, then this EIS contains a proposed process for changing the use of the land while maintaining the effectiveness of institutional controls (see Chapter ES-6).

ES1.3 Hanford Site Planning Efforts

Several Hanford Site planning documents have been developed to address the various information needs of DOE managers. These planning documents are periodically updated to reflect new information and DOE decisionmaking, such as the decision that DOE will make based on the HRA-EIS. Summarized below, these planning documents are:

- **Draft *Hanford Cultural Resources Management Plan*** – The CRMP establishes guidance for the identification, evaluation, recordation, curation, and management of archaeological, historic, and traditional cultural resources. The plan specifies methods of consultation with affected Tribes, government agencies, and interested parties; and includes strategies for the preservation and/or curation of representative properties, archives, and objects.

- **Draft *Hanford Biological Resources Management Plan* (BRMaP)** – The BRMaP provides DOE and DOE contractors with a consistent approach for protecting biological resources and for monitoring, assessing, and mitigating impacts to biological resources from site development and environmental restoration activities. The BRMaP provides a comprehensive direction that specifies DOE biological resource policies, goals, and objectives.

- ***Hanford Strategic Plan*** – This plan articulates DOE's vision and commitments to a long-range strategic direction for Hanford Site missions. The strategic plan provides a basis for decisions and actions to achieve DOE goals.

- ***Accelerating Cleanup: Paths to Closure at the Hanford Site*** – A revision of DOE's 2006 Plan, this document builds on an already accelerated pace of activities and numerous efficiencies implemented at the Hanford Site during the last few years. It commits to significant cleanup progress on the Site by 2006, while recognizing that much of the cleanup effort will remain beyond 2006.

- ***Hanford Site Ground-Water Protection Management Plan*** and ***Management and Integration of Hanford Site Groundwater and Vadose Zone Activities*** – These documents provide management and protection guidelines to protect Hanford groundwater from radioactive and nonradioactive hazardous substances.

The Revised Draft HRA-EIS builds on past efforts to address land-use planning at the Hanford Site and presents a range of alternative land uses that represent several different visions.

ES1.4 Integrating Planning Efforts by Other Governments and Agencies

This section includes information supplied to DOE by representatives of other local governments and agencies about their respective planning efforts. The concept of "agreeing to disagree" on issues such as Tribal treaty rights allowed the agencies to set aside differences and to work together on the land-use planning process.

ES1.4.1 Tribal Rights

Tribal governments and DOE agree that the Tribal governments' treaty-reserved right of taking fish at all "usual and accustomed" places applies to the Hanford Reach of the Columbia River where it passes through Hanford.

Tribal governments and DOE, however, disagree over the applicability of Tribal members' treaty-reserved rights to hunt, gather plants, and pasture livestock on the Hanford Site. The Tribal governments and DOE have decided not to delay completion and implementation of a comprehensive land-use plan for the Hanford Site. Instead, the Tribes and DOE have gone ahead with the land-use planning process while reserving all rights to assert their respective positions regarding treaty rights. Neither the existence of this EIS nor any portion of its contents is intended to have any influence over the resolution of the treaty rights dispute.

ES1.4.2 Other Federal Agencies

In 1943, the U.S. Army Corps of Engineers (USACE) began the acquisition of the Hanford Site. Public land managed by the BLM was withdrawn from BLM and placed under DOE control by a land withdrawal order. BoR land was placed under DOE control by a Memorandum of Agreement (MOA) and, finally, land was purchased (sometimes via condemnation) from private owners. Today, DOE continues to manage these acquired lands,

which form a checkerboard pattern of underlying ownership over large portions of the Hanford Site (see Figure ES-20).

The BLM and BoR continue to retain an interest in their original property holdings prior to the establishment of the Hanford Site. The DOE must use the land consistent with the purposes for which they were originally acquired from BLM and BoR. Any other use of these lands by DOE requires BLM and BoR involvement. The BLM is responsible for administering Public Domain land. The BoR is responsible for the ultimate development of the irrigable lands within the Wahluke Slope, as part of the Columbia Basin Reclamation Project. Both the BLM and BoR have an interest in the Hanford resources and in management of those resources over the long term. When DOE relinquishes its withdrawals on these lands, the BLM and/or BoR would have the right of first refusal to the land. If they choose not to accept the land, then DOE or the Federal General Services Administration (GSA) would have the responsibility to dispose of the land.

In addition to BoR's irrigation system maintenance activities, DOE lands on the Wahluke Slope are managed in part by the Washington Department of Fish and Wildlife (WDFW) as the Wahluke State Wildlife Recreation Area and, in part, by the USFWS as the Saddle Mountain National Wildlife Refuge.

The USFWS is managing the Fitzner-Eberhardt Arid Lands Ecology Reserve (ALE Reserve) under a cooperative agreement with DOE that was signed on August 27, 1997. The USFWS will be preparing a Comprehensive Conservation Plan (CCP) (equivalent to an Area Management Plan [AMP]; see Chapter ES-6) for the ALE Reserve.

Aside from BoR, BLM, and the USFWS current management responsibilities, the U.S. National Park Service (NPS), with DOE as a co-preparer, completed an EIS in 1994 for the Hanford Reach of the Columbia River. The *Hanford Reach of the Columbia River, Comprehensive River Conservation Study and Final Environmental Impact Statement* (Hanford Reach EIS) examined alternatives for preservation of the resources and features of the Hanford Reach (including addition of the Hanford Reach to the National Wild and Scenic Rivers System), and evaluated impacts that could result from various uses of the river. The DOI's ROD recommended that the Congress designate Federally owned and privately owned lands within 0.4 km (0.25 mi) of the Columbia River, on both banks from river mile 396 to 346.5 as a Recreational River under the Wild and Scenic Rivers System; and the portion of the Hanford Site that lies north of the river, as a National Wildlife Refuge that is to be managed by the USFWS. Congress is still contemplating actions that are necessary to implement the DOI's ROD.

In addition to the proposed wild and scenic discussions, other discussions have occurred to swap certain parcels of land in the State of Washington from the Secretary of Energy to the Secretary of the Interior, affecting ownership of about 197 km^2 (75 mi^2) of the Hanford Site. This swap would consolidate the scattered Benton County portion of Hanford's BLM Public Domain lands into an area beginning near 100-D, running south and east along the Columbia River shore, to just north of Energy Northwest (formerly the Washington Public Power Supply System [WPPSS]) and then west to Gable Mountain.

As long as these lands are needed by DOE (i.e., still withdrawn from BLM by DOE), this legislative action would not affect DOE's administration of the areas involved. The DOE's use of withdrawn BLM Public Domain lands is consistent with most land-use designations with the exceptions of Industrial Exclusive, Research and Development, High-Intensity Recreation, or Industrial designations where BLM's multiple-use mandate would be limited by an extensive infrastructure.

ES1.4.3 Local Governments

Portions of the Hanford Site lie within Benton, Franklin, Adams, and Grant counties. The primary contaminated portion of the Site falls within Benton County, and parts of the Wahluke Slope fall within Franklin, Grant, and Adams counties. The City of Richland is located in Benton County at the southern boundary of the Hanford Site, and considerable development within the city limits and adjacent to the Site has already occurred.

Most planning by local governments falls under the *State of Washington Growth Management Act of 1990* (GMA), which established a statewide planning framework and created roles and responsibilities for planning at the local, regional, and state level. The GMA required the largest and fastest growing counties, and cities within those counties, to develop new comprehensive plans (counties not required to plan may elect to do so). Benton, Franklin, and Grant counties, as well as the City of Richland, have elected to plan under the GMA requirements.

ES1.4.3.1. Benton County. Benton County is preparing a comprehensive land-use plan that covers the entire county, including a portion of the Hanford Site. As a cooperating agency, Benton County's government does not agree with the Tribal view that Hanford lands are "open and unclaimed." As part of its planning effort, Benton County has developed a proposed critical areas map (see Figure ES-15). Critical areas include wetlands, areas with a critical recharging effect on aquifers used for potable water, fish and wildlife habitat conservation areas, frequently flooded areas, and geologically hazardous areas.

The Port of Benton, which must comply with county land-use plans, has already received the 1100 and 3000 areas and has expressed interest in the industrial development of portions of the 300 Area, and the area south of Energy Northwest (formerly WPPSS) Plant Number 2.

ES1.4.3.2. City of Richland. The City of Richland plans in coordination with Benton County under the GMA. Future land use at the Hanford Site has the potential to affect the economic development of Richland. The City of Richland has identified portions of the southern Hanford Site suitable for urban development and possible annexation (see Figure ES-16).

ES1.4.3.3. Grant, Franklin, and Adams Counties. Grant, Franklin, and Adams counties coordinate local land-use planning for the Wahluke Slope. The three counties, along with the Port of Mattawa, have expressed a desire to implement a land-use plan that would accommodate increased agricultural activities, including irrigated cropping systems, along with wildlife and cultural resource protections (see Figure ES-17).

ES2.0 Purpose and Need

The DOE has several missions to fulfill at the Hanford Site that have competing natural resource consumption needs and management values. Governments and stakeholders within the region have an interest in Hanford resources and in management of those resources over the long-term. The DOE needs to assess the relative qualities of Hanford's resources, compare the priorities and needs of Hanford's missions, and reach decisions such as the identification and disposal of any excess lands. DOE Order 430.1 and 42 USC 7274k require a land-use plan for the Hanford Site. The *Revised Draft Hanford Remedial Action Environmental Impact Statement and Comprehensive Land-Use Plan* (HRA-EIS) (DOE/EIS-0222D) provides the analysis needed to adopt a land-use plan.

The role of the HRA-EIS is to document, in the public forum, the process of determining the best combination of land uses required to meet DOE mission needs for at least the next 50 years.

ES3.0 Proposed Action and Alternatives

The proposed action for the HRA-EIS is to develop and implement a comprehensive land-use plan for the Hanford Site. Federal law (42 USC 7274k) requires that the land-use plan address at least a 50-year planning period, although some specific DOE activities such as decommissioning of reactors are expected to take longer. A comprehensive land-use plan consisting of a land-use map, land-use policies and implementing procedures would be adopted in the ROD for this EIS. Once established, this land-use plan would provide a framework for making land-use and facility-use decisions.

Six land-use alternatives (including the No-Action) were developed by the nine Cooperating Agencies and Consulting Tribal Governments using common land-use designations and definitions. With the exception of the No-Action Alternative, each of the six alternatives presented represents a Tribal, Federal, state, or local agency's Preferred Alternative.

No-Action Alternative. This alternative, developed by DOE in compliance with the National Environmental Policy Act of 1969 (NEPA), presents the current status of land use at the Hanford Site and represents no change from current land-management processes or intergovernmental relationships with the cooperating agencies. Specific land-use decisions for Hanford would continue to be made under the NEPA process and the Tri-Party Agreement, based on the *Hanford Strategic Plan* (Mission Plan) and on a project-by-project basis.

DOE's Preferred Alternative. DOE's Preferred Alternative anticipates multiple uses of Hanford, including anticipated future DOE missions, non-DOE Federal missions, and other public and private-sector land uses. The DOE Preferred Alternative would do the following:

- *for the clean-up mission* – consolidate waste management operations on 50.1 km^2 (20 mi^2) in the Central Plateau of the site

- *for the economic development mission* – allow industrial development in the eastern and southern portions of Hanford and increase recreational access to the Columbia River

- *for the Natural Resource Trustee mission* – expand the existing Saddle Mountain National Wildlife Refuge to include all of the Wahluke Slope (North Slope) of the Site, consistent with the 1994 Hanford Reach EIS and 1996 Hanford Reach ROD; place the Arid Lands Ecology Reserve (ALE Reserve) under USFWS management by permit; and ensure that, where practicable, withdrawn BLM lands are clean enough to support BLM's multiple-use mandate (i.e., mining and grazing).

Alternative One (Natural Resource Trustee). The USFWS's alternative emphasizes a Federal stewardship role for managing the natural resources at Hanford. This alternative considers these resources in a regional context, and would expand the existing Saddle Mountain National Wildlife Refuge to include all of the Wahluke Slope (North Slope), the Riverlands, McGee Ranch, and the ALE Reserve (e.g., all of the Hanford lands north and east

of the Columbia River and west of State Highways 24 and 240). The vision of Alternative One is to conserve the Hanford Site shrub-steppe ecosystem and protect the Hanford Reach.

Alternative Two (Nez Perce Tribe, Department of Environmental Restoration and Waste Management). This Nez Perce alternative calls for preservation of natural and cultural resources and traditional Tribal use at the site. Future DOE missions would be constrained to the Central Plateau, 300 Area, and 400 Area. Both this alternative and Alternative Four (developed by the Confederated Tribes of the Umatilla Indian Reservation) reflect Tribal visions and views of Tribal treaty rights and traditional Tribal uses of Hanford lands. The Tribes and DOE have "agreed to disagree" on the interpretation of treaty rights on Hanford lands in the interest of moving the EIS process forward. Each party reserves the right to assert its respective interpretation of treaty rights at Hanford.

Alternative Three (Cities and Counties). This local governments' alternative is based on the individual planning efforts of local agencies and organizations including Benton County, Franklin County, Grant County, and the City of Richland. Alternative Three recognizes the potential that land use at the Hanford Site has in relation to economic development. Alternative Three would allow dryland (non-irrigated) agricultural and grazing activities, and irrigated agriculture on the Hanford Site. The land-use designations contained in Alternative Three were developed consistent with local availability of infrastructure, nearness of urban areas, soils capabilities, and current use patterns.

Alternative Four (Confederated Tribes of the Umatilla Indian Reservation, [CTUIR]). This CTUIR alternative calls for preservation of natural resources and areas of religious importance to the CTUIR as well as traditional Tribal use at the Site. Both this alternative and Alternative Two (developed by the Nez Perce Tribe, Department of Environmental Restoration and Waste Management) reflect Tribal visions and views of Tribal treaty rights and traditional Tribal uses of Hanford lands. The Tribes and DOE have "agreed to disagree" on the interpretation of treaty rights on Hanford lands in the interest of moving the EIS process forward. Each party reserves the right to assert its respective interpretation of treaty rights at Hanford.

The land-use designations and their definitions shown in Table ES-1 were co-written by the cooperating agencies and consulting Tribal governments so alternative land-use plans could be commonly developed and compared.

Based on goals, objectives, and values (vision) of the cooperating agencies and consulting Tribal governments, the land-use designations were applied to specific geographic areas of the Hanford Site (Figure ES-2). This process resulted in the development of the five alternatives (six, including the No-Action Alternative) that are presented and analyzed in the Revised Draft HRA-EIS.

Following development of the alternatives, an analysis of potential environmental impacts resulting from the proposed land uses associated with each alternative was conducted. With the exception of DOE's Preferred Alternative and the No-Action Alternative (both of which were written by DOE), the narratives of each alternative do not contain precisely parallel information because each alternative was written by a separate cooperating agency or consulting Tribal government with differing management goals. A summary of the results of the impact analyses from the EIS is presented in Section ES5.0 (Table ES-5).

Table ES-1. Hanford Site Land-Use Designations.

Land-Use Designation	Definition
Industrial-Exclusive	An area suitable and desirable for treatment, storage, and disposal of hazardous, dangerous, radioactive, and nonradioactive wastes. Includes related activities consistent with Industrial-Exclusive uses.
Industrial	An area suitable and desirable for activities, such as reactor operations, rail, barge transport facilities, mining, manufacturing, food processing, assembly, warehouse, and distribution operations. Includes related activities consistent with Industrial uses.
Agricultural	An area designated for the tilling of soil, raising of crops and livestock, and horticulture for commercial purposes along with all those activities normally and routinely involved in horticulture and the production of crops and livestock. Includes related activities consistent with Agricultural uses.
Research and Development	An area designated for conducting basic or applied research that requires the use of a large-scale or isolated facility. Includes scientific, engineering, technology development, technology transfer, and technology deployment activities to meet regional and national needs. Includes related activities consistent with Research and Development.
High-Intensity Recreation	An area allocated for high-intensity, visitor-serving activities and facilities (commercial and governmental), such as golf courses, recreational vehicle parks, boat launching facilities, Tribal fishing facilities, destination resorts, cultural centers, and museums. Includes related activities consistent with High-Intensity Recreation.
Low-Intensity Recreation	An area allocated for low-intensity, visitor-serving activities and facilities, such as improved recreational trails, primitive boat launching facilities, and permitted campgrounds. Includes related activities consistent with Low-Intensity Recreation.
Conservation (Mining and Grazing)	An area reserved for the management and protection of archeological, cultural, ecological, and natural resources. Limited and managed mining and grazing could occur as a special use (e.g., a permit would be required) within appropriate areas. Limited public access would be consistent with resource conservation. Includes activities related to Conservation (Mining and Grazing), consistent with the protection of archeological, cultural, ecological, and natural resources.
Conservation (Mining)	An area reserved for the management and protection of archeological, cultural, ecological, and natural resources. Limited and managed mining could occur as a special use (e.g., a permit would be required) within appropriate areas. Limited public access would be consistent with resource conservation. Includes activities related to Conservation (Mining), consistent with the protection of archeological, cultural, ecological, and natural resources.
Preservation	An area managed for the preservation of archeological, cultural, ecological, and natural resources. No new consumptive uses (e.g., mining) would be allowed within this area. Public access controls would be consistent with resource preservation requirements. Includes activities related to Preservation uses.

ES3.1 No-Action Alternative

The No-Action Alternative is presented as "no change" from current management direction or level of management intensity. Specifically, “no change” means the land uses shown in Table ES-1, an alternative map (or combination of alternative maps), and the CLUP policies and implementing procedures would *not* be used for managing Hanford Site lands into the future.

The No-Action Alternative serves two purposes. First, it serves as a baseline common to all of the alternatives that presents the current status of land use and land management on the Hanford Site. For this purpose, a baseline no-action map was developed that contains available information defining existing buildings and infrastructure at the Hanford Site. Second, the No-Action Alternative provides a basis for comparing the alternatives against a “no change” in land-use management policy baseline.

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Figure ES-2. Geographic Study Areas on the Hanford Site.

To analyze the impacts associated with implementing the no change in land-use management policy/No-Action Alternative, assumptions regarding land-management options were applied. In the No-Action Alternative, specific land-use decisions and designations would be made through the NEPA process on a project-by-project basis as needed. Still, there would not be a true land-use designation or land-use policies. There would only be areas of the Hanford Site that are currently used or managed for specific purposes guided by administrative agreements (e.g., the ALE Reserve and the Wahluke Slope), and areas of the Hanford Site that are committed to a general land-use because of historical uses and existing NEPA or CERCLA/RCRA ROD commitments, but are subject to change by future projects or missions that are unknown at this time. Consequently, potential uses for the Hanford Site lands under the No-Action Alternative are mapped using the policies presented in the *Hanford Strategic Plan* (Figure ES-3).

ES3.1.1 Wahluke Slope

The area of the Wahluke Slope currently managed by the USFWS would continue to be managed as Preservation. The area managed by the WDFW would continue to be managed as Conservation (Mining and Grazing). Limited public access would be allowed for hunting, fishing, or recreation; permitted mining and grazing would be allowed; and agricultural leases would continue.

ES3.1.2 Columbia River Corridor

The Columbia River would continue to be managed to allow limited public access and use as a Low-Intensity Recreation area. Access to the Columbia River's islands would remain restricted to protect cultural and biological resources. Public access to the Reactors on the River area (i.e., the 100 Areas) would remain restricted.

ES3.1.3 Central Plateau

Lands within the Central Plateau area would continue to be used for the management of radioactive and hazardous waste materials.

ES3.1.4 All Other Areas

These areas would be available for other Federal and non-Federal uses, which are consistent with safety, cultural, and biological resources protection requirements. The area north of the City of Richland would be used for industrial purposes. The lands in and adjacent to the 300 and 400 Areas would remain under Federal ownership but could be leased for private and public uses to support industrial and economic development. Other Federal uses would be allowed by permit (e.g., the Laser Interferometer Gravitational-Wave Observatory [LIGO]).

ES3.1.5 Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE Reserve)

The ALE Reserve geographic area would continue to be managed by the USFWS as Preservation. The Big Bend Alberta Mining Company holds mineral rights on about 5.2 km^2 (2 mi^2) under the southern portion of the ALE Reserve.

Figure ES-3. No-Action Alternative.

ES3.2 The Agency's (DOE's) Preferred Alternative

Much like the No-Action Alternative, DOE's Preferred Alternative was developed based on policies that are consistent with the *Hanford Strategic Plan*. However, unlike the No-Action Alternative, DOE's Preferred Alternative would establish land-use policies and implementing procedures that would place Hanford's land-use planning decisions in a regional context.

In the development of the Preferred Alternative, DOE took into account its role as the long-term caretaker for the Site for at least the next 50 years. The DOE used information from the Hanford Geographic Information System (HGIS) and Waste Information Data System (WIDS) database. Information considered by DOE includes:

- All surface waste sites, including those remediated (Figure ES-4)
- Groundwater contaminants and flow direction (Figures ES-5, ES-6, and ES-7)
- Cultural and biological resources (Figure ES-8)
- Exclusive Use Zones (EUZs) and Emergency Planning Zones (EPZs) associated with DOE and other Hanford activities (e.g., Energy Northwest's nuclear power reactor, U.S. Ecology's low-level waste disposal site, LIGO, etc.) (Figure ES-9).

Land-use designations identified for DOE's Preferred Alternative are Industrial-Exclusive, Industrial, Research and Development, High-Intensity Recreation, Low-Intensity Recreation, Conservation (Mining and Grazing), Conservation (Mining), and Preservation. Figure ES-10 is a map of DOE's Preferred Alternative.

ES3.2.1 Wahluke Slope

The Saddle Mountain National Wildlife Refuge would be expanded to include all of the Wahluke Slope, consistent with the 1994 Hanford Reach EIS and 1996 Hanford Reach ROD. Until the USFWS develops an Area Management Plan (AMP) (e.g., Comprehensive Conservation Plan [CCP]) for the expanded refuge, the Wahluke Slope would be designated as Preservation to protect sensitive areas and species of concern with the exceptions near the Columbia River, as discussed in the Columbia River Corridor Section below. The USFWS would use their CCP process to develop wildlife compatible management plans.

ES3.2.2 Columbia River Corridor

The Columbia River Corridor would include High-Intensity Recreation, Low-Intensity Recreation, Conservation (Mining and Grazing), and Preservation. The river islands and a quarter mile buffer zone would be designated as Preservation to protect cultural and ecological resources.

Four sites away from existing contamination would be designated as High-Intensity Recreation for visitor-serving activities and facilities development. The B Reactor would be converted into a museum and the surrounding areas would be available for museum-support facilities. The area near the Vernita Bridge would be expanded to include a boat ramp and other visitor facilities. Two areas on the Wahluke Slope would be designated as High-Intensity Recreation for potential exclusive Tribal fishing sites.

The area west of the B Reactor would be designated Low-Intensity Recreation and used as a corridor between the High-Intensity Recreation areas associated with the B Reactor and Vernita Bridge. A White Bluffs boat launch would be a Low-Intensity Recreation area located between the H and F Reactors. Other areas would include visitor facilities near the old Hanford High School and a support site near Energy Northwest (formerly WPPSS) for hiking and biking trails from Richland to the Vernita rest stop.

The remainder of the land within the Columbia River Corridor outside the quarter mile buffer zone would be designated for Conservation (Mining and Grazing). In the Corridor, grazing would be used for fire and weed management and mining would be permitted only in support of the cleanup mission.

ES3.2.3 Central Plateau

The Central Plateau would be designated for Industrial-Exclusive use. This would allow for continued waste management operations within the Central Plateau geographic area.

ES3.2.4 All Other Areas

Within the All Other Areas geographic area, the Preferred Alternative would include Industrial, Research and Development, High-Intensity Recreation, Low-Intensity Recreation, Conservation (Mining and Grazing), and Preservation land-use designations.

The majority of the All Other Areas would be designated Conservation (Mining and Grazing) to support a possible BLM mission of multiple uses. Two distinct areas, one located east of the 200 Area and the other located north of Richland, would be designated for Industrial use to support economic development. An area west of Highway 10 and east of State Highway 240 would be designated for Research and Development to support economic diversification and DOE's Energy Research mission. Gable Mountain, Gable Butte, the area from Umtanum Ridge to the ALE Reserve, and the active sand dunes areas would be designated as Preservation to protect sensitive cultural and biological resources. Washington State land that is deed restricted to waste management would be designated as Conservation (Mining and Grazing).

ES3.2.5 Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE Reserve)

Nearly all of the ALE Reserve geographic area would be designated as Preservation. A portion of the ALE Reserve would be managed as Conservation (Mining) for a basalt and fine soils landfill cover source during the remediation of the Hanford Site.

Figure ES-4. Hanford Surface Waste Site Locations (Past and Present).

Figure ES-5. Distribution of Hazardous Chemicals in Groundwater Within the Hanford Site.

Figure ES-6. Distribution of Radionuclides of Concern in Groundwater Within the Hanford Site.

Figure ES-7. Watertable Change Map for 1996 - 1997.

Figure ES-8. Composite Map of Level II, Level III, and Level IV Biological Resources.

Figure ES-9. Protective Safety Buffer Zones.

Figure ES-10. DOE Preferred Alternative.

ES3.3 Alternative One

Alternative One represents a Federal stewardship role for managing valuable national resources on the Hanford Site. This alternative addresses these national resources (i.e., ecological, historic, cultural, and economic resources) in a regional context, and would be used to enlarge an existing Federal Wildlife Refuge. Figures ES-11 and ES-12 show how the Hanford Site has become a regional preserve for shrub-steppe species by presenting the historic and current distributions. Figure ES-13 is a map of Alternative One.

ES3.3.1 Wahluke Slope

The land-use designation for the Wahluke Slope under Alternative One would be Preservation. The Wahluke Slope is currently administered for wildlife and recreation as the Saddle Mountain National Wildlife Refuge and the Wahluke State Wildlife Recreation Area under permits granted by DOE to the USFWS and WDFW, respectively. Management of the Wahluke Slope would be consolidated under the USFWS as a portion of the Saddle Mountain National Wildlife Refuge.

The Saddle Mountain National Wildlife Refuge would be designated Preservation, which is consistent with the current administered land use. Preservation would provide a protective safety buffer zone for remedial activities in the 100 Area. These activities are expected to continue for the planning period, and would continue to provide a sanctuary for shrub-steppe dependent species that inhabit the area. Preservation would also prevent activities within the BoR's Red Zone (an area where irrigation is restricted because it accelerates mud slides along the Columbia River) that could jeopardize stability of the White Bluffs. Preservation would not interfere with the BoR's management of the Columbia Basin Project's irrigation wasteways because they would be considered a pre-existing, nonconforming use. An agreement would be established by the DOI between its four agencies (i.e., USFWS, BoR, NPS, and BLM) to enable all to fulfill their congressionally mandated missions on the Wahluke Slope.

ES3.3.2 Columbia River Corridor

Land-use designations for the Columbia River Corridor under Alternative One would include High-Intensity Recreation, Low-Intensity Recreation, Conservation (Mining), and Preservation.

The Columbia River islands within the Hanford Site boundary would be designated for Preservation and included in the Saddle Mountain National Wildlife Refuge to maintain important areas for wildlife. The Columbia River Corridor itself includes Low-Intensity Recreation, High-Intensity Recreation, Conservation (Mining), and Preservation land-use designations.

The 100 Areas would include High-Intensity Recreation, Conservation (Mining), and Preservation land-use designations. The B Reactor would be designated High-Intensity Recreation to allow tourism of the Federally registered landmark, and would be consistent with the B Reactor museum proposal. Conservation (Mining) would provide local areas where backfill and contouring materials could be obtained to protect the radioactive contamination that would remain below 4.6 m (15 ft) in the 100 Areas vadose (the soil above groundwater) zone. During the planning period for this document (at least the next 50 years), the spent fuel will be removed from the K Basins. Associated environmental risks were evaluated in the K Basin EIS.

ES3.3.3 Central Plateau

The Central Plateau would include Industrial-Exclusive and Preservation land-use designations. Research and development projects specific to DOE's waste management activities would be allowed. Lands located to the west of the 200 West Area within the Central Plateau geographic area that contain high-quality mature sagebrush would be designated as Preservation. This designation encourages siting of new projects between the 200 East and 200 West Areas.

ES3.3.4 All Other Areas

The All Other Areas geographic area would include Industrial, Research and Development, Low-Intensity Recreation, Conservation (Mining), and Preservation land-use designations. All development would occur south of Energy Northwest (formerly WPPSS). This would include transition of existing facilities in the 300 and 400 Areas, and the Energy Northwest site to Industrial, and Research and Development designations. The majority of the non-Federal uses would occur offsite or within a portion of the area identified by the City of Richland's Urban Growth Area (UGA) boundary in the southeast portion of the Site. Wildlife corridors designated as Preservation would be located around this industrial development to allow wildlife movements between the ALE Reserve, the Columbia River, and the Saddle Mountain National Wildlife Refuge. Between the western boundary and State Highway 240, a wildlife corridor would run north from the ALE Reserve to the Columbia River. This northwestern wildlife corridor would include the areas known as McGee Ranch and the Riverland.

Within the southeastern wildlife corridor north of the Yakima River, a small area would be designated Conservation (Mining) to allow potential extraction of geologic materials for use in the 200 Areas remedial efforts. Considering this as a quarry site for basalt and soil provides DOE with the option to designate Gable Mountain, Gable Butte, and West Haven as Preservation because of their significant cultural value; and also to designate, as Preservation, the McGee Ranch site (which is DOE land north and west of Highway 24 and south of the Columbia River) and all of the ALE Reserve. This Preservation designation, and including the McGee Ranch site as part of the expansion of the Saddle Mountain National Wildlife Refuge, would allow consistent management of a large block of habitat and help preserve and protect an important habitat link between the Hanford Site and the Yakima Training Center.

Just west of the Industrial designation is an extensive tract of seral shrub-steppe habitat that has been designated as Conservation (Mining). As the canopy cover increases, this seral shrub-steppe habitat will become more important for shrub-steppe dependent species as additional shrub-steppe habitat is destroyed off-site.

ES3.3.5 Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE Reserve)

The ALE Reserve geographic area would be designated Preservation consistent with the management of the expanded Saddle Mountain National Wildlife Refuge. Preservation, and management of the ALE Reserve as an expansion of the Saddle Mountain National Wildlife Refuge would protect the rare and high quality shrub-steppe plant communities, and unique and rare fauna that reside on this portion of the Site. Many of these plant communities and fauna are found nowhere else in the state of Washington or in the Columbia Basin ecoregion.

Figure ES-11. Historic Distribution and Extent of Land Cover Classes Within a Portion of the Columbia Basin Ecoregion.

Figure ES-12. Current Distribution and Extent of Land Cover Classes Within a Portion of the Columbia Basin Ecoregion.

Figure ES-13. Alternative One.

ES3.4 Alternative Two

Alternative Two presents the vision of the Nez Perce Tribe Department of Environmental Restoration and Waste Management. This vision calls for the preservation of the natural and cultural resources at Hanford. Traditional tribal use is consistent with the Preservation land-use designation. Figure ES-14 is a map of Alternative Two.

ES3.4.1 Wahluke Slope

Alternative Two would designate the entire Wahluke Slope as Preservation.

ES3.4.2 Columbia River Corridor

The Columbia River Corridor would include High-Intensity Recreation, Low-Intensity Recreation, Research and Development, and Preservation land-use designations. The Columbia River (surface water only) would be designated for Low-Intensity Recreation. The river islands would be designated as Preservation. The B Reactor and surrounding area would be designed for High-Intensity Recreation, and would allow conversion of the reactor into a museum. The K Reactor area would be designated for Research and Development and could be used by Tribal governments and others for fish farming or for aquaculture and aquatic research. The remainder of the land within the 100 Areas would be designated Preservation.

ES3.4.3 Central Plateau

Lands within the Central Plateau geographic area would be designated as Industrial-Exclusive, allowing for continued management of radioactive and hazardous waste and other related and compatible uses.

ES3.4.4 All Other Areas

The All Other Areas would include Industrial, Research and Development, and Preservation designations. Alternative Two designates the City of Richland UGA, the 400 Area (including the Fast Flux Test Facility [FFTF]), and the Energy Northwest (formerly WPPSS) site as Industrial. The area around LIGO would be designated as Research and Development. The remainder of the All Other Areas would be designated as Preservation to protect natural, aesthetic, geologic, cultural, and archaeological features.

ES3.4.5 Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE Reserve)

The ALE Reserve geographic area would be designated as Preservation in accordance with its management as the Rattlesnake Hills Research Natural Area.

Figure ES-14. Alternative Two.

ES3.5 Alternative Three

Benton, Franklin, and Grant counties and the City of Richland contain portions of the Hanford Site. Alternative Three represents the planning efforts of these local governments. The procedures used by these governments to develop Alternative Three vary by each planning jurisdiction, as follows:

- Benton County is preparing a comprehensive land-use plan that covers the entire county, which includes a portion of the Hanford Site. As part of its planning effort, Benton County has developed a proposed critical areas map, which depicts lands identified as critical areas under the GMA (Figure ES-15). Critical areas include wetlands areas with a critical recharging effect on aquifers used for potable water, fish and wildlife habitat conservation areas, frequently flooded areas, and geologically hazardous areas.

- The City of Richland plans in coordination with Benton County under the GMA. Richland is greatly influenced by activities at the Hanford Site and has gone through several boom-and-bust cycles in response to employment levels at Hanford. Land use at Hanford has the potential to affect the economic development of Richland. The city currently provides services such as water, electricity, and sanitary sewers to the southern portion of the Hanford Site. The City of Richland has identified portions of the southern Hanford Site (Figure ES-16) suitable for industrial development and possible annexation.

- The designations in Franklin County result from a land-use analysis conducted by the Franklin County Planning Department.

- The designations in Grant County reflect the Wahluke 2000 Plan prepared by farming interests in 1992 and supported by Grant County (Figure ES-17).

Alternative Three would accommodate both future Federal missions and private activities such as business-related industry and research and development enterprises in the southeastern portion of the Site. Accommodation for the expansion of public and commercial recreational activities would be focused on the northern portion of the Site (i.e., primarily in the vicinity of the Vernita Bridge). The Conservation (Mining) designation would extend over most geographic areas except the southern portion of the Hanford Site and the Wahluke Slope. Figure ES-18 is a map of Alternative Three.

ES3.5.1 Wahluke Slope

Approximately two-thirds of the Wahluke Slope would be designated as Agricultural. Land designated as Agricultural within the "Red Zone" would be conserved under a "no-action" scenario pending the completion of geotechnical studies analyzing the impacts of irrigation on the White Bluffs and the Columbia River. Approximately one-third of the Wahluke Slope is designated as Conservation, providing land for wildlife and Low-Intensity Recreation. Approximately 261 ha (645 ac) of BoR wetlands would be designated as Preservation.

ES3.5.2 Columbia River Corridor

The Preservation land-use designation would extend 0.4 km (0.25 mi) from the average high-water line of the river. In Franklin and Grant counties, the boundary would extend further inland to include sensitive features such as the White Bluffs and several upland wetlands.

Permitted uses would be similar to those within the Conservation land-use designation, except mining would be allowed as a conditionally permitted use. Agriculture would be prohibited.

The areas outside of the KE, KW, N, D, DR, and H Reactor sites would be designated as Low-Intensity Recreation. A hiking and biking recreational trail along the entire river corridor would extend from North Richland to the Vernita Bridge.

ES3.5.3 Central Plateau

The DOE would be expected to continue all waste management and disposal activities in the Central Plateau. The Central Plateau would be designated for Industrial-Exclusive Use.

ES3.5.4 All Other Areas

The majority of the All Other Areas geographic area would be designated Conservation (Mining). Within the Conservation land-use designation, mining would be allowed as a conditionally permitted use. Agricultural uses would be prohibited. A small area along the southern boundary of the Site near the Yakima River would be designated High-Intensity Recreation. The area adjacent to the Vernita Rest Stop, east of State Highway 24 (which includes the B Reactor Site) would also be designated as High-Intensity Recreation. The strip designated for the west 135 ha (333 ac) of the Vernita Terrace would be designated Low-Intensity Recreation, primarily for limited activities such as biking, hiking, fishing, hunting, boat launching facilities, primitive camping, and nature viewing.

Areas north of the City of Richland would be designated as Industrial and Research and Development.

ES3.5.5 Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE Reserve)

The ALE Reserve would be designated as Conservation (Mining) under Alternative Three.

Figure ES-15. Benton County Proposed Critical Areas Map.

Figure ES-16. City of Richland Urban Growth Area.

Figure ES-17. Wahluke 2000 Plan Map.

Figure ES-18. Alternative Three.

ES3.6 Alternative Four

Alternative Four represents the vision of the CTUIR for the management of the Hanford Site for the next 50 years. In the view of the CTUIR, the greatest value provided to the region and the nation by the Hanford Site is its role as a natural resources reserve. The Hanford Site contains numerous places of religious importance to members of the CTUIR who practice traditional Indian religions. These places include the major basalt outcrops, the active dunes area, and other sites. Protection of these sites and of Tribal governments' access to these sites are of great important to the CTUIR and its members (as well as to other Hanford-affected Tribal governments) and will be an issue of great importance. Figure ES-19 is a map of Alternative Four.

ES3.6.1 Wahluke Slope

Alternative Four would manage the entire Wahluke Slope area as Preservation. Under the Preservation designation, grazing would not be allowed.

ES3.6.2 Columbia River Corridor

Alternative Four would designate almost the entire Columbia River Corridor as Preservation. The Preservation designation would allow managed recreation within the Corridor. This activity would include the continued operation of the White Bluffs boat launch on the east side of the river. A High-Intensity Recreation public boat launch would be located near the Vernita Bridge on the south side of the river. Alternative Four would also provide another High-Intensity Recreation boat launch, located at the White Bluffs boat launch on the Benton County side of the river, to support Tribal treaty-reserved fishing activity throughout the Hanford Reach.

ES3.6.3 Central Plateau

The Central Plateau would be used for waste management activities. All permanent waste disposal at the Hanford Site and research and development activities associated with waste management would take place within the Central Plateau.

ES3.6.4 All Other Areas

While Low-Intensity Recreation generally does not appear as a separate land use in this geographic area, it is anticipated that compatible Low-Intensity Recreation would be established throughout much of the All Other Areas geographic regions.

Alternative Four designates the area within 3.2 km (2 mi) of the Columbia River as Preservation to protect archaeological resources. Areas north of Gable Butte and Gable Mountain would be designated Preservation to protect sagebrush-steppe habitat. The area north of the ALE Reserve and south of Umtanum Ridge (also known as McGee Ranch) would be designated as Preservation to avoid habitat fragmentation and to provide a wildlife corridor between Hanford and the Yakima Training Center.

Gable Mountain in the east and moving west through Gable Butte, and Umtanum Ridge would be designated Preservation because of their cultural and biological importance. Alternative Four also recognizes the religious, cultural, and habitat significance of active dunes north of Energy Northwest (formerly WPPSS) by designating them as Preservation.

Alternative Four designates a large area near the Central Plateau and between the Plateau and the southeastern border of the Hanford Site as Conservation (Mining). This area contains large areas of high quality mature sagebrush communities; therefore, DOE would need to make prudent choices regarding the removal of needed material. If these geologic materials are not needed, the land-use designation for this area should revert to Preservation.

Alternative Four treats LIGO as a pre-existing, nonconforming use. The area south and east of the Wye Barricade (between State Highway 10 and the Hanford Site rail line) is designated as Research and Development, and Industrial.

Alternative Four designates a 3.2 km (2 mi) corridor along the Yakima River as Preservation because of the density of archaeological sites and the area's value as a wildlife corridor.

ES3.6.5 Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE Reserve)

Alternative Four would continue to manage the ALE Reserve in a manner consistent with the Preservation designation. The sole exception is an area of the ALE Reserve bordering State Highway 240 near the 200 West Area that would be designated Conservation (Mining). If the site is not used as a source for waste site capping material, the land-use designation should revert to Preservation.

ES3.7 Comparisons of Affected Areas by Alternatives

Table ES-2 shows comparisons of the affected areas by alternative, Table ES-3 shows the potential realm of impacts from each of the land-use designations. Table ES-5 (immediately following Section ES.5.4.4) shows a summary of potential impacts to Hanford Site resources.

Figure ES-19. Alternative Four.

Table ES-2. Comparisons of Affected Areas by Alternative. (2 pages)

	No-Action*	Preferred Alt.	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Areas in Hectares						
Agriculture	0	0	0	0	23,951	0
Conservation (Mining and Grazing)	0	43,857	0	0	6,476	0
Conservation (Mining)	0	1,005	15,921	0	72,685	19,341
Industrial	22,534	15,378	2,542	1,830	17,860	6,882
Industrial-Exclusive	5,064	5,064	4,593	4,593	5,064	5,064
Preservation	46,366	77,449	124,517	140,767	9,002	112,321
High-Intensity Recreation	0	82	64	191	1,768	77
Low-Intensity Recreation	1	334	29	0	3,097	7
Research & Development	0	4,912	414	699	8,177	4,388
Open Space Reserved	74,115	0	0	0	0	0
****TOTAL**	**148,080**	**148,080**	**148,080**	**148,080**	**148,080**	**148,080**
Areas in Acres						
Agriculture	0	0	0	0	59,184	0
Conservation (Mining and Grazing)	0	108,371	0	0	16,003	0
Conservation (Mining)	0	2,483	39,342	0	179,609	47,793
Industrial	55,684	38,000	6,281	4,522	44,133	17,006
Industrial-Exclusive	12,513	12,513	11,350	11,350	12,513	12,513
Preservation	114,573	191,381	307,688	347,843	22,244	277,551
High-Intensity Recreation	0	203	158	472	4,369	190
Low-Intensity Recreation	2	825	72	0	7,653	17
Research & Development	0	12,138	1,023	1,727	20,206	10,843
Open Space Reserved	183,142	0	0	0	0	0
TOTAL	**365,914**	**365,914**	**365,914**	**365,914**	**365,914**	**365,914**

* The No-Action Alternative does not have land-use designations. It has areas administered similar to land-use designations (see Figure ES-3).

** In addition to the 148,080 ha (572 mi^2) of land surface areas, this EIS affects 3642.3 ha (14.1 mi^2) of surface water, almost all of which is the Columbia River.

Table ES-2. Comparisons of Affected Areas by Alternative. (2 pages)

	No-Action*	Preferred Alt.	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Areas in Square Miles						
Agriculture	0	0	0	0	92	0
Conservation (Mining and Grazing)	0	169	0	0	25	0
Conservation (Mining)	0	4	61	0	281	75
Industrial	87	59	10	7	69	27
Industrial-Exclusive	20	20	18	18	20	20
Preservation	179	299	481	544	35	434
High-Intensity Recreation	0	0	0	1	7	0
Low-Intensity Recreation	0	1	0	0	12	0
Research & Development	0	19	2	3	32	17
Open Space Reserved	286	0	0	0	0	0
****TOTAL**	**572**	**572**	**572**	**572**	**572**	**572**
Percentage of Area						
Agriculture	0.00%	0.00%	0.00%	0.00%	16.17%	0.00%
Conservation (Mining and Grazing)	0.00%	29.62%	0.00%	0.00%	4.37%	0.00%
Conservation (Mining)	0.00%	0.68%	10.75%	0.00%	49.08%	13.06%
Industrial	15.22%	10.38%	1.72%	1.41%	12.06%	4.65%
Industrial-Exclusive	3.42%	3.42%	3.10%	3.10%	3.42%	3.42%
Preservation	31.31%	52.30%	84.09%	94.89%	6.08%	75.85%
High-Intensity Recreation	0.00%	0.06%	0.04%	0.13%	1.19%	0.05%
Low-Intensity Recreation	0.00%	0.23%	0.02%	0.00%	2.09%	0.00%
Research & Development	0.00%	3.32%	0.28%	0.47%	5.52%	2.96%
Open Space Reserved	50.05%	0.00%	0.00%	0.00%	0.00%	0.00%
TOTAL	**100.00%**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

* The No-Action Alternative does not have land-use designations. It has areas administered similar to land-use designations (see Figure ES-3).

** In addition to the 148,080 ha (572 mi^2) of land surface areas, this EIS affects 3642.3 ha (14.1 mi^2) of surface water, almost all of which is the Columbia River.

Table ES-3. Potential Adverse Impacts of Each Land-Use Alternative.

Alternative	Land-Use Designation	Geologic Features	Groundwater	Surface Water	Biological Resources	BRMaP Level II	BRMaP Level III	BRMaP Level IV	Cultural Resources	Aesthetic Resources
No-Action	Agriculture	x	x		x				x	x
	Development	x	x	x	x	x	x	x	x	x
	Recreation			x	x				x	x
	Mining	x	x	x	x	x	x	x	x	x
	Grazing	x		x	x	x			x	x
Preferred Alternative	Agriculture									
	Development	x	x			x	x		x	x
	Recreation			x	x		x	x	x	x
	Mining	x	x		x	x	x	x	x	x
	Grazing	x	x		x	x	x	x	x	x
Alternative One	Agriculture									
	Development	x	x	x					x	x
	Recreation			x					x	x
	Mining	x								x
	Grazing								x	x
Alternative Two	Agriculture									
	Development			x						
	Recreation			x						
	Mining									
	Grazing								x	x
Alternative Three	Agriculture	x	x	x	x	x	x	x	x	x
	Development	x	x		x	x			x	x
	Recreation			x	x	x			x	x
	Mining	x	x	x	x	x	x	x	x	x
	Grazing			x	x	x			x	x
Alternative Four	Agriculture									
	Development	x	x		x	x			x	x
	Recreation			x			x	x	x	x
	Mining					x				x
	Grazing									

Note: X's signify existence of potential impacts but do not indicate comparable impacts. Use of X's is consistent with methodology used by some of the Cooperating Agencies.

ES4.0 Affected Environment

The Hanford Site lies within the semiarid Pasco Basin of the Columbia Plateau in southeastern Washington State. The Hanford Site occupies an area of approximately 1,517 km^2 (586 mi^2) north of the confluence of the Yakima River with the Columbia River. The Columbia River flows through the northern part of the Hanford Site and, turning south, forms part of the Hanford Site's eastern boundary. This section of the Columbia River is known as the Hanford Reach and is the last unimpounded, nontidal segment of the Columbia River in the United States. The Yakima River runs near the southern boundary and joins the Columbia River below the City of Richland, which bounds the Hanford Site on the southeast.

The production of defense nuclear materials at the Hanford Site since the 1940s has necessitated the exclusion of public access and most non-government-related development on the Hanford Site. As a result of its defense-related mission, the Hanford Site has also provided *de facto* protection of the natural environment and cultural resources; however, the defense nuclear production mission has also left the Hanford Site with an extensive legacy of waste. Nuclear weapons material production and associated activities at the Hanford Site during the past five decades have generated a variety of radioactive, hazardous, and other wastes that have been disposed of or discharged to the air, soil, and water at the Hanford Site.

ES4.1 Existing Land Uses

For many years, the area along the Columbia River was used extensively by American Indian tribal members for fishing, hunting, and gathering. Pasturing of livestock became important in pre-contact times. Land uses at the Hanford Site have changed dramatically over the past 100 years. By the turn of the century, settlers had moved into the area, developing irrigated farmland and practicing extensive grazing. In 1943, the Federal government acquired the Hanford Site for production of nuclear materials to be used in the development of the atomic bomb.

Existing land uses within the vicinity of the Hanford Site include urban and industrial development, wildlife protection areas, recreation, irrigated and dryland farming, and grazing. Other land uses in the vicinity of the Hanford Site include a planned, low-level radioactive waste decontamination, super-compaction, plasma gasification and vitrification unit (operated by Allied Technology Group Corporation); and a commercial nuclear fuel fabrication facility (operated by Siemens Power Corporation). Much of the Hanford Site is undeveloped, providing a safety and security buffer for the smaller areas used for operations.

ES4.1.1 Wahluke Slope

The area north of the Columbia River consists of 357 km^2 (138 mi^2) of relatively undisturbed or recovering shrub-steppe habitat known as the Wahluke Slope. The northwest portion of the area is managed by the USFWS as the Saddle Mountain National Wildlife Refuge under a permit issued by DOE in 1971. The permit conditions require that the refuge remain closed to the public as a protective perimeter surrounding Hanford operations. The closure has benefitted migratory birds, such as curlews, and waterfowl.

In the northeast portion of the Wahluke Slope, the WDFW operates the Wahluke State Wildlife Recreation Area, which was established in 1971. The WDFW has leased a total of approximately 43 ha (107 ac) of the Wahluke State Wildlife Recreation Area for sharecropping. The purpose of these agricultural leases is to produce food and cover for

wildlife and to manage the land for continued multi-purpose recreation. In addition, the WDFW issued a grazing permit for approximately 3,756 ha (9,280 ac). The Wahluke State Wildlife Recreation Area is open to the public for recreational uses during daylight hours.

The Wahluke Slope once contained small, nonradioactively contaminated sites that DOE remediated in 1997. The DOE is not planning to alter the current land uses of the Wahluke Slope and is specifically prohibited from causing any adverse impacts on the values for which the area is under consideration for Wild and Scenic River or National Wildlife Refuge status.

ES4.1.2 Columbia River Corridor

The 111.6 km^2 (43.1 mi^2) Columbia River Corridor, which is adjacent to and runs through the Hanford Site, is used by the public and Tribes for boating, water skiing, fishing, and hunting of upland game birds and migratory waterfowl. While public access is allowed on certain islands, access to other islands and adjacent areas is restricted because of unique habitats and the presence of cultural resources.

The 100 Areas occupy approximately 68 km^2 (26 mi^2) along the southern shoreline of the Columbia River Corridor. The area contains all of the facilities in the 100 Areas, including nine retired plutonium production reactors, associated facilities, and structures. The primary land uses are reactor decommissioning and undeveloped areas. Future use restrictions have been placed in the vicinity of the 100-H Area, which is associated with the 183-H Solar Evaporation Basins. Additional deed restrictions or covenants for activities that potentially extend beyond 4.6 meters (m) (15 feet [ft]) below ground surface are expected for other CERCLA remediation areas.

The area known as the Hanford Reach includes an average of a 402 m (1,320 ft) strip of public land on either side of the Columbia River. The Hanford Reach is the last unimpounded, nontidal segment of the Columbia River in the United States. In 1988, Congress passed Public Law 100-605, *Comprehensive River Conservation Study*, which required the Secretary of the Interior to prepare an environmental impact study (in consultation with the Secretary of Energy) to evaluate the outstanding features of the Hanford Reach and its immediate environment.

Alternatives for preserving the outstanding features also were examined, including the designation of the Hanford Reach as part of the National Wild and Scenic Rivers system with the 1994 Hanford Reach EIS. In 1996 the DOI made a decision for Congressional consideration in their 1996 Hanford Reach ROD. The ROD recommended that the Hanford Reach be designated a “recreational river” as defined by the *National Wild and Scenic Rivers Act of 1968*. The ROD also recommended that the remainder of the Wahluke Slope be established as a National Fish and Wildlife Refuge. Finally, the ROD recommended that the approximately 728 ha (1,800 ac) of private land located in the Hanford Reach Study Area be included in the recreational river boundary, but not the refuge boundary. The final designation will require Congressional legislation.

There are two proposals currently under consideration in Congress. The primary differences between the proposals include the extent of the geographic scope (whether the Wahluke Slope is addressed in addition to the river corridor), and the designation of the land manager (i.e., local vs. Federal control).

In addition to the proposed Wild and Scenic legislation, discussions have been held to swap certain parcels of land in the State of Washington from the Secretary of Energy to the

Secretary of the Interior, affecting about 197 km^2 (75 mi^2) of the Hanford Site. This swap would consolidate the scattered Benton County portion of Hanford's BLM Public Domain lands, into an area beginning near 100-D, running south and east along the Columbia River shore, to just north of Energy Northwest (formerly WPPSS) and then west to Gable Mountain. As long as these lands are needed (i.e., still withdrawn from BLM by DOE), this legislative action would not affect DOE's administration of the areas involved. The DOE use of withdrawn BLM Public Domain lands is consistent with most land-use designations with the exceptions of Industrial Exclusive, Research and Development, or Industrial designations where BLM's multiple-use mandate would be limited by an extensive infrastructure.

ES4.1.3 Central Plateau

The 200 East and 200 West Areas occupy approximately 51 km^2 (19.5 mi^2). Facilities located in the Central Plateau were built to process irradiated fuel from the production reactors. The operation of these facilities resulted in the storage, disposal, and unplanned release of radioactive and nonradioactive waste. The primary land uses are waste operations and operations support. Deed restrictions or covenants for activities that potentially may extend beyond 4.6 m (15 ft) below ground surface are expected for CERCLA remediation areas in the Central Plateau geographic area.

In 1964, a 410 ha (1,000 ac) tract was leased to the State of Washington to promote nuclear-related development. A commercial low-level radioactive waste disposal facility, run by U.S. Ecology, Inc., currently operates on 41 ha (100 ac) of the leasehold. The rest of the leasehold was not used by the State, and this portion of the leasehold recently reverted to DOE. The DOE constructed the Environmental Restoration Disposal Facility (ERDF) on this tract. The ERDF is operated on the Central Plateau to provide disposal capacity for environmental remediation waste (e.g., low-level, mixed low-level, and dangerous wastes) generated during remediation of the 100, 200, and 300 Areas of the Hanford Site. The facility is currently about 65 ha (160 ac) and can be expanded up to 414 ha (1.6 mi^2) if additional waste disposal capacity is required.

ES4.1.4 All Other Areas

The All Other Areas geographic area is 689 km^2 (266 mi^2) and contains the 300, 400, and 1100 Areas; Energy Northwest (formerly WPPSS facilities); and a section of land currently owned by the State of Washington. The DOE prepared an Environmental Assessment (EA) that resulted in a finding of no significant impact on August 27, 1998 for the transfer of the 1100 Area and the Southern rail connection to the Port of Benton (DOE/RL EA-1260). The Port officially took ownership and control of the "1100 Area" (consisting of 786 acres, 26 buildings, and 16 miles of rail tract) on Oct. 1, 1998.

The 300 Area, located just north of the City of Richland, covers 1.5 km^2 (0.6 mi^2) and is used for research and technology development facilities. The 400 Area, located southeast of the 200 East Area, is the site of the FFTF, which was used in the testing of breeder reactor systems and is scheduled to be shut down. Defueling of the FFTF, which was the first major phase of deactivation, was completed in April 1995. The next deactivation phases are now under way; however, DOE is also studying if the FFTF reactor could be used to produce medical isotopes. The primary land use for the 400 Area is reactor operations and irradiation services with attendant support functions including fuel and target fabrication, processing, and interim storage.

The 1100 Area located north of Richland (now under ownership of the Port of Benton), served as the central warehousing, vehicle maintenance, and transportation operations center for the Hanford Site.

Other land uses in the All Other Areas geographic area include the Hazardous Materials Management and Emergency Response (HAMMER) Volpentest Training and Education Center; land that was leased to Energy Northwest (formerly WPPSS) in the 1970s to construct three commercial power reactors (one plant was completed and is currently operating); the LIGO, built by the National Science Foundation on the Hanford Site; and a 259 ha (640 ac) section of land south of the 200 East Area, near State Highway 240, owned by the State of Washington for the purpose of nonradioactive hazardous waste disposal. This parcel is uncontaminated (although the underlying groundwater is contaminated) and undeveloped. The deed requires that the property shall be used only for storage, processing and disposal of hazardous industrial (non-nuclear) waste, and for related activities. If the property is used for any other purpose, ownership would revert to the Federal government.

ES4.1.5 Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE Reserve)

The Fitzner/Eberhardt Arid Lands Ecology Reserve (also designated the Rattlesnake Hills Research Natural Area, or the ALE Reserve) encompasses 308.7 km^2 (119.2 mi^2) in the southwestern portion of the Hanford Site and is managed as a habitat and wildlife reserve and environmental research center. A Research Natural Area is a classification used by Federal land management agencies to designate lands on which various natural features are preserved in an undisturbed state solely for research and educational purposes. The ALE Reserve remains the largest Research Natural Area in the State of Washington.

The mineral rights to a 518 ha (1,280 ac) area on the ALE Reserve are owned by a private company. The company has been free to enter this area and explore for oil or gas since 1977.

Because public access to the ALE Reserve has been restricted since 1943, the shrub-steppe habitat is virtually undisturbed and is part of a much larger Hanford tract of shrub-steppe vegetation. This geographic area contained a number of small contaminated sites that were remediated in 1994 and 1995 and have been revegetated. In 1997, DOE granted a permit and entered into an agreement with USFWS to manage the ALE Reserve consistently with the existing ALE Facility Management Plan. Under this framework, the USFWS is preparing a CCP pursuant to the *National Wildlife Refuge System Improvement Act of 1997* to identify refuge management actions and to bring the ALE into the National Wildlife Refuge System.

ES4.2 Hanford Site Land Ownership

The Hanford Site land holdings consist of three different real property classifications: (1) lands acquired in fee by DOE or its predecessor agencies, (2) BLM-administered Public Domain lands withdrawn from the Public Domain for use as part of the Hanford Site, and (3) lands the BoR has withdrawn from the Public Domain or acquired in fee as part of the Columbia Basin Project (Figure ES-20).

The BoR agreed in a MOA to transfer custody, possession, and use of certain acquired and withdrawn lands situated within the control zone of the Hanford Works to the U.S. Atomic Energy Commission (AEC) on February 27, 1957. These lands consisted of a checkerboard pattern of alternating square-mile sections on the Wahluke Slope. The BoR retained the right

to construct, operate, and maintain the Wahluke Canal and related facilities and any necessary wasteways and drainage ways through the Wahluke Slope in connection with irrigation of lands outside of the control zone. These lands were included in the South Columbia Basin Irrigation District and the East Columbia Irrigation District at the time of district formation. In the MOA, the BoR identified a continued interest in development of irrigable lands on the Wahluke Slope as part of the Columbia Basin Project. The AEC acknowledged the interest of the BoR and reaffirmed a policy of keeping DOE land ownership and restrictions of land use on the Wahluke Slope to a minimum.

The BoR continues to retain an interest in the ultimate development of the irrigable lands within the Wahluke Slope as part of the Columbia Basin Project. The interest of the BoR pertains not only to irrigation development, but also to other project purposes (e.g., fish and wildlife protection) and to resource management and environmental concerns. The BoR maintains that the agreement with the AEC assures return of the lands when the lands are no longer necessary to support DOE's mission for the Hanford Site. Furthermore, the BoR would not concur with any change in the present use of the lands until technical and environmental studies were completed.

The alternating square-mile sections that would eventually revert to the BLM or BoR are an important consideration that complicates land-use planning. Because the lands are owned by another government agency (BLM or BoR), DOE cannot authorize uses of the property beyond the mission needs of DOE. Typically, after getting the land back, the BLM evaluates current use(s) of the land, compatibility of uses, and suitability of the land for different uses (i.e., mining, grazing, recreation, and preservation). When DOE relinquishes its withdrawals on lands that were historically Federal, those lands withdrawn only by DOE would revert to the Public Domain and management by BLM. Those lands withdrawn by the overlapping DOE and BoR withdrawals would remain withdrawn and managed by the BoR.

The BoR's use of the withdrawn Public Domain lands after the relinquishment of DOE's overlapping withdrawal must be consistent with the purposes for which they were originally withdrawn from BLM by BoR. If they are not, the BoR would be expected to relinquish or renegotiate its withdrawal notice under the *Federal Land Policy and Management Act of 1976* and the lands could be returned to the Public Domain for BLM management.

ES4.3 Geological and Soil Resources

The Hanford Site lies within the Columbia intermountain physiographic province, which is bordered on the north and east by the Rocky Mountains and on the west by the Cascade Range. The dominant geologic characteristics of this province are the thick accumulation of basaltic lava flows.

A series of bluffs occurs for a distance of approximately 56 km (35 mi) along the eastern and northern shores of the Columbia River (Figure ES-21). In the northern portion of the area, these bluffs are known as the White Bluffs. The entire area of the bluffs along the northern and eastern shores of the Columbia River is susceptible to landslides. Recent landslides have occurred in four areas along the bluffs. A slide near Locke Island caused the loss of cultural artifacts on the island by changing the channel of the river and causing erosion. These slides can also disturb and destroy salmonid spawning beds by siltation. Irrigation is a contributing factor to these landslides.

Figure ES-20. Hanford Site Land Ownership.

Natural gas was discovered on Rattlesnake Mountain in 1913. The small, shallow field was developed in 1929 and produced natural gas until the field was closed in 1941. The mineral rights to a 518 ha (1,280 ac) area of the ALE Reserve are still owned by a private company.

The Hanford Dune Field, located north of WNP-2, is one of three great dune fields in the Columbia River Basin. The Heritage Conservation and Recreation Service recommended inclusion of the dunes in the National Natural Landmark System.

Earthquake hazards are relatively low. Several major volcanos are located in the Cascade Range to the west of the Hanford Site. Mount St. Helens is located approximately 220 km (136 mi) west-southwest of the Hanford Site. The major concern is that ashfall could disrupt communication and travel on the Site.

There are 15 different soil types on the Hanford Site that vary from sand to silt loam. The most common soil type is Quincy sand. Because of the recent Missoula Floods and dry climate, pedogenesis in the area has not yet created a readily available clay that could be used for remedial action landfill covers. No soils on the Hanford Site are currently classified as prime or unique farmlands because they would require irrigation.

ES4.4 Water Resources

Primary surface-water features associated with the Hanford Site are the Columbia and Yakima Rivers. In addition, several surface ponds and ditches are associated with Hanford Site operation (Figure ES-22). Cold Creek and its tributaries are ephemeral springs within the Yakima River drainage. Rattlesnake Springs, located on the western portion of the Site, forms a small surface stream that flows for approximately 3 km (1.9 mi) before disappearing into the ground.

Wetlands include transitional lands occurring between terrestrial and aquatic ecosystems (Figure ES-23) where the water table usually is close to the surface or where shallow water covers the surface. The primary jurisdictional wetlands found on the Hanford Site occur along the Hanford Reach and include the riparian and riverine habitats located along the river shoreline. Riparian habitat includes the uplands immediately adjacent to the Hanford Reach or its backwater sloughs and supports vegetation typical of a high water table. Common riparian species found along the Hanford Reach include a variety of woody and herbaceous plant species.

Flow along the Hanford Reach is controlled by the Priest Rapids Dam. The likelihood of recurrence of large-scale flooding has been reduced by the construction of flood control and water storage dams upstream of the Hanford Site (Figure ES-24). Artificial wetlands (caused by irrigation) exist on the Wahluke Slope. Ecology has classified the Hanford Reach as Class A (Excellent). Class A waters are suitable for essentially all uses, including drinking water, recreation, and wildlife habitat. Potential well head protection areas would be associated with areas of high recharge potential (Figure ES-25). Radionuclide concentrations in the Columbia River are well below drinking water standards at all monitoring locations.

The quality of the groundwater at the Hanford Site has been affected by activities related to the production of nuclear materials. Large areas underlying the Hanford Site have elevated levels of both radiological and nonradiological constituents.

Water use in the area is primarily from surface diversion, with groundwater sources accounting for less than 10 percent of the total use. The first downstream drinking water intake below the Hanford Site is the City of Richland's intake.

The Hanford Site and the Department of Defense Yakima Training Center (located to the west of the Hanford Site) contain the largest remaining remnant of shrub-steppe vegetation in the Columbia Basin. Washington State is rapidly losing shrub-steppe habitat. The State of Washington has designated shrub-steppe habitat as priority habitat because shrub-steppe areas possess unique or significant value to many species. The DOI National Biological Service identifies native shrub and grassland steppe in Washington and Oregon as endangered ecosystem (with an 85 to 98 percent decline). The ALE Reserve supports one of the largest remnants of relatively undisturbed shrub-steppe ecosystem in the State of Washington. A herd of approximately 800 Rocky Mountain elk is present on the ALE Reserve.

ES4.5 Air Resources

The Hanford Site climate is semiarid with an average annual precipitation of 16 cm (6.3 in). Summers are warm and dry with abundant sunshine. Prevailing wind directions are from the northwest during all months of the year. Regional air quality is generally good. Particulate standards have been exceeded 20 times in the last 10 years due to blowing dust.

ES4.6 Biological Resources

As a Federal land manager, DOE is responsible for conserving fish, wildlife, and plant populations and their habitats on the Hanford Site. Information about these natural resources is presented below. The WDFW identifies priority habitats and priority species within Washington State (Figures ES-26, ES-27, and ES-28). Counties and cities may use information prepared by the WDFW to classify and designate locally important habitats and species. While these priorities are those of the Department, they and the data on which they are based may be considered by counties and cities when developing their land-use plans under the GMA.

The Hanford Site is a relatively large, mostly undisturbed area of shrub-steppe habitat containing numerous plant and animal species adapted to the semiarid environment of the region characterized as a shrub-steppe ecosystem. In the early 1800s, the dominant plant in the area was big sagebrush with an understory of perennial bunchgrasses, especially Sandberg's bluegrass and bluebunch wheatgrass. With the advent of settlement that brought increased livestock grazing and crop raising, the natural vegetation has been invaded by non-native annual species, especially cheatgrass. The dryland areas of the Hanford Site were treeless in the years before land settlement; however, trees were planted and irrigated on most of the farms to provide windbreaks and shade. Some of the trees died when the farms were abandoned in 1943. Today these trees serve as nesting platforms for several species of birds (e.g., hawks, owls, ravens, magpies, and great blue herons), and as night roosts for wintering bald eagles.

Figure ES-21. Topography of the Hanford Site.

Figure ES-22. Surface Water on the Hanford Site.

Figure ES-23. Wetlands on the Hanford Site.

Figure ES-24. Probable Maximum Flood of the Columbia River and Cold Creek, and the Actual 1948 Flood of the Columbia River.

Figure ES-25. Estimated Recharge from Infiltration of Precipitation and Irrigation on the Hanford Site.

Figure ES-26. WDFW Priority Habitats on the Hanford Site.

Figure ES-27. WDFW Priority Species: State Listed and Candidate.

Figure ES-28. WDFW Priority Species: Vulnerable Aggregations and Species of Recreation, Commercial, and/or Tribal Importance.

Figure ES-29. Plant Communities of Concern on the Hanford Site.

Figure ES-29. Plant Communities of Concern on the Hanford Site (Legend).

Several large portions of the Hanford Site are administered in a manner to protect and preserve biological resources, such as the ALE Reserve and the Wahluke Slope. The ALE Reserve has been used for ecological research dating back to 1952. As a result of a Federal interagency cooperative agreement, the ALE Reserve was designated as the Rattlesnake Hills Research Natural Area in 1971 and is now managed by the USFWS under a 1998 DOE permit. The ALE Reserve is a protected environmental and valuable ecological study site.

Mule deer are found throughout the Hanford Site, although areas of the highest concentrations are on the ALE Reserve and along the Columbia River. Islands in the Hanford Reach are used extensively as fawning sites by deer.

There are three species of birds and one fish species that are on the Federal List of Endangered and Threatened Species, and several species of plants and animals are under consideration for formal listing by the State of Washington. State endangered plants and state threatened plants are found on the Hanford site. The state endangered plants are the northern wormwood and the Columbia yellowcress; state-threatened plants are the Columbia milk-vetch, Hoover's desert-parsley, and white eatonella. State-sensitive plant species occurring along the Hanford Reach include Piper's daisy, the southern mudwort, dense sedge, shining flatsedge, false pimpernel, gray crypthana, and the dwarf evening primrose.

The Columbia River and other water bodies on the Hanford Site provide valuable habitat for aquatic organisms. The Hanford Reach represents the only remaining significant mainstream Columbia River spawning habitat for stocks of upriver bright fall chinook salmon and white sturgeon (Figure ES-30). The Upper Columbia River spring run chinook salmon (E-3/99), Middle Columbia River steelhead (T-3/99) and Upper Columbia River steelhead (E-8/97) have been placed under the protection of the Endangered Species Act. These fish spawn in or migrate through the Hanford Reach.

The DOE is currently in the process of developing and implementing an overall management strategy for the conservation of fish, wildlife, and plant populations and their habitats on the Hanford Site. The BRMaP provides a broad, but comprehensive, direction that specifies DOE biological habitat resources policies, goals, and objectives; and prescribes how they will be met.

ES4.7 Cultural Resources

The Hanford Site is rich in cultural resources, with well-preserved archaeological sites. The Draft *Hanford Cultural Resources Management Plan* was developed to establish guidance for the identification and management of archaeological, historic, and traditional cultural resources. Hanford Site cultural resources include American Indian historic and prehistoric sites, historic properties representing early Euro-American settlements, and more recent structures associated with the Manhattan Project and Cold War eras.

Figure ES-30. Key Fall Chinook Salmon Spawning Areas.

Because of the construction of dams and the resulting development elsewhere along the Columbia River, many of the original cultural resources have been destroyed or are under water. The Hanford Site is one of the few remaining archaeologically rich areas in the western Columbia Plateau. Locations along the Columbia River played a central role in the development of the Washane religion, which is still practiced by American Indian tribal members in the region. The Hanford Site is considered to be culturally important by many American Indians. Certain sites demonstrate traditional cultural significance because of traditional beliefs, religious practices, and cultural practices.

Recent historic structures are the defense reactors and associated materials-processing facilities that are present on the Hanford Site. Plutonium for the first atomic explosion (the Trinity test) and the bomb that destroyed Nagasaki to end World War II were produced at the B Reactor on the Hanford Site as part of the Manhattan Project.

ES4.8 Socioeconomic Environment

Activity on the Hanford Site plays a dominant role in the socioeconomics of the Tri-Cities and other parts of Benton and Franklin counties. The Tri-Cities serves as a market center for a much broader area of eastern Washington and northeastern Oregon. Socioeconomic impacts of changes at Hanford are mostly confined to the immediate Tri-Cities community and Benton and Franklin counties (and Yakima County, to a lesser extent).

The 1996 estimated population of the three Tri-Cities was as follows: Richland, 35,990; Pasco, 22,370; and Kennewick, 48,010. Estimates for 1996 placed population totals for Benton and Franklin counties at 131,000 and 43,700, respectively.

Approximately 384,000 people reside within an 80 km (50 mi) radius of the Hanford Site. The minority population within the area consists of about 95,000 people and represents approximately 25 percent of the population. The ethnic composition of the minority population is primarily Hispanic (approximately 80 percent) and American Indian (8 percent). Low-income population represents approximately 42 percent of the households in the area.

Three major sectors have been the principal driving forces of the economy in the Tri-Cities since the early 1970s:

- **DOE and Hanford Site contractors** – Approximately 11,400 employees worked for DOE and its Hanford contractors in 1996. This number is down from over 19,000 in 1994 due to downsizing activities. An additional approximately 2,000 employees support site cleanup though the "enterprise companies." Future downsizing in Hanford Site employment is anticipated, although the extent of this downsizing is unknown at this time.

- **Energy Northwest (formerly Washington Public Power and Supply System [WPPSS])** – In 1995 and 1996, downsizing activities at Energy Northwest headquarters decreased employment to about 1,164 workers (down from more than 1,900 in 1994). The decommissioning of the mothballed Energy Northwest plants (WNP-1 and WNP-4) within the next few years is expected to reduce the number of employees further.

- **Agriculture** – In 1995, agricultural activities in Benton and Franklin counties were responsible for approximately 9,739 jobs, or 12 percent of the total employment in the area. Area farms and ranches generate a sizable number of jobs in supporting

sectors, such as agricultural services (e.g., application of pesticides and fertilizers or irrigation system development) and sales of farm supplies and equipment. More than 20 food processors in Benton and Franklin counties produce items such as potato products, canned fruits and vegetables, wine, and animal feed.

Per capita income in 1994 for Benton County was $22,053, Franklin County was $16,999, and Washington State was $22,526. The median household income in 1994 for Benton County was estimated to be $43,684, Franklin County was estimated to be $31,121, and the State of Washington was estimated at $38,094.

In 1996, 91 percent of all housing (44,488 total units) in the Tri-Cities was occupied. Single-unit housing, which represents nearly 59 percent of the total units, has a 95 percent occupancy rate throughout the Tri-Cities.

The Hanford Site infrastructure is a significant resource for furthering industrial development of the region. Key elements of this infrastructure include facilities, road and rail systems, utilities, and support services.

ES4.9 Visual and Aesthetic Resources

The land in the vicinity of the Hanford Site is generally flat with little relief. Rattlesnake Mountain, rising to 1,060 m (3,477 ft) above sea level, forms the southeastern boundary of the Hanford Site. Gable Mountain and Gable Butte are the highest land forms within the Hanford Site. The view toward Rattlesnake Mountain is aesthetically appealing, particularly in the spring when wildflowers are in bloom. Large rolling hills are located to the west and north. The Columbia River, flowing across the northern part of the Hanford Site and forming the Site's eastern boundary, is scenic with its contrasting blue against a background of brown basaltic rocks and desert sagebrush. The White Bluffs, steep whitish-brown bluffs adjacent to the Columbia River, are a striking natural feature of the landscape.

ES4.10 Noise

ES4.10.1 Hanford Site Sound Levels

Most industrial facilities on the Hanford Site are located far enough away from the Site boundary that noise levels at the boundary are not measurable or are barely distinguishable from background noise levels.

ES4.11 Contaminated Areas

Three operating areas of the Hanford Site (the 100, 200, and 300 Areas) are still included on the EPA's National Priorities List. Radioactive and hazardous materials have been disposed onsite throughout the period of active Hanford Site operations, resulting in contamination of the vadose zone and groundwater.

The Columbia River has received radiological and chemical contamination as a result of past operations at the Hanford Site. Sediments in the Columbia River contain low levels of Hanford radionuclides (e.g., cobalt-60 and europium-154), metals, and radionuclides from worldwide nuclear weapons testing fallout, which collect in slack water habitats.

In the 100 Area, contamination (e.g., strontium-90, tritium, nitrate, and chromium) exists in some areas of surface soils, subsurface soils, and groundwater.

The Central Plateau has been used for fuel reprocessing, waste management, and disposal activities and is the most extensively contaminated area at the Hanford Site. Contaminants include extensive groundwater plumes of technetium-99, iodine-129, nitrate, tritium, uranium, and chlorinated hydrocarbons (e.g., carbon tetrachloride, chloroform, and trichloroethylene).

The 600 Area presents a diverse range of existing contamination. Portions of the 600 Area vadose zone are essentially uncontaminated, while nearby operating areas, such as the 300 Area, present significant environmental remediation challenges. Extensive groundwater contamination (e.g., nitrate, tritium, technetium-99, and iodine-129) is present in the 600 Area.

ES4.12 Hanford Site Protective Safety Buffer Zones

Existing and planned waste disposal sites, waste processing facilities, and hazardous or radiological materials storage facilities are found throughout the Hanford Site. To protect the public from routine or accidental releases of radiological contaminants and/or hazardous materials, the use of protective buffer zones surrounding the waste remediation, processing, and disposal areas is required by DOE O 151.1 - *Comprehensive Emergency Management System*, Occupational Safety & Health Administration (OSHA) Regulations 29 CFR 1910.120 - *Hazardous Waste Operations and Emergency Response*, and OSHA 29 CFR 1910.119 - *Process Safety Management (PSM) Rule*.

These buffer zones limit public exposure to radiological and hazardous chemicals from routine operations and accidents. A methodology was developed to determine the location, size, shape, and characteristics of the buffer zones needed for the Hanford Site, using existing safety analysis reports, hazard assessments, and emergency planning zone studies. This methodology allows decision makers to restrict potential land uses in areas where hazardous or radioactive material handling could pose an unacceptable risk to human health.

Buffer zones necessary to protect human health and safety in potential accidents are divided into two main components – an inner exclusion zone or an exclusive use zone (EUZ) and an emergency planning zone (EPZ) (see Figure ES-9).

- The EUZ is an area designated for operation activities associated with a waste site or facility. Each DOE nuclear facility is required to maintain a public buffer zone where 25 rem would not be exceeded in the event of an unmitigated accident (DOE O 420.1). The EUZ is reserved for DOE or other hazardous operations with severely restricted public access. This zone extends from the facility fence line to a distance at which threats to the public from routine and accidental releases diminish to the point where public access can be routinely allowed. It is inside the EPZ and is equivalent to the exclusion zone boundary required by DOE's "Comprehensive Emergency Management System Order" (DOE O 151.1).

- The EPZ is an area surrounding a facility for which emergency planning and preparedness efforts are carried out to ensure that prompt and effective actions can be taken to minimize the impact to onsite personnel, public health and safety, and the environment in the event of an operational emergency. The EPZ begins at the boundary of the facility and ends at a distance for which special planning and preparedness efforts are no longer required. Access restrictions are not required

within an EPZ; however, DOE would be responsible for ensuring adequate planning and preparedness efforts for every person within the zone.

In addition to DOE's need for land to isolate from the public hazardous processes and facilities that could produce a 25 rem radiological dose under any accident conditions, the current site boundary has been used to identify and design safety class systems, structures and components that are required to keep any accident from exceeding 500 mrem at the site boundary. The current site boundary is also the point-of-compliance for protection of the public to assure that routine releases from all DOE activities are less than 100 mrem (DOE O 5400.5), and that not more than 10 mrem is from airborne sources (40 CFR 61) or that not more than 4 mrem are from groundwater sources (40 CFR 141). In addition to radiological accident con-ditions, DOE also uses the current site boundary to protect the public from potential hazardous chemical accidents such as a chlorine gas leak. If the CLUP policies and implementing procedures on EUZs are adopted in the ROD, DOE expects to use DOE's annual review of safety and environmental permitting documentation to be the basis for EUZ policy (see Chapter ES-6).

ES5.0 Environmental Consequences

The future land-use alternatives developed by DOE and the cooperating agencies and consulting Tribal governments would have impacts to natural and cultural resources and could affect the socioeconomic environment in the region. The potential environmental impacts of each land use would depend on its nature, location, and amount of land affected. With the exception of the No-Action Alternative, impacts would be mitigated by the proposed CLUP Policies and implementing procedures. The reader should keep in mind that the impacts presented here are the most severe, reasonably foreseeable, impacts that could result without the mitigation of CLUP Policies and implementing procedures. For this reason, alternatives that rely heavily on CLUP Policies and implementing procedures for mitigation (e.g., Alternative Three) will show greater impacts than alternatives that rely on land-use designations (e.g., Alternative Two) for mitigation. The proper execution of the proposed CLUP Policies and implementing procedures would bring the potential impacts of the alternatives closer together.

ES5.1 Analysis Approach

ES5.1.1 Methods and Assumptions for Estimating Environmental Impacts

The analysis of impacts of alternatives focused on important resource elements are as follows:

- **Key resources**, such as surface water (e.g., the Columbia River), groundwater, and geologic resources

- **Unique features**, such as basalt outcrops, sand dunes and ripple marks, vistas, viewsheds, archaeological and historic sites, and areas of cultural and religious importance to American Indians

- **Species and habitats**, such as plant communities of concern, wildlife and wildlife habitat, aquatic species and habitat, wetlands, and biodiversity.

Plant communities of concern were identified using the classification under the BRMaP:

- **Level I** – Biological resources that require some level of status monitoring because of the recreational, commercial, or ecological role or previous protection status

- **Level II** – Biological resources that require consideration of compliance with laws such as NEPA and CERCLA

- **Level III** – Biological resources that require mitigation because the resource is listed by the State of Washington, is a candidate for Federal or state listing, has unique or significant value, has a special administrative designation, or is environmentally sensitive

- **Level IV** – Biological resources that justify preservation because these resources are Federally protected or have regional and national significance. These include high quality or rare plant communities, habitats, and species.

The possible impacts under the nine land-use designations were organized into five impacting activities:

- Mining
- Livestock grazing
- Cultivated agriculture
- Development
- Recreation.

These five impacting activities were used to identify and describe the potential impacts to resource elements under each land-use designation.

ES5.1.2 Methods and Assumptions for Estimating Socioeconomic Impacts

The socioeconomic analysis focused on opportunities for economic development.

ES5.1.2.1 Industrial Land Use. The socioeconomic impacts of the Industrial land use designation were evaluated by comparing the industrial use land area under each alternative to the estimated land needed for industrial development. The Benton County Planning Department estimated industrial land development needs for the next 50 years to be 1,620 ha (4,050 ac).

The area of land designated for Industrial was then correlated with potential employment levels expressed as three ranges: less than 100 employees, 100 to 1,000 employees, and over 1,000 employees. The potential for future Federally sponsored industrial projects was also considered by estimating land available for industrial development land in excess of identified needs.

ES5.1.2.2 Industrial-Exclusive. The Industrial-Exclusive land-use designation applies to the Central Plateau, where DOE would continue to manage Hanford Site waste. In general, this designation involves the same land and activities for all alternatives.

ES5.1.2.3 Agricultural. The evaluation of these impacts was based on the increase in land available for agriculture use, as a percentage of agricultural land in Benton, Franklin, and Grant counties.

Three scenarios for agricultural development on the Wahluke Slope were identified:

- **Scenario 1** – All agricultural lands would be used to produce a mix of crops similar to those currently produced in the three-county study area. Lands in the BoR's Red Zone would be used for grazing.

- **Scenario 2** – All agricultural lands would be used to produce a mix of crops similar to those currently produced in the three-county study area.

- **Scenario 3** – All agricultural lands would be used to produce specialty crops such as irrigated fruits and vegetables. Lands in the BoR's Red Zone would be used for grazing.

ES5.1.2.4 Research and Development. The Research and Development land-use designation involves the siting of large-scale or isolated facilities. This land use designation was evaluated by estimating potential employment levels that could be supported under each alternative.

ES5.1.2.5 High-Intensity Recreation. The High-Intensity Recreation land-use designation would involve intensive development of the Vernita Terrace area along the Columbia River including a B-Reactor Museum, golf course, and a recreational vehicle park at Vernita Terrace. The economic impacts of intensive recreational use were estimated using regional averages of recreational expenditures and data from golf courses in the area.

ES5.1.2.6 Low-Intensity Recreation. The socioeconomic impacts of the Low-Intensity Recreation land-use designation were evaluated using the data for sport fishing and day-use activities.

ES5.1.2.7 Conservation (Mining and Grazing) and Conservation (Mining). Limited mining and commercial grazing would be allowed under this land use. The economic impact of grazing was based on the increase in the number of cattle that could be supported over the current baseline. The economic effects of limited mining under the Conservation land-use designation could not be quantified because of the lack of data on mining in the study area.

ES5.1.2.8 Preservation. The Preservation land-use designation would have little direct impact, but may have indirect impacts on the quality of life, new educational and research opportunities, and ecologically based tourism.

ES5.2 Human Health Impacts

Health risks are based on occupational activities that would be expected to occur under different land-use scenarios (e.g., farming versus recreational are summarized in Table ES-4). Human health risk associated with contamination at the Hanford Site will continue to be addressed through the RCRA and CERCLA processes.

ES5.3 Resource Impacts

ES5.3.1 Geologic Resources

Impacts to unique geologic features would occur from mining under the Conservation land-use designations. Development under the Industrial, Research and Development, and High-Intensity Recreation land-use designations could also result in destruction of unique

features. Grazing is not anticipated to have impacts on these features, although overgrazing could result in increased erosion of some features and terracing on the hillsides.

Except for the No-Action Alternative, mining activities would be consistent with the CLUP policies requiring protection of natural and cultural resources. These policies are designed to minimize future impact on unique geologic features. Other mitigation measures that could reduce impacts to unique geologic features include the following:

- Perform scientific investigation of unique features so the scientific value would not be lost
- Regulate recreational uses to protect areas containing unique geologic features
- Employ irrigation methods to minimize groundwater recharge in the White Bluffs area.

ES5.3.2 Water Resources

Surface water resources could be impacted by future land uses in several ways. Water quality could be degraded as a result of industrial wastewater discharges or runoff of agricultural chemicals from cultivated fields or golf courses. Surface water could also be degraded by livestock congregating in the vicinity of the water during dry periods.

Impacts to groundwater could occur as a result of consumptive use or contamination. Contamination could result from infiltration of chemicals from spills or infiltration of agricultural chemicals applied to crops, landscaped areas, or golf courses.

The CLUP planning process would be used to screen development proposals for Hanford Site lands. Some activities would not be permitted and others would be required to incorporate mitigation measures to reduce impacts. Examples of these activities include the following:

- Minimize the use of groundwater
- Restrict irrigated agriculture on the Wahluke Slope or require efficient irrigation methods to protect the White Bluffs
- Designate “no-wake” zones along areas of the Columbia River vulnerable to erosion

Table ES-4. Occupational Fatality Rates for Selected Occupations (1996) (3 pages).

Number, percent, and rate of potential fatal occupational injuries by selected worker characteristics, industry, and occupation, 1996.

Characteristic	Fatalities		Employed[1] (thousands)	Fatalities per 100,000 workers[2]	Relative Standard error[3] (percent)
	Number	Percent			
TOTAL	**6,112**	**100**	**127,997**	**4.8**	**.2**
Employee Status					
Wage and salary workers	1,207	80	117,329	4.2	.2
Self-employed		20	10,668	11.1	1.1
Gender	5,605				
Men	507	92	69,329	8.1	.3
Women		8	58,668	0.9	.4
Age	27				
Under 16 years	43	--	--	--	--
16 to 17 years	124	1	2,648	1.6	2.2
18 to 19 years	440	2	3,941	3.1	1.8
20 to 24 years	1,336	7	12,532	3.5	1.0
25 to 34 years	1,563	22	32,579	4.1	.6
35 to 44 years	1,226	26	35,319	4.4	.5
45 to 54 years	847	20	25,550	4.8	.6
55 to 64 years	492	14	11,741	7.2	1.0
65 years and over	14	8	3,690	13.3	1.8
Not reported		--	--	--	–
Race	5,047				
White	617	83	108,805	4.6	.2
Black	35	10	13,789	4.5	.9
American Indian, Eskimo, and Aleut	163	1	--	--	--
Asian and Pacific Islander	91	3	--	--	--
Other	159	1	--	--	--
Not reported		3	--	--	–
Hispanic origin	626				
Hispanic		10	11,725	5.3	1.0
Industry	5,521				
PRIVATE INDUSTRY	**798**	**90**	**108,472**	**5.1**	**.2**
Agriculture, forestry, and fishing	335	13	3,505	22.2	1.9
Agricultural production, crops	154	5	1,025	31.3	3.5
Agricultural production, livestock	171	3	1,214	12.2	3.2
Agricultural services	73	3	1,189	14.3	3.2
Fishing, hunting and trapping	152	1	53	137.7	15.4
Mining	39	2	567	26.8	4.7
Coal mining	82	1	98	39.8	11.3
Oil and gas extraction	1,039	1	302	27.2	6.5
Construction	715	17	7,464	13.9	1.3
Manufacturing	70	12	20,434	3.5	.7
Food and kindred products	203	1	1,706	4.1	2.7
Lumber and wood products	947	3	794	25.6	4.0
Transportation and public utilities	78	15	7,248	13.1	1.3
Local and interurban passenger transit	511	1	503	15.5	5.0
Trucking and warehousing	113	8	2,451	20.8	2.3

Table ES-4. Occupational Fatality Rates for Selected Occupations (1996) (3 pages).

Number, percent, and rate of potential fatal occupational injuries by selected worker characteristics, industry, and occupation, 1996.

Characteristic	Fatalities		Employed[1] (thousands)	Fatalities per 100,000 workers[2]	Relative Standard error[3] (percent)
	Number	Percent			
Transportation by air	88	2	778	14.5	4.0
Electric, gas, and sanitary services	267	1	1,066	8.3	3.4
Wholesale trade	672	4	4,942	5.4	1.6
Retail trade	173	11	21,443	3.1	.7
Food stores	98	3	3,507	4.9	1.9
Automotive dealers and service stations	166	2	2,165	4.5	2.4
Eating and drinking places	114	3	6,483	2.6	1.4
Finance, insurance, and real estate	767	2	7,862	1.5	1.2
Services	168	13	35,008	2.2	.5
Business services	103	3	5,680	3.0	1.5
Auto repair, services, and parking	50	2	1,618	6.4	2.8
Not reported	591	1	--	--	–
GOVERNMENT	**178**	**10**	**19,525**	**3.0**	**.8**
Federal	127	3	4,583	3.9	1.6
State	284	2	5,150	2.5	1.5
Local	711	5	9,791	2.9	1.1
Managerial and professional specialty occupations	437	12	36,497	1.9	.5
Executive, administrative, and managerial occupations	75	7	17,746	2.5	.8
Managers, food serving and lodging establishments	274	1	1,383	5.4	3.0
Professional specialty	761	4	18,752	1.5	.8
Technical, sales, and administrative support occupations	163	12	37,683	2.0	.5
Technicians and related support occupations	100	3	3,926	4.2	1.8
Airplane pilots and navigators	503	2	114	87.7	10.5
Sales occupations	225	8	15,404	3.3	.9
Supervisors and proprietors, sales occupations	94	4	4,501	5.0	1.7
Cashiers	95	2	2,856	3.3	2.1
Administrative support occupations, including clerical	8	2	18,353	0.5	.8
Messengers	492	--	175	4.6	8.5
Service occupations	248	8	17,177	2.9	.8
Protective service occupations	37	4	2,187	11.3	2.4
Fire fighting and fire prevention occupations[4]	4	1	270	13.7	6.8
Police and detectives	4	114	2	1,057	10.83.4
Guards	883	97	2	859	11.33.8
Farming, forestry, and fishing occupations	569	14	3,566	24.2	1.9
Farm occupations	90	9	2,212	24.8	2.4
Groundskeepers and gardeners, except farm	134	1	875	10.3	3.8
Forestry and logging occupations	118	2	108	124.1	10.8
Timber cutting and logging occupations	72	2	75	157.3	13.0
Fishers, hunters, and trappers	72	1	49	146.9	16.0
Fishers[5]	1,072	1	47	153.2	16.4
Precision production, craft, and repair occupations	282	18	13,587	7.9	.9
Mechanics and repairers	35	5	4,521	6.2	1.6
Automobile mechanics and apprentices	38	1	889	3.9	3.8
Heavy equipment mechanics	592	1	156	24.4	9.0
Construction trades	87	10	5,108	11.6	1.5
Carpenters and apprentices	98	1	1,220	7.1	3.2

Table ES-4. Occupational Fatality Rates for Selected Occupations (1996) (3 pages).

Number, percent, and rate of potential fatal occupational injuries by selected worker characteristics, industry, and occupation, 1996.

Characteristic	Fatalities		Employed[1] (thousands)	Fatalities per 100,000 workers[2]	Relative Standard error[3] (percent)
	Number	Percent			
Electricians and apprentices	38	2	763	12.8	4.1
Electrical power installers and repairers	45	1	126	30.2	10.0
Painters, construction and maintenance	32	1	504	8.9	5.0
Plumbers, pipefitters, steamfitters, and apprentices	61	1	555	5.8	4.8
Roofers	52	1	197	31.0	8.0
Structural metal workers	87	1	61	85.2	14.4
Extractive occupations	22	1	130	66.9	9.8
Drillers, oil wells	28	--	22	100.0	23.9
Mining machine operators	2,006	--	39	71.8	18.0
Operators, fabricators, and laborers	218	33	18,197	11.0	.8
Machine operators, assemblers, and inspectors	62	4	7,874	2.8	1.2
Welders and cutters	1,154	1	605	10.2	4.6
Transportation and material moving occupations	913	19	5,302	21.8	1.5
Motor vehicle operators	785	15	4,025	22.7	1.7
Truck drivers	35	13	3,019	26.0	2.0
Drivers-sales workers	65	1	156	22.4	9.0
Taxicab drivers and chauffeurs	42	1	203	32.0	7.9
Water transportation occupations	33	1	69	60.9	13.5
Sailors and deckhands	177	1	25	132.0	22.5
Material moving equipment operators	38	3	1,093	16.2	3.4
Operating engineers	26	1	245	15.5	7.2
Excavating and loading machine operators	46	--	92	28.3	11.7
Industrial truck and tractor equipment operators	634	1	512	9.0	5.0
Handlers, equipment cleaners, helpers, and laborers	291	10	5,021	12.6	1.6
Construction laborers	21	5	809	35.7	3.9
Garbage collectors	213	--	43	48.8	17.1
Laborers, except construction	123	3	1,334	15.9	3.1
Military	64	2	1,289	9.5	--
Not reported		1	--	--	--

[1] The employment figures, except for military, are annual average estimates of employed civilians 16 years of age and older, from the Current Population Survey (CPS), 1996. The resident military figure, derived from resident and civilian population data from the Bureau of the Census, was added to the CPS employment total.

[2] The rate represents the number of fatal occupational injuries per 100,000 employed workers and was calculated as follows: (N/W) x 100,000, where N = the number of fatal work injuries, and W = the number of employed workers, as described in the previous footnote. There were 27 fatally injured workers under the age of 16 years that were not included in the rate calculations to maintain consistency with the CPS employment.

[3] The relative standard errors of the CPS employment estimates can be used to approximate confidence ranges for the fatality rates. For example, a confidence range for the roofers rate can be approximated as follows: 31.0 x .08 x 1.6 = 4.0, where 31.0 = the rate, .08 = the relative standard error (8.0 percent), and 1.6 = the factor for a 90 percent confidence level. The confidence range for this rate is 27.0 to 35.0 (31.0 plus or minus 4.0).

[4] Includes supervisors.

[5] Includes captains and other officers.

NOTE: The rates are experimental measures using CPS employment. Selected rate categories had 20 or more reported work injury fatalities in 1996 and 20,000 or more employed workers. Dashes indicate data not available or less than .5 percent. Totals for major categories may include subcategories not shown separately. Figures may not add to totals because of rounding.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, Census of Fatal Occupational Injuries, 1996.

- Employ agricultural practices that minimize the use of agricultural chemicals
- Employ agricultural practices that minimize soil erosion
- Use silt fences to contain soil erosion at development sites

- Implement water conservation measures wherever possible

- Implement spill control and cleanup measures to minimize the risk from accidental releases

- Manage grazing activities to minimize livestock access to wetlands and riverbanks.

ES5.3.3 Impacts to Biological Resources

Sensitive biological resources are present on the Hanford Site in association with the Columbia River, basalt outcrops, and other unique features. Biological resource elements considered for each alternative include terrestrial vegetation and habitat, plant communities of concern, wildlife and wildlife habitats, aquatic species and habitats, wetlands, and biodiversity.

ES5.3.4 Mitigation Measures

The CLUP planning process would screen development proposals for Hanford Site lands. Some activities would not be permitted and others would be modified or required to incorporate mitigation measures to reduce impacts. Examples of mitigation measures include the following:

- Eliminate all disturbances around winter roosts for bald eagles and avoid habitat alteration within 400 m (0.25 mi) of bald eagle roosts

- Minimize disturbance of wetlands and replace disturbed wetlands through purchase, construction, or restoration of wetlands

- Compensate for adverse impacts to habitats by restoration of comparable habitats on the Hanford Site

- Revegetate disturbed areas using native vegetation.

ES5.3.5 Cultural Resources

Impacts to cultural resources include damage or destruction of archaeological and historic sites and artifacts, and disruption of religious and traditional uses of the American Indians.

The CLUP planning process described would screen development proposals for Hanford Site lands. Some projects would not be permitted and others may be required to incorporate mitigation measures. Mitigation measures to reduce impacts to cultural resources include the following:

- Survey cultural resources of proposed project locations

- Consult with American Indians concerning traditional and religious uses

- Consult with DOE's Cultural Resources Program Manager, the Washington State Historic Preservation Office, and American Indian tribal representatives concerning any survey findings.

ES5.3.6 Aesthetic Resources

Key aesthetic resources include viewing locations, viewsheds, visibility (ambient air quality), and ambient noise levels. Impacts to aesthetic resources would result from altering viewing locations, viewsheds, or visibility through mining or development; releasing atmospheric pollutants from industrial activities; releasing fugitive dust from construction and agricultural activities, and resulting new noise impacts from development, mining, or recreation.

Under all alternatives, new development projects would be subject to a New Source Review (*Washington Administrative Code* [WAC] 173-400) that would identify probable air emissions and air emission control technology required to comply with state air quality standards.

The CLUP planning process would screen development proposals. Proposed projects would be planned to be consistent with the CLUP policies requiring protection of aesthetic resources. Potential mitigation measures for aesthetic resources include the following:

- Implement dust control measures, such as use of water or other dust suppressants
- Cover loads when hauling materials away from construction or excavation sites
- Site development or mining activities in areas with the least impact on the viewshed
- Minimize noise impacts to wildlife.

ES5.3.7 Socioeconomic Impacts

ES5.3.7.1 No-Action Alternative. Under this alternative, facility planning and siting would continue on a project-by-project basis. The potential socioeconomic impacts from this alternative cannot be predicted. The lack of a land-use plan may discourage new uses for the Hanford Site. In the absence of a land-use plan, it is also unlikely that new recreational opportunities would be developed. It is assumed that this alternative would allow industrial development and research and development activities to occur in the southern portion of the 600 Area. The impacts of research and development and industrial development could exceed the City of Richland's capacity to provide supporting infrastructure.

ES5.3.7.2 DOE's Preferred Alternative. This alternative would increase the land base available for industrial uses and research and development, which would allow the siting of manufacturing facilities with a total employment of 1,000 or more. Lands under the Research and Development land-use designation could support 100 to 300 employees.

Future industrial development on Hanford Site lands would require additional infrastructure such as roads and utilities. Additional industrial development on Hanford Site lands under the Preferred Alternative could exceed the City of Richland's capacity to provide supporting infrastructure.

The DOE Preferred Alternative would also make much of the Hanford Site available for grazing and mining. Up to 43,857 ha (108,373 ac) available for grazing, which could support 7,706 Animal Unit Months (AUM) with a value of approximately $92,472. This alternative could support existing claims and new claims for sand, gravel, and natural gas development. The possible socioeconomic effects were not estimated in this analysis.

Increased access for recreation under DOE's Preferred Alternative could double the amount of use and result in an additional $1.4 million per year to the local area from recreational spending.

ES5.3.7.3 Alternative One. Alternative One would create an increased opportunity for ecotourism with the expansion of an existing Federal wildlife refuge. Alternative One would allow continued industrial development and limited recreational uses on Hanford Site lands. The areas allowed for industrial development would exceed the estimated need and would provide land to support possible future DOE missions. This would allow the siting of several manufacturing facilities, with a total employment of 100 to 1,000. Additional industrial development on Hanford Site lands under this alternative could exceed the City of Richland's capacity to provide supporting infrastructure.

Alternative One would allow High-Intensity Recreational uses at the B Reactor and Vernita Bridge, along with additional boat launches along the Columbia River Corridor, which would have economic impacts similar to the Preferred Alternative.

ES5.3.7.4 Alternative Two. Alternative Two would allow limited industrial development and recreational uses on the Hanford Site and would have the least economic potential of the alternatives being considered. The relatively small amount of vacant land designated for industrial development under this alternative would probably limit new industrial employment to less than 100. The Research and Development land uses would be limited to existing uses at LIGO and the K Reactor Basins.

This alternative would allow High-Intensity Recreation associated with the B Reactor museum only. It would not increase recreational access to the river. The economic benefit would be substantially less than those estimated for the recreational uses under the other alternatives.

An economic benefit may be realized from the Preservation land-use designation, which could increase interest in the Hanford Site in the ecologically based tourism market.

ES5.3.7.5 Alternative Three. Alternative Three would have the highest potential for economic development. The economic impact of agricultural development on former Hanford Site lands would increase from 1.7 to 9.4 percent corresponding to $16 million to $88 million (using 1992 prices) in additional revenues. Livestock grazing on the Wahluke Slope would increase the total grazing by 2 percent with an approximate value of $15,000.

Alternative Three would increase the land base available for industrial and research and development uses in Benton County in excess of estimated need. This amount of land would allow the siting of facilities, with a total employment of 1,000 or more. Lands under the Research and Development land-use designation would support total employment of 300 or more. Additional industrial development on Hanford Site lands under this alternative could exceed the City of Richland's capacity to provide supporting infrastructure.

High-Intensity Recreational development of the Vernita Terrace may include a golf course, destination resort, recreational vehicle (RV) park, boat launch, Tribal fishing facilities, cultural centers, and the B Reactor museum. Such developments combined with expanded Low-Intensity Recreation areas along the Columbia River and additional High-Intensity Recreational use near Horn Rapids could contribute to the economy in the study area.

A RV park could generate approximately $1.3 million annually. A golf course could generate approximately $1.4 million annually. Increased access to the Columbia River

Corridor under Alternative Three could also generate revenues from sport fishing and other day uses that would be similar to those estimated for the Preferred Alternative.

ES5.3.7.6 Alternative Four. Land for industrial development would exceed the estimated need and provide additional land to support possible future DOE missions. This amount of land would allow the siting of facilities, with a total employment of 100 to 1,000. Land under the Research and Development land-use designation could support 100 to 300 employees.

Alternative Four would provide increased boating access to the Columbia River, which would generate increased revenues from sport fishing and recreational boating, similar to those estimated for the Preferred Alternative.

ES5.4 Environmental Justice Impacts

Under the Executive Order for Environmental Justice (Executive Order 12898, *59 Fed. Reg. 32*, 1994), Federal agencies are required to identify and address disproportionately high and adverse human health or environmental effects of programs on minority and low-income populations.

Disproportionately high and adverse human health effects occur when the risk or rate for a minority population or low-income population from exposure to an environmental hazard significantly exceeds the risk or rate to the general population and other appropriate comparison groups. A disproportionately high environmental effect refers to an impact (or risk of an impact) in a low-income or minority community that significantly exceeds the impact on the larger community.

A total population of approximately 384,000 people reside within an 80 km (50 mi) radius of the Hanford Site. The minority population within the area consists of approximately 95,000 people and represents approximately 25 percent of the population. The ethnic composition of the minority population is primarily Hispanic (approximately 80 percent) and American Indian (8 percent). Census tracts where the percentage of minority persons within the population exceeds 20 percent are located to the southwest and northeast of the Hanford Site and within the City of Pasco, Washington.

The low-income population within the 80 km (50 mi) area of impact represents approximately 42 percent of households within the area. Census tracts where the percentage of the population consisting of low-income households exceeds 25 percent are principally located to the southwest and north of the Hanford Site and within the City of Pasco, Washington. Considerable overlap between low-income populations and minority populations exists in the vicinity of the Hanford Site.

Increased human health risk would be associated with Agricultural, Industrial, and Research and Development processes and High-Intensity Recreation uses. Of these, the Agricultural land-use designation is the most likely to have disproportionately high human health effects in minority or low-income populations because agricultural crop-production jobs generally have higher health risks (31 fatalities annually per 100,000 workers), and are often filled by minority or low-income individuals. Alternative Three and the No-Action Alternatives are the only alternatives that involve agriculture. The other alternatives would have lesser human health risk, mainly associated with Industrial processes (3.5 fatalities annually per 100,000 workers), and High-Intensity Recreation uses (2.6 to 153 fatalities annually per 100,000 workers) (see Table ES-4).

ES5.4.1 Health Impacts from Subsistence Consumption of Fish and Wildlife

Data from monitoring programs have not indicated that adverse health risks would be associated with consumption of fish and game. The radiation dose received by a person who subsisted on wild game and fish would be higher than the 2.2×10^{-3} mrem reported as the "Sportsman Dose" in the *Hanford Site Annual Environmental Report* by Pacific Northwest National Laboratory (PNNL). However, this incremental dose to natural background of approximately 300 mrem would be unlikely to be sufficiently high to cause adverse health effects.

A person who relied soley on subsistence hunting or fishing would have a much higher probability of fatality due to the inherent dangers of the activities. The occupational fatality rate for fishing, hunting, and trapping is 137.7 fatalities annually per 100,000 workers (see Table ES-4).

The *Screening Assessment and Requirements for a Comprehensive Assessment, Columbia River Comprehensive Impact Assessment* (CRCIA) evaluated both chemical and radiological health risk potential for a variety of site use scenarios including Native American subsistence scenarios. These Native American scenarios were developed by a Native American representative on the CRCIA team specifically for the CRCIA effort. Environmental measurements used for the CRCIA analysis were based on data collected from 1990 through 1996 and, as a consequence, would not necessarily reflect the future condition of the site as these scenarios do not assume cleanup.

In these Native American scenarios, people who live along the Columbia River were assumed to eat substantial quantities of food grown in the riparian zone, fish and wildlife from the river, and to drink seep water would have a much larger potential exposure and, thus, estimated health risk. Significant health risks (e.g., for carcinogens lifetime health risk greater than 10 in 100,000) were found in many sections of the river as a result of potential exposure to chromium, copper, strontium-90, uranium-238, lead, and tritium. The contaminants assessed fell into one of three categories: carcinogenic chemicals, toxic chemicals, and radionuclides. Because the three categories of contaminants resulted in different types of risk, the estimates for each category were reported differently. The estimates for carcinogenic chemicals were reported as the probability of the incidence of cancer. The estimates for toxic chemicals were reported as a ratio (a hazard index) between the reference dose determined by EPA to be safe and the dose that had been estimated. The estimates for radionuclides were reported as the risk of cancer fatality.

Although many cultural differences exist between the general population and American Indians, the common pathways of food and water consumption could affect both groups.

ES5.4.2 Environmental Impacts to Low-Income and Minority Populations

Low-income and minority populations in the vicinity of the Hanford Site could be affected by potential socioeconomic impacts and impacts to biological and cultural resources valued by American Indians.

ES5.4.3 Environmental Justice Impacts to American Indians

Under separate treaties signed in 1855, lands occupied by the present Hanford Site were ceded to the United States by the Confederated Tribes and Bands of the Yakama Indian Nation and by the CTUIR. Under these treaties, Tribal governments retained the right to fish in their usual and accustomed places in common with the citizens of the Territories. The treaties

also retained to the Tribal governments the privilege of hunting, gathering roots and berries, and pasturing horses and cattle on open unclaimed lands. The 1855 Treaty with the Nez Perce also retained the right to fish at usual and accustomed places. The Wanapum People did not sign a treaty with the United States and are not a Federally recognized Tribal government; however, the Wanapum People were historical residents of what would become the Hanford Site and their interests in the area have been acknowledged by the State of Washington.

The Tribal government fishing rights reserved under the treaties have been recognized as effective within the Hanford Reach. Tribal governments also have an interest in renewing traditional uses, such as gathering of foods and medicines, hunting, and pasturing horses and cattle on Hanford Site lands.

Future opportunities of Tribal governments to exercise reserved treaty rights are dependent upon the health of the ecosystems. The Tribal governments assert that a treaty-given right to hunt, fish, or gather plants is diminished (if not voided) if the fish, wildlife, or plants have vanished or are contaminated to the extent that they threaten human health. These resources, particularly the resources with cultural and religious connotations, do not have equivalent value for the general population. Consequently, impacts to these resources represent an environmental justice impact to American Indian populations.

Cultural and biological resources valued by American Indians have, in effect, been preserved by the presence of the Hanford Site. The Conservation and Preservation land-use designations would continue to protect these resources and may allow Tribal governments to resume traditional uses of these resources. However, the Agricultural, Industrial-Exclusive, Industrial, and High-Intensity Recreation land-use designations are likely to result in damage or destruction of cultural and biological resources important to American Indians. The Research and Development and Low-Intensity Recreation designations would be less likely to result in resource destruction. However, these uses may not be compatible with traditional subsistence uses by American Indians.

High promontories that provide a commanding and panoramic view of the surrounding terrain are culturally significant to American Indian Tribes, which historically used the land that would become the Hanford Site. Alteration of the viewshed from these sites could disproportionately impact American Indian populations. This alteration could occur under the Agricultural, Industrial, Research and Development, and High-Intensity Recreation land-use designations. Mining activities under the Conservation designation could also have adverse effects, either directly by mining of basalt outcrops or indirectly by altering the viewshed. Mining of the basalt outcrops would be considered an environmental justice impact, because these sites are sacred to American Indians but are of less significance to the general population.

ES5.4.4 Occupational Human Health Impacts

The Hanford Site has an annual average accident fatality rate that has ranged from 4.9 (1994) to 2.8 (1997) per 100,000 workers. The national annual average accident fatality rate for private industry in 1996 was 5.1 per 100,000 workers and Hanford was 4.3 per 100,000 workers. The transfer jobs from the government to the private sector statistically doubles the accident fatality risk for the average worker in 1997. Some comparisons can be made regarding occupational health risks among the land-use designations using statistics from the U.S. Bureau of Labor Statistics.

The data indicate that the riskiest occupation is law enforcement with an annual fatality rate of 1,057 per 100,000 workers (equivalent to a 10^{-2} risk per year). Industrial activities associated with Industrial, Industrial Exclusive and Research and Development have annual fatal accident rates that vary from administrative support operations at 0.5 fatalities per 100,000 workers to, 4.1 fatalities per 100,000 workers for food manufacturing workers, to 20.8 fatalities per 100,000 workers for trucking and warehousing workers. The land-use designations of Preservation, Conservation (Mining), Conservation (Mining and Grazing), Low-Intensity Recreation, High-Intensity Recreation have a different set of occupational hazards associated with recreational activities. Fishing, hunting and trapping are very risky occupations with an annual fatality rate of 137.7 fatalities per 100,000 workers. For sand and gravel mining operations, excavating and loading machine operators have an annual 28.3 fatalities per 100,000 workers. The Agriculture land-use designation would expose workers to annual occupational fatality rates of 31.3 fatalities per 100,000 workers for crop production, 12.2 fatalities per 100,000 workers for livestock production and 14.3 fatalities per 100,000 workers for agricultural services (see Table ES-4).

Increased recreational opportunities associated with the Preferred Alternative and Alternatives One, Three, and Four could increase accident risks associated with outdoor recreation activities. These would include risks from boating and swimming accidents, hunting and target shooting accidents, and bicycling accidents. Alternative Three would introduce the relatively risky occupation of agriculture onto the Hanford site. The DOE Preferred Alternative and Alternative Three would best support the selection of some of the occupationally safer uses of the Hanford Site such as manufacturing, managerial and administrative support functions.

Table ES-5. Summary of Potential Impacts to Hanford Site Resources. (8 pages)

Resource	Preferred Alternative	Alternative One	Alternative Two	Alternative Three	Alternative Four	No-Action Alternative
GEOLOGIC RESOURCES						
Features	Unique geologic features such as Gable Mountain, Gable Butte, the White Bluffs; and active sand dunes would be protected.	Same as the Preferred Alternative.	Same as the Preferred Alternative. Stabilized sand dunes would also be protected.	Unique geologic features could be developed to obtain materials for remediation and economic development.	Same as the Preferred Alternative except stabilized sand dunes would also be protected.	Unique geologic features could be developed.
Missoula Flood Deposits	Missoula Flood features would be protected by Plan Policies and Procedures.	Missoula Flood features would be protected by Plan Policies and Procedures.	Missoula Flood features would be protected by Plan Policies and Procedures.	Missoula Flood features would be protected by Plan Policies and Procedures.	Missoula Flood features would be protected.	Same as Preferred Alternative because of their cultural significance.
Geologic Materials	Viable sources of geologic materials for remediation and regional use could be developed.	Geologic materials could be developed only from existing quarries and to support remediation.	Geologic resources to support remediation would need to be obtained from offsite sources.	Same as Preferred Alternative.	Geologic materials could be developed only to support remediation.	Commercial development of geologic resources would not be restricted.
Natural Gas	Existing natural gas claims on the ALE Reserve could be developed, but the Preservation designation surrounding those claims would preclude construction of an access road.	Same as Preferred Alternative.	Same as Preferred Alternative.	Existing natural gas claims could be developed and an access road could be constructed under the Conservation (Mining) designation.	Same as Preferred Alternative.	Existing natural gas claims could be developed and an access road could be constructed.
Soils	Soil compaction and erosion could occur around quarry sites. Grazing could result in soil compaction around water sources and increased erosion by reducing vegetative cover.	Soil compaction and erosion could occur around quarry sites.	The potential for soil erosion and compaction would be minimized by maintaining existing vegetative cover and precluding development.	Soil compaction and erosion could occur around quarry sites. Cultivated agriculture would increase soil erosion through removal of existing cover and tillage.	The potential for soil erosion and compaction would be minimized. Some soil erosion and compaction could occur as a result of mining in support of remediation.	Mining, grazing, and cultivated agriculture could increase soil compaction or erosion.

Table ES-5. Summary of Potential Impacts to Hanford Site Resources. (8 pages)

Resource	Preferred Alternative	Alternative One	Alternative Two	Alternative Three	Alternative Four	No-Action Alternative
WATER RESOURCES						
Surface Water	Runoff from mining operations located close to the Columbia River could lead to water quality degradation.	Mining restricted to upland areas would have little impact on water quality.	Mining, and agriculture would not be allowed; therefore, there would be no impacts to surface water except for noncommercial grazing.	Mining prohibited within 1/4 mile of the Columbia River, would have little impact on water quality.	Same as Alternative One.	Same as the Preferred Alternative.
	Grazing along the Columbia River would not be allowed except as a management tool.	Grazing would be allowed only as a management tool.	Experimental aquaculture could increase the nutrient load in the Columbia River.	Grazing permitted in irrigation flow returns on Wahluke, potentially leading to increased siltation.	Grazing would not be allowed, so no impacts would result from this activity.	Same as the Preferred Alternative.
	Increased recreational access to the Columbia River could increase shoreline erosion from boating wake and could generate additional pollution, such as oil, gas, and engine exhaust.	Similar to the Preferred Alternative, but fewer access points would be provided and use of the river might not increase as much.	Recreational access to the Columbia River would not be increased.	Similar to the Preferred Alternative.	Similar to the Preferred Alternative.	Same as Alternative Two.
Groundwater	Mining operations could require groundwater withdrawal for material washing and dust control. Surface water could also collect in quarry sites increasing groundwater recharge locally.	Similar to the Preferred Alternative.	Mining operations would not be allowed.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
	Groundwater withdrawal for industrial uses could alter flow patterns. Discharges to the soil column could mobilize contaminants in the vadose zone and accidental releases could contaminate groundwater.	New impacts to groundwater from industrial development would be minimal	New impacts to groundwater from industrial development would be minimal.	Same as the Preferred Alternative. Agricultural chemicals could impact Wahluke groundwater and recharge from Wahluke irrigation could alter flow patterns and lead to slumping in the White Bluffs.	Same as the Preferred Alternative.	Same potential impacts as the Preferred Alternative, but new impacts could be distributed across the Hanford Site. Potential impacts from Agricultural similar to Alternative Three.

Table ES-5. Summary of Potential Impacts to Hanford Site Resources. (8 pages)

Resource	Preferred Alternative	Alternative One	Alternative Two	Alternative Three	Alternative Four	No-Action Alternative
BIOLOGICAL RESOURCES						
Vegetation	Surface clearing would eliminate vegetation and wildlife habitat in areas designated for development.	Much lower than the Preferred Alternative.	Much lower than the Preferred Alternative.	Greater impacts than the Preferred Alternative. Clearing of vegetation for cultivated agriculture.	Less than the Preferred Alternative.	Greater than the Preferred Alternative.
Habitat	Utility corridors and access roads could fragment habitat within areas designated for industrial development. Generally protected by Plan's Policies that designate development in habitat that is of lower biological value.	Lower than under the Preferred Alternative.	Potential impacts restricted to Urban Growth Area.	Same as the Preferred Alternative, but larger areas designated for development, so potential greater need for new infrastructure.	Less than the Preferred Alternative.	Greater than Preferred Alternative.
Grazing	Livestock grazing could affect sensitive habitats by altering plant communities.	Grazing is only allowed as a management tool under this alternative.	Commercial grazing would not be allowed under this alternative.	Similar to Preferred Alternative as grazing is a permitted interim use for other than Preservation or Conservation uses under this alternative's Policies.	Grazing is not allowed under this alternative.	Grazing impacts restricted to the Wahluke Slope north of State Highway 24.
Aquatic Resources	Increased recreational access to the Columbia River could adversely affect salmonid spawning areas, aquatic plant communities, and other resources associated with the river.	Lower than the Preferred Alternative.	No increase in recreational access under this alternative, so no new impacts.	Same as the Preferred Alternative.	Similar, but potentially lower, impacts than the Preferred Alternative.	Less than the Preferred Alternative because no new boat ramps.
Wildlife Migration Corridor	The integrity of the wildlife migration corridor associated with McGee Ranch would be maintained.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	McGee Ranch available for development.	Same as the Preferred Alternative.	McGee Ranch available for development.

Table ES-5. Summary of Potential Impacts to Hanford Site Resources. (8 pages)

Resource	Preferred Alternative	Alternative One	Alternative Two	Alternative Three	Alternative Four	No-Action Alternative
Preservation of BRMaP Level III and Level IV Resources	Preservation designation would protect 66% of BRMaP Level III, and 85% of BRMaP Level IV resources.	Preservation designation would protect 100% of BRMaP Level III and 85% of BRMaP Level IV resources.	Preservation designation would protect 96% of BRMaP Level III and 85% of BRMaP Level IV resources.	Preservation designation would protect 5% of BRMaP Level III and 13% BRMaP Level IV resources.	Preservation designation would protect 85% of BRMaP Level III and 85% of BRMaP Level IV resources.	The No-Action Alternative does not specifically designate land for Preservation.
CULTURAL RESOURCES						
Religious Sites	Cultural resources and religious sites associated with basalt outcrops such as Gable Butte and Gable Mountain would be protected.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Cultural resources and religious sites associated with basalt outcrops such as Gable Butte and Gable Mountain would be protected by Plan Policies and Procedures.	Same as the Preferred Alternative.	Cultural resources and religious sites associated with basalt outcrops such as Gable Butte and Gable Mountain would be protected by NEPA and CRMP Plan Policies and Procedures.
Viewsheds	Mining and industrial development could occur within viewsheds from high promontories.	Area that could be developed within viewsheds is smaller than for the Preferred Alternative.	Viewsheds would be protected. Impacts would be less than for the Preferred Alternative.	Development could occur within viewsheds to a greater extent than for the Preferred Alternative.	Same as Alternative Two. Less than the Preferred Alternative.	Development not precluded at any location. Greater than for the Preferred Alternative.
Natural Resource Gathering Areas	Damage to natural resource gathering areas from development, increased recreational use of the Columbia River, and grazing.	Less than the Preferred Alternative.	Impacts to natural resource gathering areas would be minimal.	Same as the Preferred Alternative.	Less than the Preferred Alternative.	Greater than the Preferred Alternative.
Cultural Sites	Damage to cultural sites from livestock grazing and development. Increased access to the Columbia River could result in damage from artifact collection, vandalism, and erosion.	Less than the Preferred Alternative.	Commercial grazing would not be allowed and impacts to cultural sites from development would be minimal. Access to the Columbia River would not be increased.	Impacts to the Wahluke Slope and White Bluffs only. Damage to cultural sites on the Wahluke Slope from agriculture (including grazing), and could lead to loss of the White Bluffs.	Less than the Preferred Alternative.	Greater than the Preferred Alternative.
Salmonid Spawning Sites	No impact to salmonid spawning sites.	Same as Preferred Alternative.	Same as Preferred Alternative.	Increased sediment loading from White Bluffs irrigation sloughing, and grazing could damage salmonid spawning sites.	Same as Preferred Alternative.	Between Alternative Three and Preferred Alternative.

Table ES-5. Summary of Potential Impacts to Hanford Site Resources. (8 pages)

Resource	Preferred Alternative	Alternative One	Alternative Two	Alternative Three	Alternative Four	No-Action Alternative
AESTHETIC RESOURCES						
Viewsheds	Viewing locations associated with Gable Butte and Gable Mountain would be protected. Locations associated with the Columbia River would be disrupted. Viewsheds could be disrupted.	Same as the Preferred Alternative.	Minimal impacts; less than the Preferred Alternative.	Viewing locations associated with basalt outcrops could be adversely impacted, but locations along the river would be protected. Viewsheds could be disrupted.	Viewing locations would be protected. Minimal impacts to viewsheds. Less than the Preferred Alternative.	Viewing locations and viewsheds could be adversely impacted. Greater than the Preferred Alternative.
Ambient Visibility	Visibility could be impacted by releases of fugitive dust from construction sites and pollutants from new industrial sources.	Similar to, but less than, the Preferred Alternative.	Minimal impacts; less than the Preferred Alternative.	Greater than the Preferred Alternative.	Less than the Preferred Alternative.	Greater than the Preferred Alternative.
Ambient Noise	Blasting, industrial sites, and increased use of motorized water craft could increase noise levels, disrupt wildlife, and detract from recreational experiences.	Less than the Preferred Alternative.	Minimal impacts; less than the Preferred Alternative.	Greater than the Preferred Alternative.	Less than the Preferred Alternative.	Same as the Preferred Alternative.
SOCIO-ECONOMICS AND INDUSTRIAL DEVELOPMENT	15,378 ha available for industrial development, which would meet the need forecasted by the Benton County Planning Department and provide ample area to support possible future DOE missions. This amount of land would support employment of 1,000 or more.	2,542 ha available for industrial development, which would meet the forecasted need and provide 1,615 ha for possible future DOE missions. This land could support employment of 100 to 1,000.	1,830 ha available for industrial development, but much of the land is already developed. Would not provide sufficient vacant land to meet Benton County's estimated future needs or provide for possible future DOE missions. Employment limited to less than 100.	17,860 ha available for industrial development, which would meet the need forecasted by the Benton County Planning Department and provide ample area to support possible future DOE missions. This amount of land would support employment of 1,000 or more.	6,882 ha available for industrial development, meeting the estimated future need and providing land for future DOE missions. This land could support employment of 100 to 1,000.	Facility planning and siting conducted on a project-by-project basis as guided by the Site Strategic Plan. At least 22,534 ha available to support future Industrial or Research and Development DOE missions

Table ES-5. Summary of Potential Impacts to Hanford Site Resources. (8 pages)

Resource	Preferred Alternative	Alternative One	Alternative Two	Alternative Three	Alternative Four	No-Action Alternative
RESEARCH AND DEVELOPMENT	4,912 ha designated for Research and Development could support up to 300 employees.	414 ha designated for Research and Development, but limited to previously developed areas.	Research and Development limited to 699 ha of existing uses at LIGO and the K Reactor water supply used for fish rearing.	Greater than the Preferred Alternative 8,177 ha designated for Research and Development could support up to 600 employees	4,388 ha designated for Research and Development could support up to 300 employees	Facility siting conducted on a project-by-project basis. Ample land available. At least 22,534 ha available to support future Industrial or Research and Development DOE missions
GRAZING AND AGRICULTURE	Up to 43,857 ha available for grazing, which could support 7,706 AUM with a value of approximately $92,472. Cultivated agriculture would not be allowed.	No lands designated for commercial grazing or cultivated agriculture.	No lands designated for commercial grazing. Cultivated agriculture would not be allowed.	1,059 AUM with a value of $12,700. Cultivated agriculture could generate from $16 to $88 million in additional revenue depending on the scenario.	No lands designated for grazing or cultivated agriculture.	Lack of a plan may discourage multiple use of Hanford lands and grazing and agriculture would be considered under individual proposals. Lands permitted for grazing could support 1,655 AUM with a value of $19,900. Cultivated agriculture would be allowed.
MINERAL RESOURCES (Privately held)	Existing natural gas claims could be developed, but the Preservation designation in the surrounding are would preclude construction of an access road.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Existing claims could be developed and access roads could be constructed. Additional development of natural gas could be encouraged.	Same as the Preferred Alternative.	Existing natural gas claims could be developed and access road could be constructed.
RECREATION	Increased recreation could increase revenues generated by tourism.	Less than the Preferred Alternative.	Less than the Preferred Alternative.	A destination resort/conference center at Vernita Terrace could generate up to $2 million to $4 million in payroll.	Less than the Preferred Alternative.	New revenue generating recreational opportunities would be unlikely.

Table ES-5. Summary of Potential Impacts to Hanford Site Resources. (8 pages)

Resource	Preferred Alternative	Alternative One	Alternative Two	Alternative Three	Alternative Four	No-Action Alternative
ENVIRONMENTAL JUSTICE	Increased access to the Columbia River would potentially increase exposure and health risk. Minority or low-income populations may be more prone to adopt a subsistence lifestyle, but a particular population would not necessarily be affected.	Because the purpose of a Federal Wildlife Refuge is to conserve native ecological systems, consumption of those systems would be limited and therefore provide better protection from contamination than the Preferred Alternative.	Access to the Columbia River would be limited. No disproportionately high impacts would occur.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
	Areas of cultural value to American Indians would be protected, but development would be allowed within the viewscape of some of those areas.	Same as the Preferred Alternative.	Same as the Preferred Alternative, but viewscapes would also be protected.	Areas of cultural value to American Indian tribes could be developed and development could occur within culturally significant viewscapes.	Same as Alternative Two.	Same as Alternative Three.
	Economic development of Hanford Site lands would be neutral in low-income and minority communities within the assessment area.	Limitation on development could adversely impact low-income populations. However, local low-income populations are not greatly influenced by Hanford Site spending.	Same as Alternative One.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
	Prohibiting agriculture on the Wahluke Slope would reduce the potential for new jobs available to low-income and minorities north of the Hanford Site.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Agriculture on the Wahluke Slope, potentially benefitting low-income and minority populations or creating an excess of commodities that would reduce the profit margin for the producer and drive down the worker's wages.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
HUMAN HEALTH	Increased access to Hanford Site lands would increase the potential for health risks.	Less than the Preferred Alternative.	Access to Hanford would be limited and the potential for health risks would be minimized.	Greater than the Preferred Alternative because of the intensity of use.	Less than the Preferred Alternative.	Access would be restricted and risks would be less than for the Preferred Alternative.

Table ES-5. Summary of Potential Impacts to Hanford Site Resources. (8 pages)

Resource	Preferred Alternative	Alternative One	Alternative Two	Alternative Three	Alternative Four	No-Action Alternative
	New developments on the Hanford Site could lead to an increase in occupational injuries and fatalities associated with mining and industrial activities.	Less than the Preferred Alternative.	Much less than the Preferred Alternative.	Greater than the Preferred Alternative and would have the additional risk of occupational injuries from agriculture.	Less than the Preferred Alternative.	Potentially greater risk than for the Preferred Alternative.
	Increased recreational activities could increase the risk of injury from recreational accidents.	Less than the Preferred Alternative.	No increase in recreational use and the risk of recreational accidents would be minimized.	Greater than the Preferred Alternative.	Less than the Preferred Alternative.	Minimal increase in recreational use. Risk of recreational accidents would not increase.
	Remediation to an Industrial standard in the 300 and 200 areas would involve less remediation worker risk from hazardous materials exposure and cumulative equipment operation time than some of the CRCIA scenarios could require for non-industrial uses. Actual remediation scenario will be picked through the CERCLA/RCRA process which could require more or less remediation based on the scenario chosen.	Minimum Industrial development could require more remediation worker risk exposure than Preferred Alternative.	Minimum Industrial development could require the most remediation worker risk exposure.	Maximum Industrial development could require the least remediation worker risk exposure.	Industrial development between Alternative One and the Preferred Alternative.	Minimal increase in changes of land use from open space reserved designation. The validity of an Industrial remediation scenario could be questioned without an integrated GMA Industrial designation. Actual remediation scenario will be picked through the CERCLA/RCRA process which could require more or less remediation based on the scenario chosen.

ES5.5 Cumulative Impacts

This section summarizes cumulative impacts associated with Hanford Site land-use designations for each alternative identified in Chapter ES3. Cumulative impacts result

> *. . . from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).*

Reasonably foreseeable actions are identified and the relationship between these actions and the proposed land-use designations is discussed. The description of potential cumulative impacts couples impacts of each alternative with impacts from past and existing operations at the Hanford Site and impacts that may be associated with anticipated future actions. Section ES5.5.1 discusses cumulative impacts to land use associated with present and reasonably foreseeable actions; Section ES5.5.2 discusses cumulative impacts to trustee resources; and Sections ES5.5.3 and ES5.5.4 discuss cumulative socioeconomic impacts and cumulative human health risk, respectively.

ES5.5.1 Cumulative Impacts to Land Use

The alternatives analyzed in this document would establish acceptable uses for Hanford Site lands for at least the next 50 years. The alternative identified and selected for implementation in the ROD will allocate lands for use under the defined land-use designations. Other present and reasonably foreseeable actions at the Hanford Site that involve siting new facilities or using Site resources also would, in effect, allocate lands for certain uses. Those present and reasonably foreseeable actions that involve land uses that are compatible with the proposed land-use designations under all the alternatives would not have cumulative impacts for land use; these actions are listed in Table ES-6. However, those present and reasonably foreseeable actions that do not conform with the proposed land-use designations would change the land-use allocations and, in this sense, could be considered to have cumulative impacts. Those present and reasonably foreseeable actions involving nonconforming uses are listed in Table ES-7.

The five actions listed in Table ES-7 could involve land uses that conflict with land-use designations under some alternatives. The USFWS is initiating a Comprehensive Conservation Plan (CCP) for the ALE Reserve. Assuming that the USFWS management plan would call for maintaining the ALE Reserve in its present, Preservation and Conservation type of management, the management plan would not conflict with any of the proposed land-use designations. If the USFWS plan only addresses preservation, then the proposed mining alternative on ALE, in lieu of the McGee Ranch mining area, would be in conflict with alternatives, Preferred, Four and Three.

A similar situation exists with the alternative selected in the ROD for the Hanford Reach, which calls for designating the Wahluke Slope as an overlay refuge and designating the Columbia River Corridor on the Hanford Site (i.e., the Hanford Reach) as a Wild and Scenic Recreational River. These designations could result in the management of the Wahluke Slope and the Columbia River Corridor as Preservation, Conservation or Agriculture depending on the USFWS's CCP and intent for establishing the refuge. The management of the Wahluke Slope as a wildlife refuge could conflict with the Agriculture land-use designation under Alternative Three unless a purpose of establishing the refuge as defined in the

USFWS's CCP included sharecropping for wildlife. The need to link agriculture to furthering the purposes of wildlife is the reason agriculture appears as a conflict in Table ES-7. Of the 181 National Wildlife Refuges with farming programs in 1989, 612 km^2 (233 mi^2) of the129 refuges were farmed by permittees who retained a share of the crop in return for costs incurred to farm the land. On the remaining refuges, Service personnel conducted farming operations with government equipment.

The remaining nonconforming uses listed in Table ES-7 involve present or upcoming actions that would conflict with land-use designations. The operation of LIGO would be considered a pre-existing, nonconforming use under Alternative One and Alternative Four, which could require that the LIGO site be restored to the designated use at the end of the facility's life. Operation of LIGO conflicts with Conservation mining designations because of the facility's sensitivity to vibrations. The Inert/Demolition Waste Landfill proposed for Pit 9 involves using an existing gravel pit located north of the 300 Area for disposal of inert and demolition wastes from the 300 Area. This would be classified as an Industrial land use, and would be considered a pre-existing, nonconforming use under Alternative One, Alternative Two, and Alternative Four. The proposed salvage and demolition of the 300 Area Steam Plant calls for obtaining fill from Pit 9 for filling voids and constructing the final cover. The use of Pit 9 for quarrying materials would be a pre-existing, nonconforming use under Alternative One, Alternative Two, and Alternative Four. The B-Reactor Museum would be in conflict with the Preservation designation of Alternative Four. Management and mitigation of these nonconforming land uses would be accomplished through the CLUP policies and implementing procedures as explained in Chapter 6.

ES5.5.2 Cumulative Impacts by Trustee Resource

ES5.5.2.1 Geologic Resources. Geologic resources on the Hanford Site include unique features that have been preserved while similar features in the region have been damaged or destroyed by development. Mining of geologic materials would be allowed under all alternatives being considered, except Alternative Two, and could damage or destroy unique geologic features, such as Missoula Floods features and sand dunes. Mining under the No-Action Alternative and Alternative Three, if permitted by DOE, could also impact basalt outcrops, such as Umtanum Ridge, Gable Mountain, and Gable Butte. Because these features are rare and susceptible to development elsewhere in the region, damage or destruction of these features on the Hanford Site would increase their aesthetic and ecological value offsite, and decrease their availability for scientific study.

Alternative Three would allow development of cultivated agriculture on the Wahluke Slope. Increasing irrigated lands in the vicinity of the White Bluffs would cumulatively increase groundwater recharge in the area and also could result in additional slumping of the White Bluffs. Additional slumping of the White Bluffs would further reduce their aesthetic, historic, and ecological value; would cumulatively increase sedimentation of the Columbia River; and could accelerate riverbank and island erosion. The No-Action Alternative would also allow the WDFW's current management practice of growing crops for wildlife management purposes on the Wahluke Slope.

ES5.5.2.2 Water Resources. Water resources on the Hanford Site, including groundwater and surface water, have been impacted by past waste disposal practices at Hanford. Remediation strategies for cleaning up past contamination are designed for current and predicted future hydrologic conditions. Additional development on the Hanford Site could alter hydrologic conditions, disrupt CERCLA ROD conditions, and increase impacts to water quality from contamination.

Table ES-6. Present or Reasonably Foreseeable Future Actions Compatible with Land-Use Designations Under All Alternatives.

Present or Reasonably Foreseeable Future Action	Location	Land Use
Wild and Scenic River Designation for Hanford Reach	Hanford Reach	Preservation
Decommissioning of Eight Surplus Production Reactors	200 Areas (disposal)	Industrial-Exclusive
Deactivation of the N Reactor	200 Areas (disposal)	Industrial-Exclusive
Safe Interim Storage of Hanford Tank Wastes	200 Areas	Industrial-Exclusive
Tank Waste Remediation System	200 Areas	Industrial-Exclusive
Plutonium Finishing Plant Stabilization	200 Areas	Industrial-Exclusive
Decommissioning of Building 232-Z and Building 233-S	200 Areas	Industrial-Exclusive
Environmental Restoration Disposal Facility Expansion	200 Areas	Industrial-Exclusive
Spent Nuclear Fuel Management	200 Areas	Industrial-Exclusive
200 Area Effluent Treatment Facility	200 Areas	Industrial-Exclusive
Operation of 200 Areas LLW Burial Grounds	200 Areas	Industrial-Exclusive
Operation of U.S. Ecology Commercial LLW Burial Ground	200 Areas	Industrial-Exclusive
Solid Waste Retrieval Complex, Enhanced Radioactive and Mixed Waste Storage Facility, and Central Waste Support Complex	200 Areas	Industrial-Exclusive
Tank 241-C-106 Sluicing and Waste Removal	200 Areas	Industrial-Exclusive
Special Case Waste Storage Facility	200 Areas	Industrial-Exclusive
Disposal of Decommissioned Naval Reactor Plants	200 Areas	Industrial-Exclusive
Environmental Molecular Sciences Laboratory	300 Area	Industrial, Research & Development (R&D)
Disposition of Sodium Test Loops	200 Areas, 300 Area	Industrial-Exclusive, Industrial, R&D
Fast Flux Test Facility for Medical Isotope Production	400 Area	Industrial, R&D
Disposal of S3G and D1G Prototype Reactor Plants	200 Areas	Industrial-Exclusive
Hanford Solid Waste EIS	200 Areas	Industrial-Exclusive
Offsite Thermal Treatment of Low-Level Mixed Waste	200 Areas, City of Richland	Industrial-Exclusive, Industrial, R&D
200 Area Emergency Facilities Campus	200 Areas	Industrial-Exclusive
300 Area Steam Replacement	300 Area	Industrial, R&D
Lead Test Assembly Irradiation and Analysis	200 Areas, 300 Area	Industrial-Exclusive, Industrial, R&D
Management of Hanford Site Non-Defense Production Reactor Spent Nuclear Fuel	200 Areas	Industrial-Exclusive
Relocation and Storage of Sealed Isotopic Heat Sources	200 Areas	Industrial-Exclusive
Trench 33 Widening in 218-W-5 LLW Burial Ground	200 Areas	Industrial-Exclusive
1171 Building Annex Lease	1100 Area	Industrial
City of Richland Comprehensive Land-Use Plan	300 Area, 600 Area	Industrial, R&D
Expansion of the Energy Northwest (formerly known as WPPSS) area industrial facilities (natural gas fired electric generator turbine or aluminum smelter)	600 Area	Industrial, R&D

Table ES-7. Present or Reasonably Foreseeable Future Actions with Nonconforming Land Uses.

Present or Reasonably Foreseeable Future Action	Nonconforming Land-Use Designations ✓ = nonconforming					
	No-Action	**Preferred Alternative**	**Alternative One**	**Alternative Two**	**Alternative Three**	**Alternative Four**
Development of a Comprehensive Conservation Plan for the ALE Reserve by the USFWS **(Preservation)**	N/A	✓ **Conservation (Mining)**			✓ **Conservation (Mining)**	✓ **Conservation (Mining)**
Designation of the Wahluke Slope as a National Wildlife Refuge **(Preservation)**	N/A				✓ **Agriculture**	
Operation of the Laser Interferometer Gravitational Wave Observatory **(Research and Development)**	N/A	✓ **Conservation (Mining)**	✓ **Conservation (Mining)**		✓ **Conservation (Mining)**	✓ **Conservation (Mining)**
Inert/Demolition Waste Landfill (Pit 9) **(Industrial)**	N/A		✓ **Preservation**	✓ **Preservation**		✓ **Preservation**
B-Reactor Museum **(High-Intensity Recreation)**	N/A					✓ **Preservation**

Industrial development would be allowed under all alternatives being considered and would increase groundwater consumption and alter groundwater hydrology. Changes to groundwater hydrology as a result of aquifer drawdown and discharges to the soil column could alter the rate of the movement of contaminants toward the Columbia River or in any other direction. Groundwater recharge from industrial waste water discharges and collection and infiltration of runoff in quarries could mobilize contaminants in the vadose zone and cumulatively increase contaminant levels in groundwater.

The Preferred Alternative and Alternatives One, Three, and Four would increase recreational use of the Columbia River over existing levels, which would cumulatively increase levels of oil, gas, and engine exhaust discharged to the river; and increase riverbank and island erosion from boat wakes. Unregulated non-point sources associated with industrial development and mining could add to pollutants discharged to the river from upstream sources, resulting in further water quality degradation. Mining and grazing along the Columbia River Corridor, which would be allowed under the No-Action Alternative, would increase sedimentation in the river, with possible cumulative impacts on spawning areas in the Columbia River.

ES5.5.2.3 Biological Resources. Because the Hanford Site contains much of remaining undisturbed Columbia Basin shrub-steppe habitat, proposed developments of undisturbed areas would result in cumulative impacts to rare plants and animals, unique plant communities, and terrestrial and aquatic ecosystems. In addition, the Hanford Site contains the last unimpounded, nontidal segment of the Columbia River, and further development along the Reach could result in cumulative losses to species and habitats associated with the Hanford Reach. In some cases (e.g., Upper Columbia River spring run chinook salmon (E-3/99), Middle Columbia River steelhead (T-3/99) and Upper Columbia River steelhead [E-8/97]), further losses of habitat could endanger remaining populations.

The Industrial, Research and Development, and Industrial-Exclusive land-use designations would allow industrial development to displace native plant communities and wildlife habitats where the habitats still exist. In addition, ongoing remediation activities, such as the decommissioning of surplus production reactors, would result in further habitat losses. Many of the actions listed in Table ES-6 for the 200 Areas would involve small losses of

habitat, but expansion of the Environmental Restoration and Disposal Facility (ERDF) and other future actions in the 200 Areas could involve larger losses, with cumulative impacts to shrub-steppe habitat. Alternatives One and Two would limit cumulative impacts in the 200 Areas by reducing the size of the Industrial-Exclusive land-use designation.

The Conservation land-use designations could result in cumulative impacts by allowing commercial livestock grazing and mining. Cumulative impacts from grazing are most likely under the No-Action and Preferred Alternatives, which would allow grazing over the largest area and could result in further losses of regional biodiversity.

Although basalt and sand and gravel quarries are unlikely to have cumulative impacts because they would disturb relatively small areas, large-scale soil mining to support remediation could result in large habitat losses. If permitted by DOE, the potential for cumulative effects from mining are greatest under the No-Action Alternative and Alternative Three, which would allow development of quarry sites at the McGee Ranch. Losses of shrub-steppe habitat in this area could eliminate the remaining segments of the wildlife movement corridor between the Hanford Site and the Yakima Training Center; which are among the last remaining large tracts of shrub-steppe habitat in the region. Mining in the McGee Ranch area would add to habitat fragmentation that has previously taken place in the region as a result of agricultural, residential, and industrial development; and could further reduce regional biodiversity.

Increased recreational use associated with the Wild and Scenic River designation and High- or Low-Intensity Recreation land-use designations under the Preferred Alternative and Alternatives One, Three, and Four could result in cumulative impacts to wildlife and habitats that are not currently accessible by the public under the No-Action Alternative. Recreation designations would increase impacts from boating as well as foot traffic on sensitive plant communities and habitats.

The potential for cumulative impacts to biological resources may best be evaluated by determining the amount of BRMaP Level III and IV resources that could be affected. The BRMaP III and IV designations identify the resources that could be most adversely affected by further habitat losses. Alternative Three has the greatest potential to impact Level III and IV resources, primarily because it would allow conversion of native plant communities on the Wahluke Slope to cultivated agriculture. The Preferred Alternative and the No-Action Alternative would have less potential for impacts to BRMaP Level III and IV resources, but are more likely to impact those resources than Alternatives One, Two, or Four. Alternative Two is least likely to have cumulative effects on biological resources, based on the amounts of BRMaP Level III and IV resources that could be impacted by development.

ES5.5.2.4 Cultural Resources. Regionally, agricultural, industrial, and residential development have damaged or destroyed cultural resources. In addition, construction of dams along the Columbia River has inundated cultural resources and sites of significance to American Indian tribes. Cultural resources on the Hanford Site have been preserved by access restrictions for the past 55 years. Preservation of the Hanford Reach as the last free-flowing stretch of Columbia River would also preserve cultural resources associated with the river. Loss of these sites through development of Hanford Site lands could lead to potentially significant impacts on the remaining cultural resources in the region.

Many of the biological resources on the Hanford Site are also important to American Indian tribes for traditional subsistence uses. In addition, the Hanford Site includes religious sites important to American Indians. American Indian tribes with ties to the Hanford Site have long advocated the protection of these resources in their efforts to maintain their cultures and

traditional life ways. Further losses of these resources could impact American Indian cultures associated with the Hanford Site.

Potential cumulative impacts to cultural resources are most likely to occur along the Columbia River, where cultural resources and traditional American Indian uses are concentrated. The No-Action Alternative has the greatest potential to affect these resources by allowing mining, grazing, or industrial development in the Columbia River Corridor. The Preferred Alternative and Alternatives One, Three, and Four would increase recreational access to the corridor, which could result in impacts to cultural resources from unauthorized artifact collection, vandalism, and losses to riverbank and island erosion from boat wakes.

Industrial development under any of the alternatives has the potential to disturb archaeological and historic sites. Alternatives One and Two are least likely to result in cumulative impacts because these alternatives would minimize the amount of land designated for Industrial, Research and Development, and Industrial-Exclusive land uses. Ongoing remediation activities and some of the proposed projects listed in Table ES-7 could also have cumulative effects on cultural resources.

Other cumulative impacts to American Indian cultures could occur under the No-Action Alternative and Alternative Three which, if permitted by DOE, would allow quarrying on basalt outcrops that are important religious and cultural sites. Alternative Two would designate most of the Hanford Site for Preservation to protect cultural resources and would be least likely to have cumulative impacts.

ES5.5.2.5 Aesthetic Resources. The large, undeveloped portions of the Hanford Site and features such as the basalt outcrops, Rattlesnake Mountain, the White Bluffs, and the Columbia River Corridor have aesthetic values that are unique to the region. Industrial development associated with past Hanford operations has altered some viewsheds. Future development of Hanford Site lands could further alter viewsheds and reduce the aesthetic value by increasing airborne particulate, odors, or other pollutants.

The potential for cumulative impacts to viewsheds would be greatest under the No-Action Alternative, which would allow development of Hanford Site lands on a project-by-project basis. This alternative is more likely to result in the siting and construction of industrial developments in previously undisturbed viewsheds. Alternative Three could also have cumulative impacts to viewsheds by allowing, if permitted by DOE, quarrying on basalt outcrops, the conversion of native plant communities on the Wahluke Slope to crop land and orchards, and development of High-Intensity Recreational facilities adjacent to the Columbia River Corridor. Future industrial development under the Industrial-Exclusive land-use designation, along with proposed and planned actions listed in Table ES-6, would have cumulative effects on viewsheds that would be similar under the alternatives being considered.

Alternative Three also has the greatest potential for cumulative impacts on visibility associated with air quality. The conversion of much of the Wahluke Slope to agriculture would create a significant new source of fugitive dust from cultivated fields. Industrial development under this alternative as well as all other alternatives being considered could also result in new sources of industrial pollutants, which could further diminish visibility.

Future development could also increase ambient noise levels, which would detract from the recreational experience associated with the Columbia River Corridor and other natural areas on the Hanford Site. Cumulative increases in noise are most likely occur under the No-Action Alternative, which could allow industrial development along the Columbia River. Mining along the river corridor, which could occur under the No-Action Alternative, could also increase noise impacts. Increases in High-Intensity Recreational land-use activities such as Alternative

Three's proposed destination resort and RV camps or the Preferred Alternative's and Alternative Four's proposed Tribal fishing camps, could also increase the noise along the river and distract from the aesthetic experience.

ES5.5.3 Cumulative Socioeconomic Impacts

The economy of the area has in the past been strongly influenced by Hanford Site activities. Changes in the Site mission and reductions in Site activities have had negative impacts in the past. Recently, the area economy has become more diversified and less dependent on the Hanford Site. Future development of Hanford Site lands under multiple uses could accelerate the transition to a diversified economy. On the other hand, economic growth associated with future uses of the Hanford Site could cumulatively increase demand for infrastructure and services.

Alternative Three has the greatest potential to have cumulative impacts, both positive and negative, on socioeconomic conditions. On the positive side, Alternative Three would provide the most opportunities to develop alternate uses of Hanford Site lands, maximizing the economic return. Alternative Three could have negative impacts on socioeconomic conditions by increasing the demand for services, including schools, law enforcement, and health and human services. Alternative Two has the least potential to have cumulative socioeconomic impacts because it would minimize future site development.

Industrial development on Hanford Site lands could place increased demand on infrastructure beyond the City of Richland's capacity. This potentially cumulative impact could occur under the Preferred Alternative and Alternatives Three and Four because they have Industrial land-use designations larger than the City of Richland UGA. However, the impact would be the most under the No-Action Alternative, because no land-use plan would be available to assist government entities in anticipating and addressing increased demand.

ES5.5.4 Cumulative Human Health Risk

Risks due to exposure to residual contamination remaining after completion of CERCLA activities would be dependent on the level of access to any particular area where residual contamination remained. Consequently, the cumulative health risk to humans would be expected to be greatest under Alternative Three because it would provide greater access to more areas and would provide more opportunities for development of Hanford Site lands than would the other alternatives. Conversely, Alternative Two would have the least potential for cumulative human health risks, because it would provide the least access to Hanford Site lands.

Significant occupational risk to workers could occur under some industrial uses, under both the Industrial-Exclusive and Industrial land-use designations. Agriculture is also traditionally a high risk occupation (Table ES-4). Cumulative occupational risk would likely be the greatest under Alternative Three because of the large area designated for Agriculture and the higher level of use associated with the entire Hanford Site. Conversely, occupational risk would be lowest for Alternative Two because industrial risk would be limited to workers in the 200 Areas (similar under all alternatives) and Alternative Two designates the smallest area for Industrial development.

ES5.6 Present and Reasonably Foreseeable Actions Adjacent to the Hanford Site

- **Offsite thermal treatment of low-level mixed waste** – The Allied Technology Group (ATG) proposes to construct a facility that would be located adjacent to the Hanford Site boundary in the northeast corner of the City of Richland. DOE has proposed that approximately 5,120 m^3 (6,696 yd^3) of contact-handled low-level mixed waste be shipped from the Hanford Site to the ATG facility for treatment.

Land-use planning efforts for areas outside of and surrounding the Hanford Site are currently being undertaken by Benton, Franklin, and Grant counties; and by the City of Richland. These planning efforts will establish land uses that would be permitted by local governments in areas surrounding the Hanford Site.

ES5.7 Other NEPA Considerations

ES5.7.1 Unavoidable Adverse Impacts

Unavoidable adverse impacts are impacts that would occur after implementation of all feasible mitigation measures. The greatest potential for unavoidable adverse impacts is associated with more intensive land uses and the area extent of those uses in each alternative. These impacts would principally be associated with the degree of disturbance of sensitive habitats and loss of cultural resources.

ES5.7.2 Irreversible and Irretrievable Commitments of Resources

Irreversible and irretrievable (I&I) commitments of resources are related to use of nonrenewable resources and the effects that consumption of those resources could have on future generations. Irreversible effects occur as a result of use or destruction of a resource (e.g., energy and minerals) that cannot be replaced within a reasonable time. Irretrievable resources commitments involve the loss in value of an affected resource that cannot be restored (e.g., extinction of a species or disturbance of a cultural site). This land-use plan would establish programmatic land-use policies and implementing procedures that will influence how natural resources are consumed by specific projects in the future, but each future project will carry its own level of NEPA or CERCLA/RCRA NEPA integrated analyses that would make the required I&I commitments for the proposed project.

ES6.0 Implementation of the Comprehensive Land-Use Plan

This section provides an overview of the procedures and guidance which will be used by DOE and the cooperating agencies and consulting Tribal governments for implementing the CLUP. The CLUP would provide the framework within which future use of the Hanford Site's lands and resources would occur. This framework consists of four basic elements:

1. A final ***Hanford CLUP Land-Use Map***, depicting land uses for the Site. The ROD for this EIS will select one of the alternative land-use maps presented in Chapter ES3 or will select a land-use map that combines features of several alternatives.

2. ***Hanford CLUP Land-Use Definitions***, describing the purpose, intent, and principal use(s) of each of the land-use designations on the adopted CLUP map (see Table ES-1).

3. ***Hanford CLUP Policies***, directing land-use actions. These policies ensure that individual actions of successive administrations shall collectively advance the adopted CLUP map, goals, and objectives.

4. ***Hanford CLUP Implementing Procedures***, including:

   - Administrative procedures for reviewing and approving Use Requests for consistency with the CLUP

   - A Site Planning Advisory Board (SPAB) consisting of representatives from the cooperating agencies and the affected Tribal governments

   - Actions which, after plan adoption, shall be undertaken to align and coordinate existing and new "area" and "resource" management plans for the Site (e.g., the CCP for the ALE Reserve; fire; cultural and historical resources; and species management), with the CLUP land-use map, land-use policies and implementing procedures.

For all proposals and projects, the above procedures and actions would be integrated with existing DOE land-use review procedures (e.g., biological, cultural, and the NEPA), while DOE maintains control of the land. The DOE has the final determination and approval of all land-use decisions taking place on Hanford-site lands under DOE authority.

ES6.1 Definitions and Descriptions of Land-Use Map Designations

The land-use designations of each alternative land-use map depict land uses that could occur on the Site. The definitions of the various land-use designations are provided in Table ES-1. These land-use designations and their definitions and descriptions were co-developed by the cooperating agencies and consulting Tribal governments.

ES6.2 Definitions for Terms Relating to Plan Implementation

The following three definitions – Allowable Use, Special Use, and Amendments – relate the land-use policies to the land-use maps:

- ***Allowable Use*** – Any reservation of land for a physical development or land-use activity that is consistent with the land-use designation and policies of the land-use map and CLUP, or a specifically identified part of an approved area management plan (AMP), except for "Amendments" or uses that are identified as "Special Use."

- ***Special Use*** – Activities requiring further review and approval prior to being allowed. The following are special uses.

  1. Any physical development or land-use activity in the Preservation or Conservation designation

  2. AMPs outside of the 200, 300, 400, and 1100 Areas

  3. Any proposed new development that is inconsistent with the adopted local counties' or cities' comprehensive plans for the Hanford Site

  4. Mining or grazing activities within areas designated for Conservation

5. Any proposed new project that is located within a deed restricted area

6. Additions to or enlargements of pre-existing, nonconforming uses

7. Any proposed new project that establishes an exclusive use zone (EUZ) over lands not currently under an EUZ.

- ***Amendments*** – Amendments are required for the following:

  1. Any change to the map land-use designation of an area

  2. Any change to CLUP policy

  3. Any change in the use of land or an existing facility to a use that is inconsistent with the land-use designation.

Additionally, definitions are used to define the terms of the land-use policies. These definitions include the following:

- ***Area Management Plans (AMPs)*** – AMPs are management plans for specific geographic areas, which may include specific resource management plans, mitigation strategies, and various uses and facilities. An AMP shall be consistent with the CLUP's land-use designations and policies.

- ***Use Request*** – A Use Request is a proposal to use land or a facility for an activity different from what is currently occurring. This Use Request can be brought to DOE during the scoping of either NEPA, RCRA, CERCLA, or SEPA proposed actions. Use Requests can include site preparations, leasing, granting right-of-ways, or any other land-use related activities.

- ***Policy*** – Policies are statements of intent which direct decisions toward the accomplishment of adopted goals and objectives. Policies are applied on a continuous basis and applied consistently over time.

- ***Pre-existing, Nonconforming Use*** – Any existing lawfully established use that is neither allowed nor conditionally permitted within a land-use designation, but exists therein, having been established prior to the CLUP land-use designation.

- ***Resource Management Plan (RMP)*** – An RMP contains adopted management standards and strategies for a specific resource. Generally, resources subject to RMPs are not confined to geographically discrete areas and they are not static (i.e., their characteristics and conditions often vary in time and/or location across the Site). Examples of resources which have RMPs are biological resources (BRMaP), cultural resources (CRMP), and the *Bald Eagle Management Plan*. The provisions of each RMP apply wherever its subject resource occurs on the Site, except for areas specifically exempted within the RMP itself.

  Several RMPs may apply within an AMP. A single RMP may extend across several AMPs. Where an RMP exists within an AMP, the provisions of both must be integrated toward achieving their common objectives, consistent with land-use designations within which they occur.

- ***RL Manager*** – The RL Manager is the Manager of DOE's Richland Operations Office (RL).

- ***RL Site Management Board (SMB)*** – The SMB is chaired by the Site Deputy Manager and comprises selected members of RL senior management staff.

- ***Real Estate Officer (REO)*** – The REO, from the RL Site Infrastructure Division (SID), is the single point of contact for reviewing, processing, and coordinating land-use activities on the Hanford Site.

- ***Shall*** – For the purpose of Chapter 6 of this EIS, "shall" refers to activities that would be mandatory if adopted by the ROD.

- ***Should*** – For the purpose of Chapter 6 of this EIS, "should" refers to activities that would be discretionary if adopted by the ROD.

- ***Site Planning Advisory Board (SPAB)*** – The SPAB is an advisory board to land-use matters on the Hanford Site. The SPAB consists of representatives from HRA-EIS cooperating agencies and affected Tribal governments. The SPAB reviews Use Requests that are other than "allowable uses" and makes recommendations to DOE.

ES6.3 Hanford CLUP Policies

The Hanford CLUP policies connect all the CLUP elements. It is expected that the ROD for this EIS would set forth policies that do the following:

- Establish land-use mitigation procedures

- Establish hierarchies, priorities, and standards relating to land use, resource use, and values

- Integrate competing land and resource goals and objectives

- Provide reference points for addressing unanticipated circumstances and making actual Amendments to the CLUP when necessary

- Identify which RMPs or AMPs shall be considered for development or revision as part of the CLUP implementation.

Land-use and resource-related decisions, actions, and programs should neither conflict with, nor be inconsistent with the adopted CLUP map and policies. Actions related to policies should be feasible and practical, and policies should be consistently applied on a continuous basis.

The proposed Hanford CLUP policies are described below. They are a synthesis of stated values and objectives from DOE, Future Site Uses Working Group, Hanford Advisory Board, August 1996 Draft HRA-EIS public hearing and public meetings, cooperating agencies, consulting Tribal governments, and those associated with municipal and county land-use planning principles.

ES6.3.1 Overall Policy

The CLUP policy would accomplish the following for the Hanford Site:

1. Protect the Columbia River and associated natural and cultural resources and water quality.

2. Wherever possible, locate new development, including cleanup and remediation-related projects, in previously disturbed areas.

3. Protect and preserve the natural and cultural resources of the Hanford Site for the enjoyment, education, study, and use of future generations.

4. Honor treaties with American Indian Tribes as they relate to land uses and resource uses.

5. Reduce EUZ areas to maximize the amount of land available for alternate uses while still protecting the public from inherently hazardous operations.

6. Allow access for other uses (e.g., recreation) outside of active waste management areas, consistent with the land-use designation.

7. Ensure that a public-involvement process is used for amending the CLUP and land-use designations to respond to changing conditions.

8. As feasible and practical, remove pre-existing, nonconforming uses.

9. Facilitate cleanup and waste management.

ES6.3.2 Protection of Environmental Resources

The CLUP policy would accomplish the following for the Site:

1. Implement DOE's Land- and Facility-Use Policy (DOE P 430.1) which is to protect and sustain native species and their habitats on the Site. The Conservation and Preservation land-use designations are the primary land-use controls to accomplish this policy. Within the Conservation and Preservation designations, land uses shall be consistent with the purpose of the designation and significant impacts shall be mitigated. Implementation mechanisms such as the Draft *Biological Resources Mitigation Strategy* (BRMiS), and habitat management plans augment these designations for development review and approval sitewide. Developments for public access and recreation should be according to adopted AMPs depicting management of use, and siting of support facilities.

2. Within land-use designations other than Conservation and Preservation, mitigate significant unavoidable (residual) impacts at locations by enhancing habitats within the Conservation or Preservation designations. To accomplish this, undertake the following actions:

    a. Modify the BRMaP and BRMiS to be consistent with this policy and with implementing procedures.

b. Review habitat management plans to redirect their actions and strategies, where necessary and possible, to the Conservation and Preservation designations.

c. Consider provisions for the protection of "vulnerable aggregations," as defined by the WDFW, for nongame species wherever they occur on the Site.

3. Require that projects have reasonable setbacks from the Preservation and Conservation features of importance.

4. Within all land-use designations, require that land not be cleared until a specific project has been approved.

ES6.3.3 Protection of Cultural Resources

The CLUP policy would accomplish the following for the Site:

1. Implement DOE's Land- and Facility-Use Policy (DOE P 430.1) which is to protect and sustain cultural resources on the Site. The Conservation and Preservation land-use designations are the primary land-use controls to accomplish this policy. The CRMP addresses those actions where land-use controls are not the appropriate mitigation (i.e., if a cultural resource is found in an industrial designation, provisions of the CRMP would be applied to mitigate impacts to the resource). Within the Conservation and Preservation designations, land uses shall be consistent with the purpose of the designation and significant impacts mitigated. Implementation mechanisms such as the CRMP, and habitat management plans augment these designations for development review and approval sitewide. Developments for public access and recreation should be according to adopted AMPs depicting management of use, and siting of support facilities.

2. Proposed developments within all areas should be reviewed consistent with the BRMaP and the CRMP, and reflected in the applicable AMP.

ES6.3.4 Siting New Development

The CLUP policy would accomplish the following for the Site:

1. Locate and approve new developments in areas consistent with the adopted Hanford CLUP.

2. Locate proposed projects, as feasible and practical, in those areas of the Hanford Site where the adopted CLUP and the local cities' and counties' land-use maps are consistent.

3. Within all land-use designations, previously disturbed areas (as defined by the BRMaP) should be developed first, followed by the acreages with the least sensitive biological and cultural resources. Within the site plan of any proposed new development, the acreages with the most sensitive biological and cultural resources should be worked into natural open space for landscaping, buffers, natural drainage areas, etc.

4. Focus on using existing infrastructure and developed areas for new projects within a land-use designation.

a. Locate new development in close proximity to existing infrastructure unless a project requires an isolated site away from incompatible uses.

b. Concentrate development on or adjacent to existing infrastructure. Where extensions of infrastructure are necessary, minimize the extension of infrastructure into undeveloped areas.

c. Site, plan, and design development to avoid significant impacts on resources. Mitigate unavoidable impacts through design to minimize impacts and mitigation costs associated with biological and cultural resources.

ES6.3.5 Utility and Transportation Corridors

The CLUP policy would accomplish the following for the Site:

1. With to-be-identified exception(s), existing utility and transportation corridor rights-of-way are the preferred routes for expanded capacity and new infrastructure.

2. Existing utility corridors that are in actual service, clearly delineated, and of defined width, are not considered "nonconforming" uses in any land-use designation.

3. Utility corridors and systems without the characteristics of number 2 (above) are considered to be nonconforming uses and shall be identified in the applicable RMP or AMP.

4 Avoid the establishment of new utility corridors within the Conservation and Preservation designations unless the use of an existing corridor(s) is infeasible or impractical.

5. Avoid the location of new above-ground utility corridors and systems in the immediate viewshed of an American Indian sacred site. Prioritize for removal, as funding is available, existing nonconforming utility corridors and systems in such areas.

ES6.3.6 Economic Development and Diversification

The CLUP policy would promote the following for the Site:

1. Multiple land uses for both the private and public sector.

2. Protection and maintenance of existing functional infrastructure and utilities for use in economic development and Site transition.

3. Future Federal missions and programs, consistent with the provisions of the CLUP.

4. Protection of natural, historic, and cultural resources to assure continued biodiversity and cultural values as essential elements of a recreation and tourism economy.

5. Reduction or elimination of existing conditions which are impediments to the realization of the land-use designations (e.g., scattered withdrawn Public Domain land, contamination, and nonconforming and abandoned developments).

ES6.4 Organizational Structure and Procedure for Review and Approval of Use Requests

It is intended that the existing organizational structure within DOE be used to implement the Hanford CLUP, augmented with the SPAB consisting of representatives from cooperating agencies and affected Tribal governments (Figure ES-31).

It is recommended that the CLUP land-use map, land-use policies and implementing procedures be integrated with and addressed at the threshold decision points of all authorizations, operational plans (e.g., the *Hanford Strategic Plan*), and actions. This includes contracts and budget proposals that directly or indirectly affect land use on the Site so they will not create conflicts with the CLUP, or fail to forward its map and policy objectives where the opportunity and ability to do so exists.

After the HRA-EIS ROD is approved, the actions presented in this section would be undertaken to ensure that the plan is implemented. The objectives of these actions are as follows:

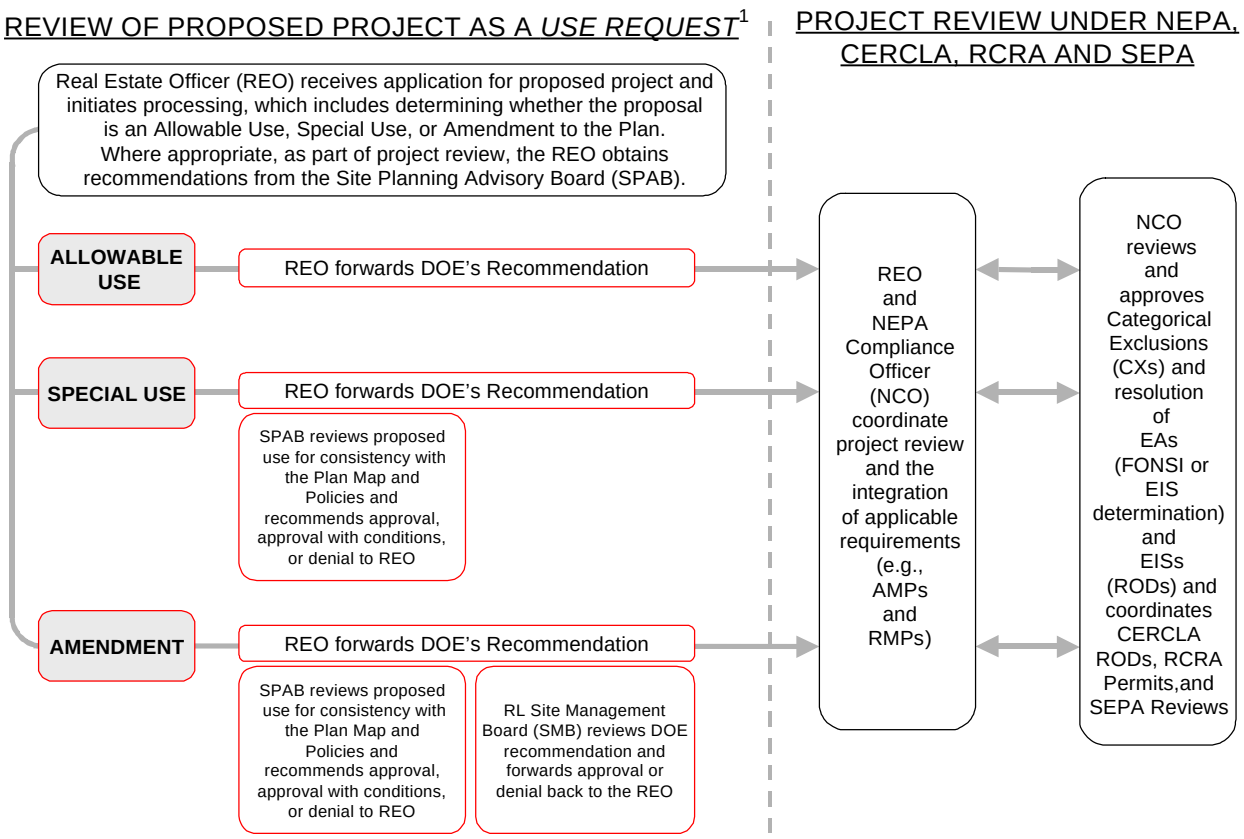
- To streamline and integrate procedures for project review, including ensuring project consistency with the plan, pre-planning for large areas, siting new developments, providing and using infrastructure and utilities, managing resources, notifying the public, and conducting environmental review.

- To make decisions on the use of lands and resources on the Site within the frame-work of existing DOE legal and administrative procedures, with an implementation process that parallels, and efficiently coordinates with local land-use regulatory processes, and provides similar accountability and tracking.

- To make adjustments in existing DOE administrative structures as necessary to efficiently implement the CLUP.

Achieving these objectives is essential to accomplishing DOE missions and working with Federal agencies, Tribes, and local cities and counties to jointly accomplish planning goals, economic transition, and multiple uses of the Site.

Figure ES-31. Organizational Structure for CLUP Implementation.



[1]The proposed land or facility use, and location are reviewed for consistency with the Plan Map and Policies.

AMP = Area Management Plan
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CX = Categorical Exclusion
EA = Environmental Assessment
FONSI = Finding of No Significant Impact
EIS = Environmental Impact Statement
NEPA = National Environmental Policy Act
RCRA = Resource Conservation Recovery Act
ROD = Record of Decision
SEPA = State Environmental Policy Act