

## AR TARGET SHEET

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DOCUMENT #: DOE/EIS-0222D

EDMC#: 0050638

SECTION: 1of2

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DOE/EIS-0222D

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

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*Executive Summary*

*U.S. Department of Energy  
April 1999*

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# Cover Sheet

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**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<sup>2</sup>) (586 square miles [mi<sup>2</sup>]) 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

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## 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

1 indirectly affect land use so that they would not create unintentional conflicts with the CLUP, or  
2 fail to forward CLUP objectives where the opportunity and ability to do so exists.  
3

4 The DOE would have the final approval of all land-use decisions taking place on the  
5 Hanford Site while under DOE responsibility. The DOE Richland Operations Office would  
6 coordinate review of Hanford land development and land-use requests, and determine, with  
7 input from the SPAB, whether a request represents an *allowable use* or, *special use*, or whether  
8 the request would require an *amendment* to the CLUP.  
9

### 10 ***Cooperating Agencies and Consulting Tribal Governments***

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

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

12  
13 Originally, this EIS was intended to provide an environmental review under the *National*  
14 *Environmental Policy Act of 1969* (NEPA) for all aspects of the developing Hanford  
15 Environmental Restoration Project. The document, however, no longer directly considers  
16 remediation issues. Instead, remediation issues are now integrated into specific Tri-Party  
17 Agreement-remediation decision documents. Remediation decisions are made by the U.S.  
18 Environmental Protection Agency and the State of Washington, as lead regulatory agencies,  
19 and DOE as lead implementing agency. DOE does expect that the EIS process will assist  
20 Hanford remediation efforts by determining reasonably foreseeable land uses and establishing  
21 land-use decision-making processes to ensure the viability of any future institutional control that  
22 might be required.  
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## Acronyms and Initialisms

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6	ac	acres
7	AEA	Atomic Energy Act
8	AEC	Atomic Energy Commission
9	AMP	area management plan
10	ATG	Allied Technology Group
11	BLM	Bureau of Land Management
12	BoR	Bureau of Reclamation
13	BPA	Bonneville Power Administration
14	BRMaP	Biological Resources Management Plan
15	BRMiS	Biological Resources Mitigation Strategy
16	CAA	<i>Clean Air Act of 1970</i>
17	CAAA	<i>Clean Air Act Amendments of 1990</i>
18	CBC	Columbia Basin College
19	CBRP	Columbia Basin Reclamation Project
20	CCP	Comprehensive Conservation Plan
21	CEQ	Council on Environmental Quality
22	CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
23	CLUP	comprehensive land-use plan
24	CRADA	Cooperative Research & Development Agreement
25	CRMP	Cultural Resources Management Plan
26	CTUIR	Confederated Tribes of the Umatilla Indian Reservation
27	D&D	Decontamination and Decommissioning
28	DOE	U.S. Department of Energy
29	DOH	Department of Health
30	DOI	U.S. Department of Interior
31	DSTs	double-shell tanks
32	EA	environmental assessment
33	Ecology	Washington State Department of Ecology
34	EIS	environmental impact statement
35	EM	Environmental Management
36	EMSL	Environmental Molecular Sciences Laboratory
37	Energy	formerly known as the Washington Public Power Supply System (WPPSS)
38	Northwest	
39	EPA	U.S. Environmental Protection Agency
40	EPZ	emergency planning zone
41	ERDF	Environmental Restoration Disposal Facility
42	ESU	Evolutionary Significant Units
43	EUZ	exclusive use zone
44	FFCA	<i>Federal Facilities Compliance Act of 1992</i>
45	FFTF	Fast Flux Test Facility
46	RI/FS	Remedial Investigation/Feasibility Study
47	FONSI	Finding of No Significant Impact
48	Working Group	Future Site Uses Working Group

1	GIS	Geographic Information System
2	GMA	Growth Management Act
3	GSA	General Services Administration
4	HAB	Hanford Advisory Board
5	HAMMER	Hazardous Materials Management and Emergency Response
6	HAP	hazardous air pollutants
7	ha	hectares
8	HCRL	Hanford Cultural Resources Laboratory
9	HEAL	Hanford Education Action League
10	HEHF	Hanford Environmental Health Foundation
11	HGIS	Hanford Geographic Information System (database)
12	HMS	Hanford Meteorological Station
13	HRA-EIS	<i>Hanford Remedial Action Environmental Impact Statement and Comprehensive Land-Use Plan</i>
14	I&I	irreversible and irretrievable
15	ICBEMP	Interior Columbia Basin Ecosystem Management Project
16	ILCR	incremental lifetime cancer rate
17	INEEL	Idaho National Engineering and Environmental Laboratory
18	km <sup>2</sup>	square kilometers
19	LIGO	Laser Interferometer Gravitational-Wave Observatory
20	MEI	maximally exposed individual
21	mi <sup>2</sup>	square miles
22	MMI	Modified Mercalli Intensity
23	MOA	Memorandum of Agreement
24	MOX	mixed oxide
25	NAAQS	National Ambient Air Quality Standards
26	NARM	naturally occurring and accelerator-produced radioactive materials
27	NCO	NEPA Compliance Officer
28	NCP	National Contingency Plan
29	NEPA	<i>National Environmental Policy Act of 1969</i>
30	NERP	National Environmental Research Park
31	NOA	Notice of Availability
32	NOI	Notice of Intent
33	NPA	<i>Northwest Power Act</i>
34	NPDES	National Pollutant Discharge Elimination System
35	NPL	National Priorities List
36	NPPC	Northwest Power Planning Council
37	NPS	U.S. National Park Service
38	NWR	National Wildlife Refuge
39	OSHA	Occupational Safety and Health Administration
40	PCB	polychlorinated biphenyl
41	PFP	Plutonium Finishing Plant
42	PSD	Prevention of Significant Deterioration
43	PUD	Public Utility District
44	PUREX	Plutonium-Uranium Extraction
45	R&D	research and development
46	RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
47	RCW	Revised Code of Washington

1	REO	Real Estate Officer
2	RL	(Department of Energy) Richland Operations Office
3	RMP	Resource Management Plan
4	ROD	Record of Decision
5	SALDS	state-approved land disposal structure
6	SARA	<i>Superfund Amendments and Reauthorization Act of 1986</i>
7	SDWA	<i>Safe Drinking Water Act of 1974</i>
8	SEPA	<i>State Environmental Policy Act of 1971</i>
9	SHPO	State Historic Preservation Office
10	SMB	Site Management Board
11	SPAB	Site Planning Advisory Board
12	SRS	Savannah River Site
13	SSTs	single-shell tanks
14	TAP	toxic air pollutants
15	TRIDEC	Tri-City Industrial Development Council
16	TSCA	<i>Toxic Substances Control Act of 1976</i>
17	TSD	Treatment, Storage and Disposal
18	TSP	total suspended particulates
19	TWRS	Tank Waste Remediation System
20	UBC	Uniform Building Code
21	USACE	U.S. Army Corps of Engineers
22	USFWS	U.S. Fish and Wildlife Service
23	VOC	volatile organic compounds
24	WAC	Washington Administrative Code
25	WCAA	<i>Washington Clean Air Act of 1991</i>
26	WDFW	Washington Department of Fish and Wildlife
27	WNP-2	Washington Nuclear Plant Number 2
28	WSU-TC	Washington State University - Tri-Cities
29	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.

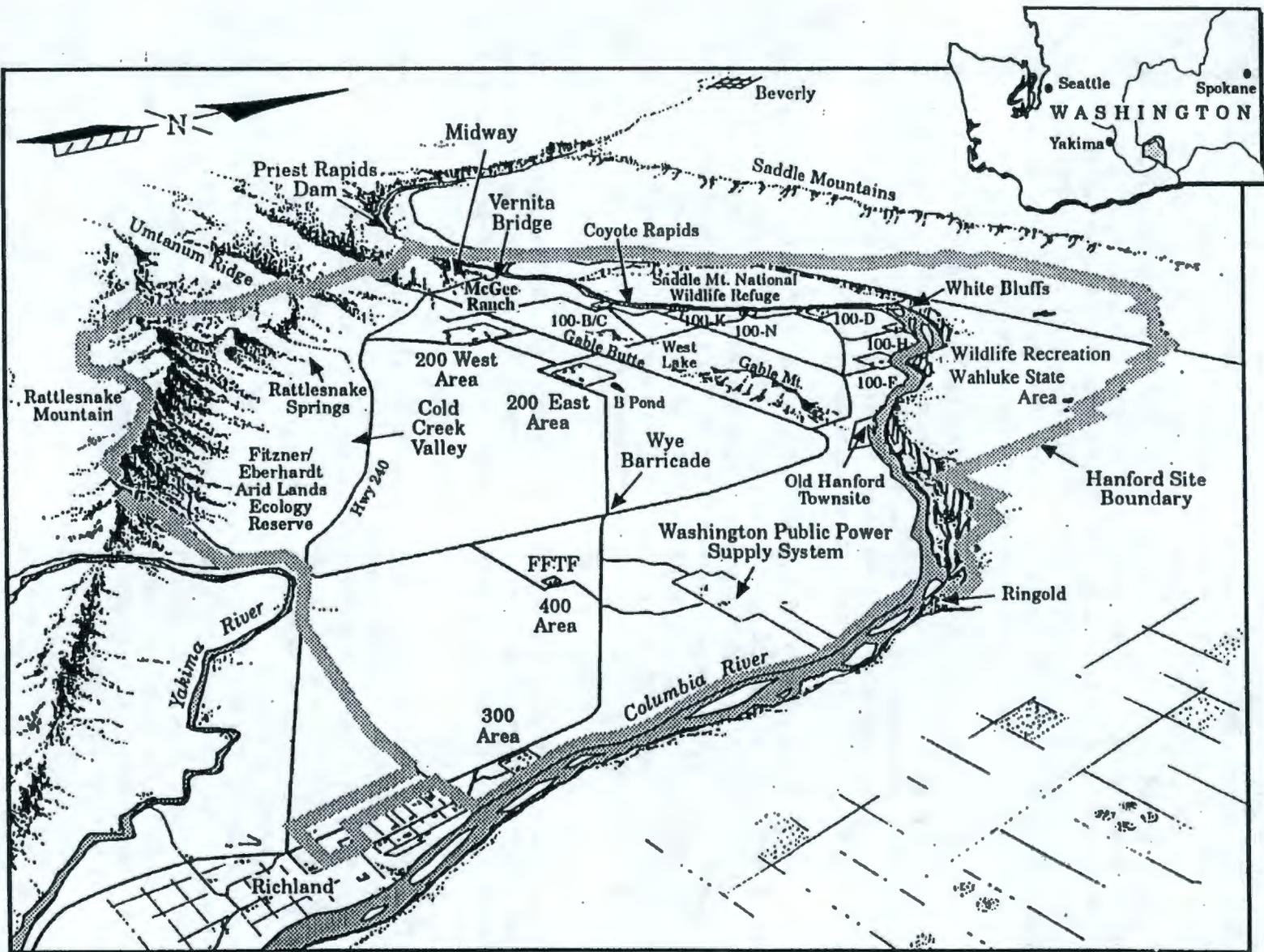
As with all Federal activities, where, when, and how quickly Hanford waste sites are remediated and proposed land uses are achieved depends on Congressional funding. The Tri-Party Agreement, which defines the schedule for clean-up activities at the Hanford Site, is itself dependent on Congressional funding. 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<sup>2</sup>) (586 square miles [mi<sup>2</sup>]) 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.



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1 **ES1.1 The National Environmental Policy Act**

2  
3 The *National Environmental Policy Act of 1969* (NEPA) requires consideration of  
4 potential environmental impacts associated with Federal agency actions, and provides  
5 opportunities for public involvement in the decision-making process.  
6

7 In August 1996, DOE published the *Draft Hanford Remedial Action Environmental*  
8 *Impact Statement and Comprehensive Land Use Plan* for public review. In response to  
9 comments received on the Draft HRA-EIS (see Appendix F of EIS), DOE decided to reduce the  
10 scope and issue a Revised Draft. Because the original EIS provided for consideration of land  
11 use, no further scoping meetings were required, and; as Implementation Plans were no longer  
12 required by DOE, the Implementation Plan was not reissued.  
13

14 The Revised Draft HRA-EIS evaluates the potential environmental impacts associated  
15 with establishing land uses at the Hanford Site for at least the next 50 years, defers the  
16 evaluation of impacts associated with remedial actions to Tri-Party Agreement documents, and  
17 includes the entire Hanford Site within the scope of the document. The major differences  
18 between this Revised Draft HRA-EIS, and the August 1996 Draft HRA-EIS are as follows:  
19

- 20 • The Revised Draft HRA-EIS focuses on land-use impacts and decisions rather than  
21 potential remediation impacts.
- 22
- 23 • Each alternative in the Revised Draft HRA-EIS features a site-wide map designating  
24 land uses, whereas alternatives in the August 1996 Draft HRA-EIS focused on  
25 individual geographic areas.
- 26
- 27 • The Revised Draft HRA-EIS includes DOE's Preferred Alternative as well as new  
28 land-use alternatives developed by the cooperating agencies and consulting Tribal  
29 governments.
- 30
- 31 • The Revised Draft HRA-EIS contains proposed land-use policies and implementing  
32 procedures that would be integrated into the Hanford CLUP (see Chapter ES-6).  
33

34 Refocusing the HRA-EIS is consistent with 42 USC 7274k (Public Law 104-201,  
35 Section 3153 [as amended]), which requires the development of a future-use plan for the  
36 Hanford Site; and is responsive to public comments received during scoping and during the  
37 public comment period on the original draft (see DEIS, Appendix F). Refocusing the EIS also  
38 provides a basis for considering potential future proposals regarding transferring ownership and  
39 control of some or all of the Hanford Site. As the original EIS provided for consideration of land  
40 use, no additional scoping meetings were required.  
41

42 Since March 1997, DOE has worked with the cooperating agencies and consulting  
43 Tribal governments to establish a framework for the environmental analyses presented in this  
44 Revised Draft HRA-EIS. Substantial agreement was reached among the cooperating agencies  
45 and consulting Tribal governments on the development of land-use designations and on the  
46 format for determining the potential environmental impacts associated with the land uses  
47 carried forward in this EIS. The cooperating agencies and consulting Tribal governments also  
48 worked together to develop the proposed CLUP policies and implementing procedures.  
49  
50

1       **ES1.2       National Environmental Policy Act and Other Environmental**  
2                   **Reviews**

3  
4               Past land-use commitments based on other NEPA documents, as well as CERCLA  
5       RODs addressing remediation, have had a direct impact on the development of the land-use  
6       alternatives presented in the Revised Draft HRA-EIS. These documents are listed in the  
7       following sections.

8  
9       **ES1.2.1   NEPA Reviews Affecting the Hanford Site**

- 10           • *Waste Management Operations, Hanford Reservation, Richland, Washington*  
11            (ERDA-1538, December 1975)
- 12  
13           • *Double-Shell Tanks for Defense High-Level Radioactive Waste Storage, Hanford*  
14            *Site, Richland, Washington (DOE/EIS-0062, April 1980)*
- 15  
16           • *Decommissioning of the Shippingport Atomic Power Station, Hanford Site, Richland,*  
17            *Washington (DOE/EIS-0080, May 1982)*
- 18  
19           • *Operation of PUREX and Uranium Oxide Plant Facilities, Hanford Site, Richland,*  
20            *Washington (DOE/EIS-0089, February 1983)*
- 21  
22           • *Disposal and Decommissioning, Defueled Naval Submarine Reactor Plants (Lead*  
23            *Agency - Department of the Navy; DOE was a Cooperating Agency) (No document*  
24            *no., May 1984)*
- 25  
26           • *Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes, Hanford*  
27            *Site, Richland, Washington (DOE/EIS-0113, December 1987)*
- 28  
29           • *Decommissioning of Eight Surplus Production Reactors at the Hanford Site,*  
30            *Richland, Washington (DOE/EIS-0119, December 1991)*
- 31  
32           • *Tank Waste Remediation System, Hanford Site, Richland, Washington*  
33            *(DOE/EIS-0189, August 1996)*
- 34  
35           • *Waste Management Programmatic Environmental Impact Statement (DOE/EIS-*  
36            *0200, May 1997)*
- 37  
38           • *Programmatic Spent Nuclear Fuel Management and Idaho National Engineering*  
39            *Laboratory Environmental Restoration and Waste Management Programs*  
40            *(DOE/EIS-0203, April 1995)*
- 41  
42           • *Safe Retrieval, Transfer and Interim Storage of Hanford Tank Wastes, Hanford Site,*  
43            *Richland, Washington (DOE/EIS-0212, October 1995)*
- 44  
45           • *Plutonium Finishing Plant Stabilization Environmental Impact Statement*  
46            *(DOE/EIS-0244, May 1996)*
- 47  
48           • *Management of Spent Nuclear Fuel from the K Basins Hanford Site, Richland,*  
49            *Washington (DOE/EIS-0245, January 1996)*
- 50  
51

- 1 • *Disposal of Decommissioned, Defueled Cruiser, Ohio Class, and Los Angeles Class*
- 2 *Naval Reactor Plants Environmental Impact Statement* (Adopted by DOE as
- 3 DOE/EIS-0259, April 1996)
- 4
- 5 • *Hanford Reach of the Columbia River, Comprehensive River Conservation Study*
- 6 *and Final Environmental Impact Statement* (Hanford Reach EIS) (National Park
- 7 Service, June 1994)
- 8
- 9 • *Storage and Disposition of Weapons-Usable Fissile Materials Programmatic*
- 10 *Environmental Impact Statement* (DOE/EIS-0229, November 1996)
- 11
- 12 • *Surplus Plutonium Disposition Environmental Impact Statement* (DOE/EIS-0283)
- 13
- 14 • *Columbia River System Operation Review Environmental Impact Statement*
- 15 (DOE/EIS-0170, November 1995)
- 16
- 17 • *Environmental Impact Statement for the Geologic Repository for the Disposal of*
- 18 *Spent Nuclear Fuel and High Level Radioactive Waste at Yucca Mountain, Nye*
- 19 *County, Nevada* (DOE/EIS-0250) – in preparation.
- 20
- 21 • *Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental*
- 22 *Impact Statement* (DOE/EIS-0286) – in preparation.
- 23
- 24 • *Proposed Production of Plutonium-238 (Pu-238) for Use in Advanced Radioisotope*
- 25 *Power Systems (RPS) for Space Missions* (DOE/EIS-0299) – in preparation.
- 26
- 27 • *Transfer of the Heat Source/Radioisotope Thermoelectric Generator Assembly and*
- 28 *Test Operations From Mound Site* (DOE/EIS-0302) – in preparation.
- 29

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

- 31
- 32 • Commercial Low-Level Radioactive Waste Disposal Site (U.S. Ecology) on the
- 33 Hanford Site Environmental Impact Statement – in preparation.
- 34
- 35 • City of Richland Comprehensive Plan/Environmental Impact Statement
- 36 (August 1997).
- 37
- 38 • SEPA EIS on Treatment of Low-Level Mixed Wastes (Allied Technology Group) City
- 39 of Richland EIS (EA6-97, March 1998).
- 40
- 41 • Draft Benton County Comprehensive Plan (SEPA EIS Addendum) (September
- 42 1997)
- 43

#### 44 **ES1.2.3 CERCLA Reviews Affecting the Hanford Site**

- 45
- 46 • 1100 Area Remediation – 1100-EM-1, 1100-EM-2, 1100-EM-3, and 1100-IU-1. Final
- 47 Record of Decision (ROD) issued September 24, 1993; certified remedial action -
- 48 July 1996; delisted from National Priorities List (NPL).
- 49
- 50 • 300 Area Remediation – 300-FF-1, 300-FF-5. Final ROD issued July 17, 1996.
- 51 Remedial Investigation/Feasibility Study (RI/FS) for NPL Site - to be completed after
- 52 all operable units are addressed.
- 53

- 1 • 100 Area Remediation – 100-BC-1, 100-HR-1, and 100-DR-1. Interim ROD for  
2 37 high-priority waste sites issued September 1995. The ROD was amended May  
3 14, 1997, to include additional waste sites.
- 4
- 5 • 100-HR-3/100-KR-4 (groundwater operable units). Interim ROD issued April 1,  
6 1996.
- 7
- 8 • 100-IU-1, 100-IU-3, 100-IU-4, 100-IU-5. Interim ROD issued February 12, 1996.  
9
- 10 RI/FS for NPL Site – to be completed after all operable units are addressed.
- 11
- 12 • 200 Area Remediation – Environmental Restoration Disposal Facility - Final ROD  
13 issued January 1995.
- 14
- 15 200-ZP-1 (groundwater operable unit). Interim ROD issued June 5, 1995.
- 16
- 17 200-UP-1 (groundwater operable unit). Interim ROD issued February 24, 1997.
- 18
- 19 RI/FS for NPL site – to be completed after all operable units are addressed.
- 20

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

### 30 **ES1.3 Hanford Site Planning Efforts**

31  
32  
33 Several Hanford Site planning documents have been developed to address the various  
34 information needs of DOE managers. These planning documents are periodically updated to  
35 reflect new information and DOE decisionmaking, such as the decision that DOE will make  
36 based on the HRA-EIS. Summarized below, these planning documents are:

- 37
- 38 • **Draft Hanford Cultural Resources Management Plan** – The CRMP establishes  
39 guidance for the identification, evaluation, recordation, curation, and management of  
40 archaeological, historic, and traditional cultural resources. The plan specifies  
41 methods of consultation with affected Tribes, government agencies, and interested  
42 parties; and includes strategies for the preservation and/or curation of representative  
43 properties, archives, and objects.
- 44
- 45 • **Draft Hanford Biological Resources Management Plan (BRMaP)** – The BRMaP  
46 provides DOE and DOE contractors with a consistent approach for protecting  
47 biological resources and for monitoring, assessing, and mitigating impacts to  
48 biological resources from site development and environmental restoration activities.  
49 The BRMaP provides a comprehensive direction that specifies DOE biological  
50 resource policies, goals, and objectives.
- 51

- 1 • **Hanford Strategic Plan** – This plan articulates DOE's vision and commitments to a  
2 long-range strategic direction for Hanford Site missions. The strategic plan provides  
3 a basis for decisions and actions to achieve DOE goals.
- 4
- 5 • **Accelerating Cleanup: Paths to Closure at the Hanford Site** – A revision of  
6 DOE's 2006 Plan, this document builds on an already accelerated pace of activities  
7 and numerous efficiencies implemented at the Hanford Site during the last few  
8 years. It commits to significant cleanup progress on the Site by 2006, while  
9 recognizing that much of the cleanup effort will remain beyond 2006.
- 10
- 11 • **Hanford Site Ground-Water Protection Management Plan and Management and**  
12 **Integration of Hanford Site Groundwater and Vadose Zone Activities** – These  
13 documents provide management and protection guidelines to protect Hanford  
14 groundwater from radioactive and nonradioactive hazardous substances.
- 15

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

#### 21 **ES1.4 Integrating Planning Efforts by Other Governments and** 22 **Agencies**

23  
24 This section includes information supplied to DOE by representatives of other local  
25 governments and agencies about their respective planning efforts. The concept of "agreeing to  
26 disagree" on issues such as Tribal treaty rights allowed the agencies to set aside differences  
27 and to work together on the land-use planning process.

##### 28 29 **ES1.4.1 Tribal Rights**

30  
31 Tribal governments and DOE agree that the Tribal governments' treaty-reserved right of  
32 taking fish at all "usual and accustomed" places applies to the Hanford Reach of the Columbia  
33 River where it passes through Hanford.

34  
35 Tribal governments and DOE, however, disagree over the applicability of Tribal  
36 members' treaty-reserved rights to hunt, gather plants, and pasture livestock on the Hanford  
37 Site. The Tribal governments and DOE have decided not to delay completion and  
38 implementation of a comprehensive land-use plan for the Hanford Site. Instead, the Tribes and  
39 DOE have gone ahead with the land-use planning process while reserving all rights to assert  
40 their respective positions regarding treaty rights. Neither the existence of this EIS nor any  
41 portion of its contents is intended to have any influence over the resolution of the treaty rights  
42 dispute.

##### 43 44 **ES1.4.2 Other Federal Agencies**

45  
46 In 1943, the U.S. Army Corps of Engineers (USACE) began the acquisition of the  
47 Hanford Site. Public land managed by the BLM was withdrawn from BLM and placed under  
48 DOE control by a land withdrawal order. BoR land was placed under DOE control by a  
49 Memorandum of Agreement (MOA) and, finally, land was purchased (sometimes via  
50 condemnation) from private owners. Today, DOE continues to manage these acquired lands,  
51 which form a checkerboard pattern of underlying ownership over large portions of the Hanford  
52 Site (see Figure ES-20).

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

12  
13 In addition to BoR's irrigation system maintenance activities, DOE lands on the Wahluke  
14 Slope are managed in part by the Washington Department of Fish and Wildlife (WDFW) as the  
15 Wahluke State Wildlife Recreation Area and, in part, by the USFWS as the Saddle Mountain  
16 National Wildlife Refuge.

17  
18 The USFWS is managing the Fitzner-Eberhardt Arid Lands Ecology Reserve (ALE  
19 Reserve) under a cooperative agreement with DOE that was signed on August 27, 1997. The  
20 USFWS will be preparing a Comprehensive Conservation Plan (CCP) (equivalent to an Area  
21 Management Plan [AMP]; see Chapter ES-6) for the ALE Reserve.

22  
23 Aside from BoR, BLM, and the USFWS current management responsibilities, the U.S.  
24 National Park Service (NPS), with DOE as a co-preparer, completed an EIS in 1994 for the  
25 Hanford Reach of the Columbia River. The *Hanford Reach of the Columbia River,*  
26 *Comprehensive River Conservation Study and Final Environmental Impact Statement* (Hanford  
27 Reach EIS) examined alternatives for preservation of the resources and features of the Hanford  
28 Reach (including addition of the Hanford Reach to the National Wild and Scenic Rivers  
29 System), and evaluated impacts that could result from various uses of the river. The DOI's  
30 ROD recommended that the Congress designate Federally owned and privately owned lands  
31 within 0.4 km (0.25 mi) of the Columbia River, on both banks from river mile 396 to 346.5 as  
32 a Recreational River under the Wild and Scenic Rivers System; and the portion of the  
33 Hanford Site that lies north of the river, as a National Wildlife Refuge that is to be managed by  
34 the USFWS. Congress is still contemplating actions that are necessary to implement the DOI's  
35 ROD.

36  
37 In addition to the proposed wild and scenic discussions, other discussions have  
38 occurred to swap certain parcels of land in the State of Washington from the Secretary of  
39 Energy to the Secretary of the Interior, affecting ownership of about 197 km<sup>2</sup> (75 mi<sup>2</sup>) of the  
40 Hanford Site. This swap would consolidate the scattered Benton County portion of Hanford's  
41 BLM Public Domain lands into an area beginning near 100-D, running south and east along the  
42 Columbia River shore, to just north of Energy Northwest (formerly the Washington Public Power  
43 Supply System [WPPSS]) and then west to Gable Mountain.

44  
45 As long as these lands are needed by DOE (i.e., still withdrawn from BLM by DOE), this  
46 legislative action would not affect DOE's administration of the areas involved. The DOE's use  
47 of withdrawn BLM Public Domain lands is consistent with most land-use designations with the  
48 exceptions of Industrial Exclusive, Research and Development, High-Intensity Recreation, or  
49 Industrial designations where BLM's multiple-use mandate would be limited by an extensive  
50 infrastructure.

1 **ES1.4.3 Local Governments**

2  
3 Portions of the Hanford Site lie within Benton, Franklin, Adams, and Grant counties.  
4 The primary contaminated portion of the Site falls within Benton County, and parts of the  
5 Wahluke Slope fall within Franklin, Grant, and Adams counties. The City of Richland is located  
6 in Benton County at the southern boundary of the Hanford Site, and considerable development  
7 within the city limits and adjacent to the Site has already occurred.  
8

9 Most planning by local governments falls under the *State of Washington Growth*  
10 *Management Act of 1990 (GMA)*, which established a statewide planning framework and  
11 created roles and responsibilities for planning at the local, regional, and state level. The GMA  
12 required the largest and fastest growing counties, and cities within those counties, to develop  
13 new comprehensive plans (counties not required to plan may elect to do so). Benton, Franklin,  
14 and Grant counties, as well as the City of Richland, have elected to plan under the GMA  
15 requirements.  
16

17 **ES1.4.3.1. Benton County.** Benton County is preparing a comprehensive land-use  
18 plan that covers the entire county, including a portion of the Hanford Site. As a cooperating  
19 agency, Benton County's government does not agree with the Tribal view that Hanford lands  
20 are "open and unclaimed." As part of its planning effort, Benton County has developed a  
21 proposed critical areas map (see Figure ES-15). Critical areas include wetlands, areas with a  
22 critical recharging effect on aquifers used for potable water, fish and wildlife habitat  
23 conservation areas, frequently flooded areas, and geologically hazardous areas.  
24

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

29 **ES1.4.3.2. City of Richland.** The City of Richland plans in coordination with Benton  
30 County under the GMA. Future land use at the Hanford Site has the potential to affect the  
31 economic development of Richland. The City of Richland has identified portions of the southern  
32 Hanford Site suitable for urban development and possible annexation (see Figure ES-16).  
33

34 **ES1.4.3.3. Grant, Franklin, and Adams Counties.** Grant, Franklin, and Adams  
35 counties coordinate local land-use planning for the Wahluke Slope. The three counties, along  
36 with the Port of Mattawa, have expressed a desire to implement a land-use plan that would  
37 accommodate increased agricultural activities, including irrigated cropping systems, along with  
38 wildlife and cultural resource protections (see Figure ES-17).  
39  
40

41 **ES2.0 Purpose and Need**

42  
43 The DOE has several missions to fulfill at the Hanford Site that have competing natural  
44 resource consumption needs and management values. Governments and stakeholders within  
45 the region have an interest in Hanford resources and in management of those resources over  
46 the long-term. The DOE needs to assess the relative qualities of Hanford's resources, compare  
47 the priorities and needs of Hanford's missions, and reach decisions such as the identification  
48 and disposal of any excess lands. DOE Order 430.1 and 42 USC 7274k require a land-use  
49 plan for the Hanford Site. The *Revised Draft Hanford Remedial Action Environmental Impact*  
50 *Statement and Comprehensive Land-Use Plan (HRA-EIS) (DOE/EIS-0222D)* provides the  
51 analysis needed to adopt a land-use plan.  
52

1 The role of the HRA-EIS is to document, in the public forum, the process of determining  
2 the best combination of land uses required to meet DOE mission needs for at least the next  
3 50 years.  
4  
5

### 6 **ES3.0 Proposed Action and Alternatives**

7

8 The proposed action for the HRA-EIS is to develop and implement a comprehensive  
9 land-use plan for the Hanford Site. Federal law (42 USC 7274k) requires that the land-use plan  
10 address at least a 50-year planning period, although some specific DOE activities such as  
11 decommissioning of reactors are expected to take longer. A comprehensive land-use plan  
12 consisting of a land-use map, land-use policies and implementing procedures would be adopted  
13 in the ROD for this EIS. Once established, this land-use plan would provide a framework for  
14 making land-use and facility-use decisions.  
15

16 Six land-use alternatives (including the No-Action) were developed by the nine  
17 Cooperating Agencies and Consulting Tribal Governments using common land-use  
18 designations and definitions. With the exception of the No-Action Alternative, each of the six  
19 alternatives presented represents a Tribal, Federal, state, or local agency's Preferred  
20 Alternative.  
21

22 **No-Action Alternative.** This alternative, developed by DOE in compliance with the National  
23 Environmental Policy Act of 1969 (NEPA), presents the current status of land use at the  
24 Hanford Site and represents no change from current land-management processes or  
25 intergovernmental relationships with the cooperating agencies. Specific land-use decisions for  
26 Hanford would continue to be made under the NEPA process and the Tri-Party Agreement,  
27 based on the *Hanford Strategic Plan* (Mission Plan) and on a project-by-project basis.  
28

29 **DOE's Preferred Alternative.** DOE's Preferred Alternative anticipates multiple uses of  
30 Hanford, including anticipated future DOE missions, non-DOE Federal missions, and other  
31 public and private-sector land uses. The DOE Preferred Alternative would do the following:  
32

- 33 • *for the clean-up mission* – consolidate waste management operations on 50.1 km<sup>2</sup>  
34 (20 mi<sup>2</sup>) in the Central Plateau of the site
- 35
- 36 • *for the economic development mission* – allow industrial development in the eastern and  
37 southern portions of Hanford and increase recreational access to the Columbia River  
38
- 39 • *for the Natural Resource Trustee mission* – expand the existing Saddle Mountain  
40 National Wildlife Refuge to include all of the Wahluke Slope (North Slope) of the Site,  
41 consistent with the 1994 Hanford Reach EIS and 1996 Hanford Reach ROD; place the  
42 Arid Lands Ecology Reserve (ALE Reserve) under USFWS management by permit; and  
43 ensure that, where practicable, withdrawn BLM lands are clean enough to support  
44 BLM's multiple-use mandate (i.e., mining and grazing).  
45

46 **Alternative One (Natural Resource Trustee).** The USFWS's alternative emphasizes a  
47 Federal stewardship role for managing the natural resources at Hanford. This alternative  
48 considers these resources in a regional context, and would expand the existing Saddle  
49 Mountain National Wildlife Refuge to include all of the Wahluke Slope (North Slope), the  
50 Riverlands, McGee Ranch, and the ALE Reserve (e.g., all of the Hanford lands north and east  
51 of the Columbia River and west of State Highways 24 and 240). The vision of Alternative One  
52 is to conserve the Hanford Site shrub-steppe ecosystem and protect the Hanford Reach.  
53

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

10  
11 **Alternative Three (Cities and Counties).** This local governments' alternative is based on the  
12 individual planning efforts of local agencies and organizations including Benton County,  
13 Franklin County, Grant County, and the City of Richland. Alternative Three recognizes the  
14 potential that land use at the Hanford Site has in relation to economic development. Alternative  
15 Three would allow dryland (non-irrigated) agricultural and grazing activities, and irrigated  
16 agriculture on the Hanford Site. The land-use designations contained in Alternative Three were  
17 developed consistent with local availability of infrastructure, nearness of urban areas, soils  
18 capabilities, and current use patterns.

19  
20 **Alternative Four (Confederated Tribes of the Umatilla Indian Reservation, [CTUIR]).** This  
21 CTUIR alternative calls for preservation of natural resources and areas of religious importance  
22 to the CTUIR as well as traditional Tribal use at the Site. Both this alternative and Alternative  
23 Two (developed by the Nez Perce Tribe, Department of Environmental Restoration and Waste  
24 Management) reflect Tribal visions and views of Tribal treaty rights and traditional Tribal uses of  
25 Hanford lands. The Tribes and DOE have "agreed to disagree" on the interpretation of treaty  
26 rights on Hanford lands in the interest of moving the EIS process forward. Each party reserves  
27 the right to assert its respective interpretation of treaty rights at Hanford.

28  
29 The land-use designations and their definitions shown in Table ES-1 were co-written by  
30 the cooperating agencies and consulting Tribal governments so alternative land-use plans  
31 could be commonly developed and compared.

32  
33 Based on goals, objectives, and values (vision) of the cooperating agencies and  
34 consulting Tribal governments, the land-use designations were applied to specific geographic  
35 areas of the Hanford Site (Figure ES-2). This process resulted in the development of the five  
36 alternatives (six, including the No-Action Alternative) that are presented and analyzed in the  
37 Revised Draft HRA-EIS.

38  
39 Following development of the alternatives, an analysis of potential environmental  
40 impacts resulting from the proposed land uses associated with each alternative was conducted.  
41 With the exception of DOE's Preferred Alternative and the No-Action Alternative (both of which  
42 were written by DOE), the narratives of each alternative do not contain precisely parallel  
43 information because each alternative was written by a separate cooperating agency or  
44 consulting Tribal government with differing management goals. A summary of the results of the  
45 impact analyses from the EIS is presented in Section ES5.0 (Table ES-5).

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

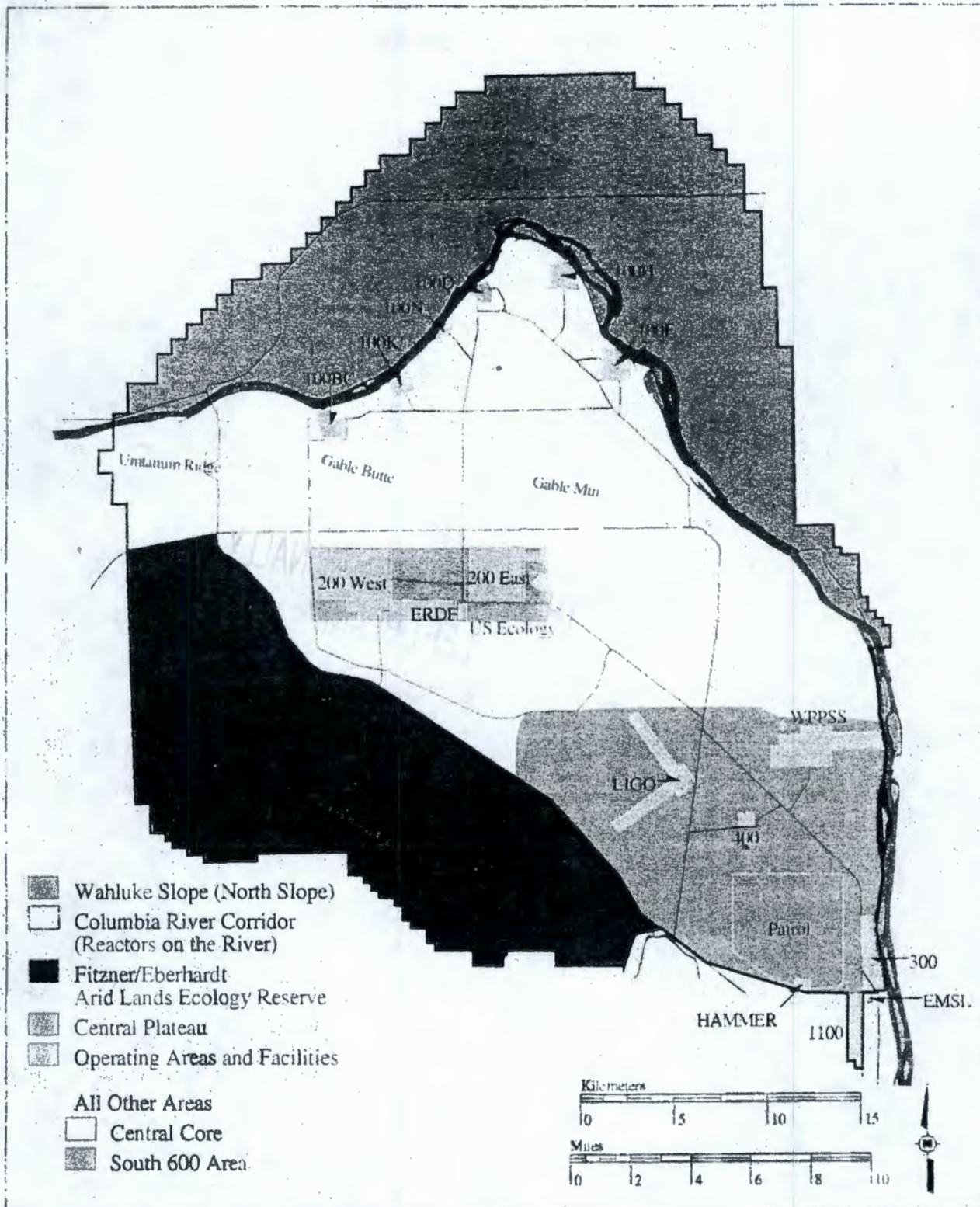
Land-Use Designation	Definition
Industrial-Exclusive	An area suitable and desirable for treatment, storage, and disposal of hazardous, dangerous, radioactive, and nonradioactive wastes. Includes related activities consistent with Industrial-Exclusive uses.
Industrial	An area suitable and desirable for 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.

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



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

13  
14 **ES3.1.1 Wahluke Slope**

15  
16 The area of the Wahluke Slope currently managed by the USFWS would continue to be  
17 managed as Preservation. The area managed by the WDFW would continue to be managed  
18 as Conservation (Mining and Grazing). Limited public access would be allowed for hunting,  
19 fishing, or recreation; permitted mining and grazing would be allowed; and agricultural leases  
20 would continue.

21  
22 **ES3.1.2 Columbia River Corridor**

23  
24 The Columbia River would continue to be managed to allow limited public access and  
25 use as a Low-Intensity Recreation area. Access to the Columbia River's islands would remain  
26 restricted to protect cultural and biological resources. Public access to the Reactors on the  
27 River area (i.e., the 100 Areas) would remain restricted.

28  
29 **ES3.1.3 Central Plateau**

30  
31 Lands within the Central Plateau area would continue to be used for the management of  
32 radioactive and hazardous waste materials.

33  
34 **ES3.1.4 All Other Areas**

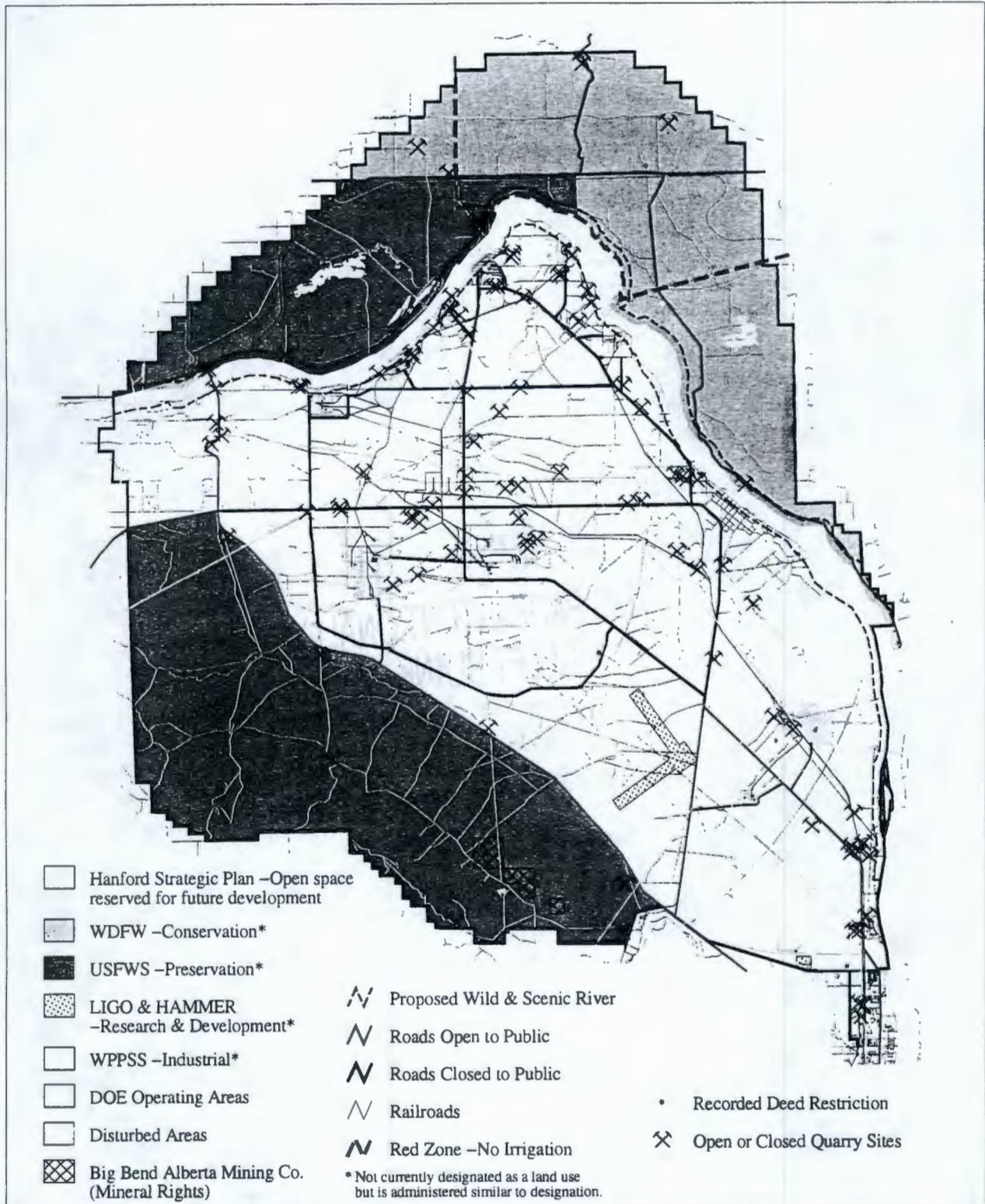
35  
36 These areas would be available for other Federal and non-Federal uses, which are  
37 consistent with safety, cultural, and biological resources protection requirements. The area  
38 north of the City of Richland would be used for industrial purposes. The lands in and adjacent  
39 to the 300 and 400 Areas would remain under Federal ownership but could be leased for  
40 private and public uses to support industrial and economic development. Other Federal uses  
41 would be allowed by permit (e.g., the Laser Interferometer Gravitational-Wave Observatory  
42 [LIGO]).

43  
44 **ES3.1.5 Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE Reserve)**

45  
46 The ALE Reserve geographic area would continue to be managed by the USFWS as  
47 Preservation. The Big Bend Alberta Mining Company holds mineral rights on about 5.2 km<sup>2</sup>  
48 (2 mi<sup>2</sup>) under the southern portion of the ALE Reserve.

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**Figure ES-3. No-Action Alternative.**



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

3 Much like the No-Action Alternative, DOE's Preferred Alternative was developed based  
4 on policies that are consistent with the *Hanford Strategic Plan*. However, unlike the No-Action  
5 Alternative, DOE's Preferred Alternative would establish land-use policies and implementing  
6 procedures that would place Hanford's land-use planning decisions in a regional context.  
7

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

- 12
- 13 • All surface waste sites, including those remediated (Figure ES-4)
- 14
- 15 • Groundwater contaminants and flow direction (Figures ES-5, ES-6, and ES-7)
- 16
- 17 • Cultural and biological resources (Figure ES-8)
- 18
- 19 • Exclusive Use Zones (EUZs) and Emergency Planning Zones (EPZs) associated  
20 with DOE and other Hanford activities (e.g., Energy Northwest's nuclear power  
21 reactor, U.S. Ecology's low-level waste disposal site, LIGO, etc.) (Figure ES-9).  
22

23 Land-use designations identified for DOE's Preferred Alternative are Industrial-  
24 Exclusive, Industrial, Research and Development, High-Intensity Recreation, Low-Intensity  
25 Recreation, Conservation (Mining and Grazing), Conservation (Mining), and Preservation.  
26 Figure ES-10 is a map of DOE's Preferred Alternative.  
27

28 **ES3.2.1 Wahluke Slope**  
29

30 The Saddle Mountain National Wildlife Refuge would be expanded to include all of the  
31 Wahluke Slope, consistent with the 1994 Hanford Reach EIS and 1996 Hanford Reach ROD.  
32 Until the USFWS develops an Area Management Plan (AMP) (e.g., Comprehensive  
33 Conservation Plan [CCP]) for the expanded refuge, the Wahluke Slope would be designated as  
34 Preservation to protect sensitive areas and species of concern with the exceptions near the  
35 Columbia River, as discussed in the Columbia River Corridor Section below. The USFWS  
36 would use their CCP process to develop wildlife compatible management plans.  
37

38 **ES3.2.2 Columbia River Corridor**  
39

40 The Columbia River Corridor would include High-Intensity Recreation, Low-Intensity  
41 Recreation, Conservation (Mining and Grazing), and Preservation. The river islands and a  
42 quarter mile buffer zone would be designated as Preservation to protect cultural and ecological  
43 resources.  
44

45 Four sites away from existing contamination would be designated as High-Intensity  
46 Recreation for visitor-serving activities and facilities development. The B Reactor would be  
47 converted into a museum and the surrounding areas would be available for museum-support  
48 facilities. The area near the Vernita Bridge would be expanded to include a boat ramp and  
49 other visitor facilities. Two areas on the Wahluke Slope would be designated as High-Intensity  
50 Recreation for potential exclusive Tribal fishing sites.  
51

52 The area west of the B Reactor would be designated Low-Intensity Recreation and used  
53 as a corridor between the High-Intensity Recreation areas associated with the B Reactor and

1 Vernita Bridge. A White Bluffs boat launch would be a Low-Intensity Recreation area located  
2 between the H and F Reactors. Other areas would include visitor facilities near the old Hanford  
3 High School and a support site near Energy Northwest (formerly WPPSS) for hiking and biking  
4 trails from Richland to the Vernita rest stop.  
5

6 The remainder of the land within the Columbia River Corridor outside the quarter mile  
7 buffer zone would be designated for Conservation (Mining and Grazing). In the Corridor,  
8 grazing would be used for fire and weed management and mining would be permitted only in  
9 support of the cleanup mission.  
10

### 11 **ES3.2.3 Central Plateau**

12  
13 The Central Plateau would be designated for Industrial-Exclusive use. This would allow  
14 for continued waste management operations within the Central Plateau geographic area.  
15

### 16 **ES3.2.4 All Other Areas**

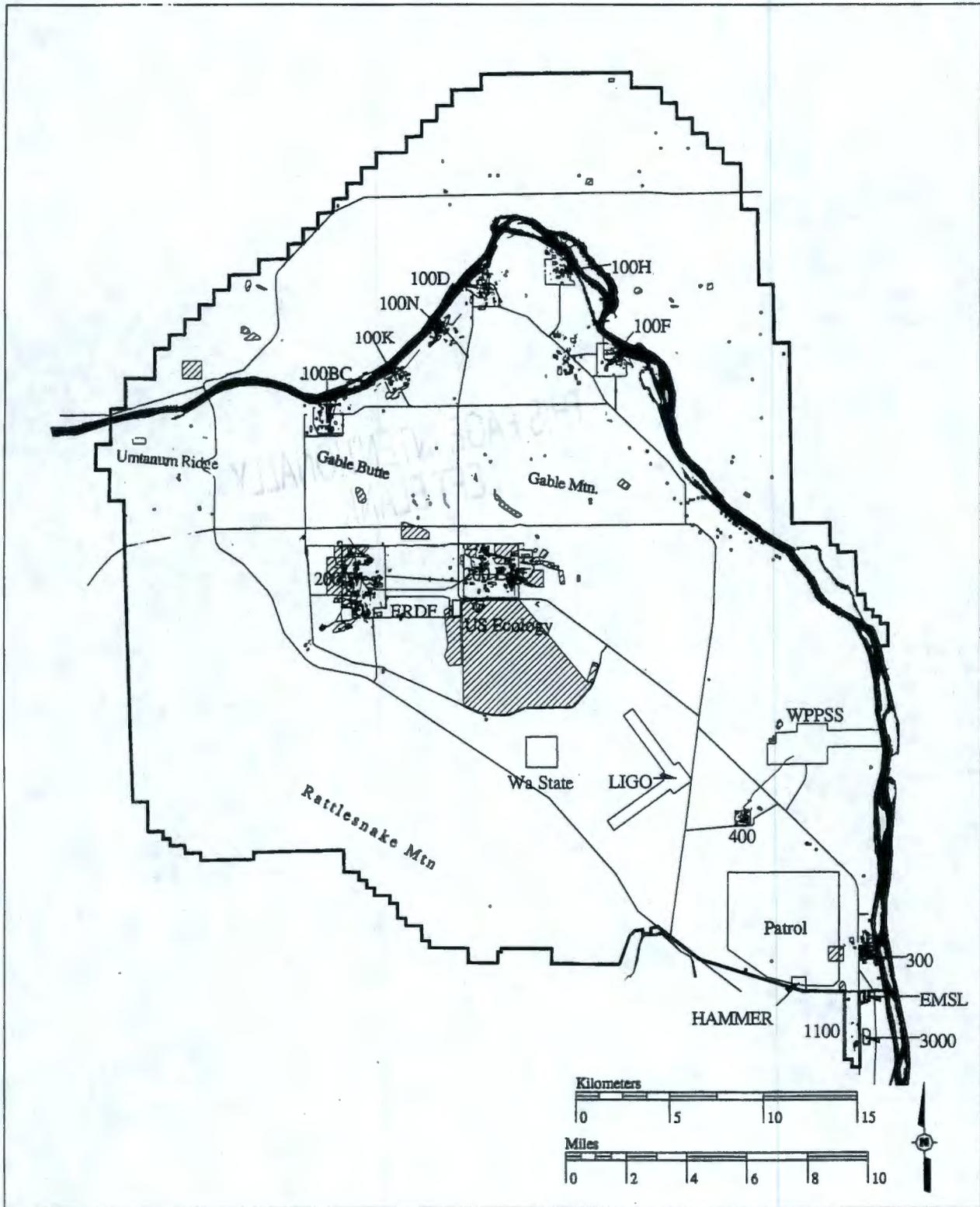
17  
18 Within the All Other Areas geographic area, the Preferred Alternative would include  
19 Industrial, Research and Development, High-Intensity Recreation, Low-Intensity Recreation,  
20 Conservation (Mining and Grazing), and Preservation land-use designations.  
21

22 The majority of the All Other Areas would be designated Conservation (Mining and  
23 Grazing) to support a possible BLM mission of multiple uses. Two distinct areas, one located  
24 east of the 200 Area and the other located north of Richland, would be designated for Industrial  
25 use to support economic development. An area west of Highway 10 and east of State  
26 Highway 240 would be designated for Research and Development to support economic  
27 diversification and DOE's Energy Research mission. Gable Mountain, Gable Butte, the area  
28 from Umtanum Ridge to the ALE Reserve, and the active sand dunes areas would be  
29 designated as Preservation to protect sensitive cultural and biological resources. Washington  
30 State land that is deed restricted to waste management would be designated as Conservation  
31 (Mining and Grazing).  
32

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

34  
35 Nearly all of the ALE Reserve geographic area would be designated as Preservation. A  
36 portion of the ALE Reserve would be managed as Conservation (Mining) for a basalt and fine  
37 soils landfill cover source during the remediation of the Hanford Site.  
38  
39

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

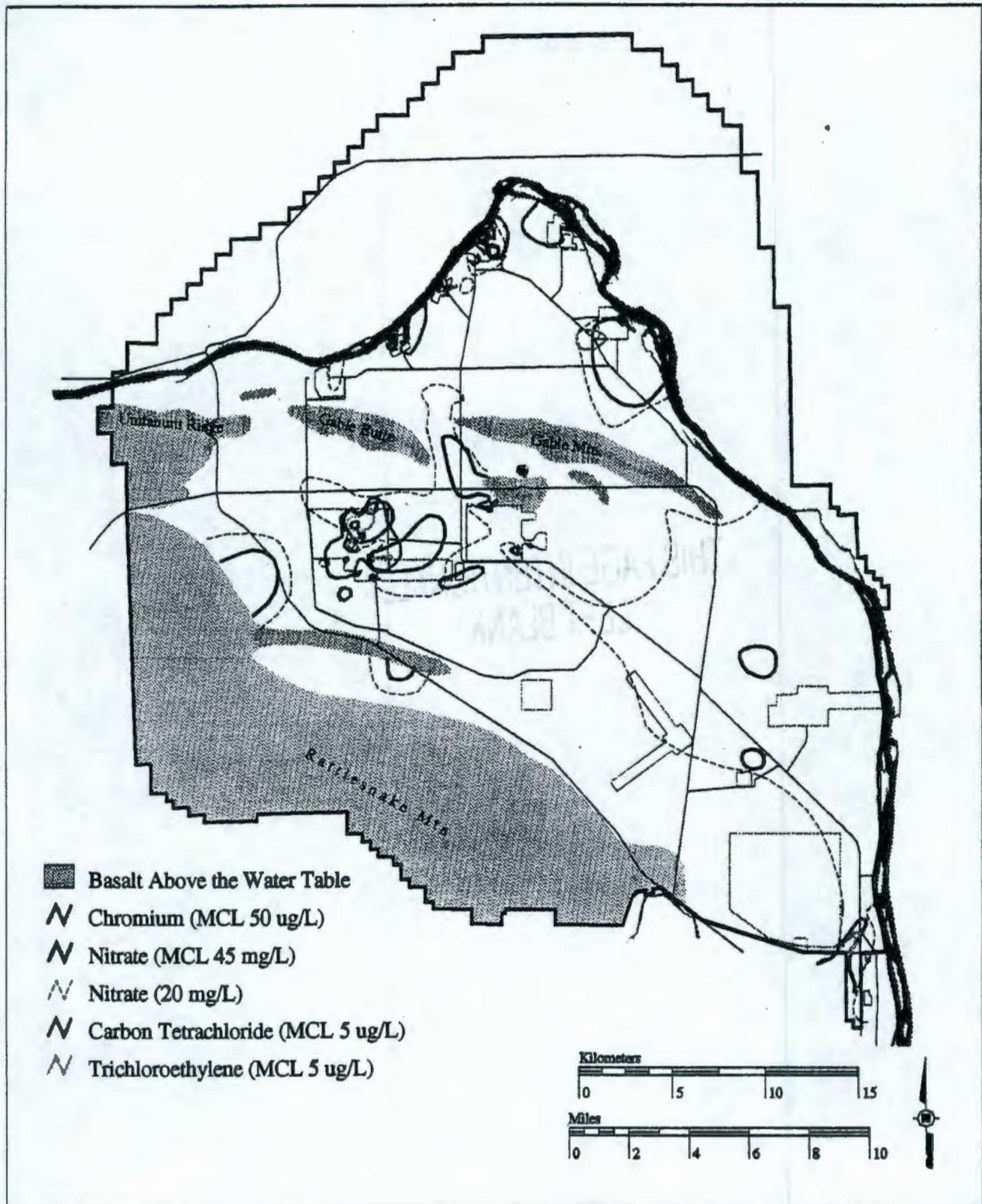


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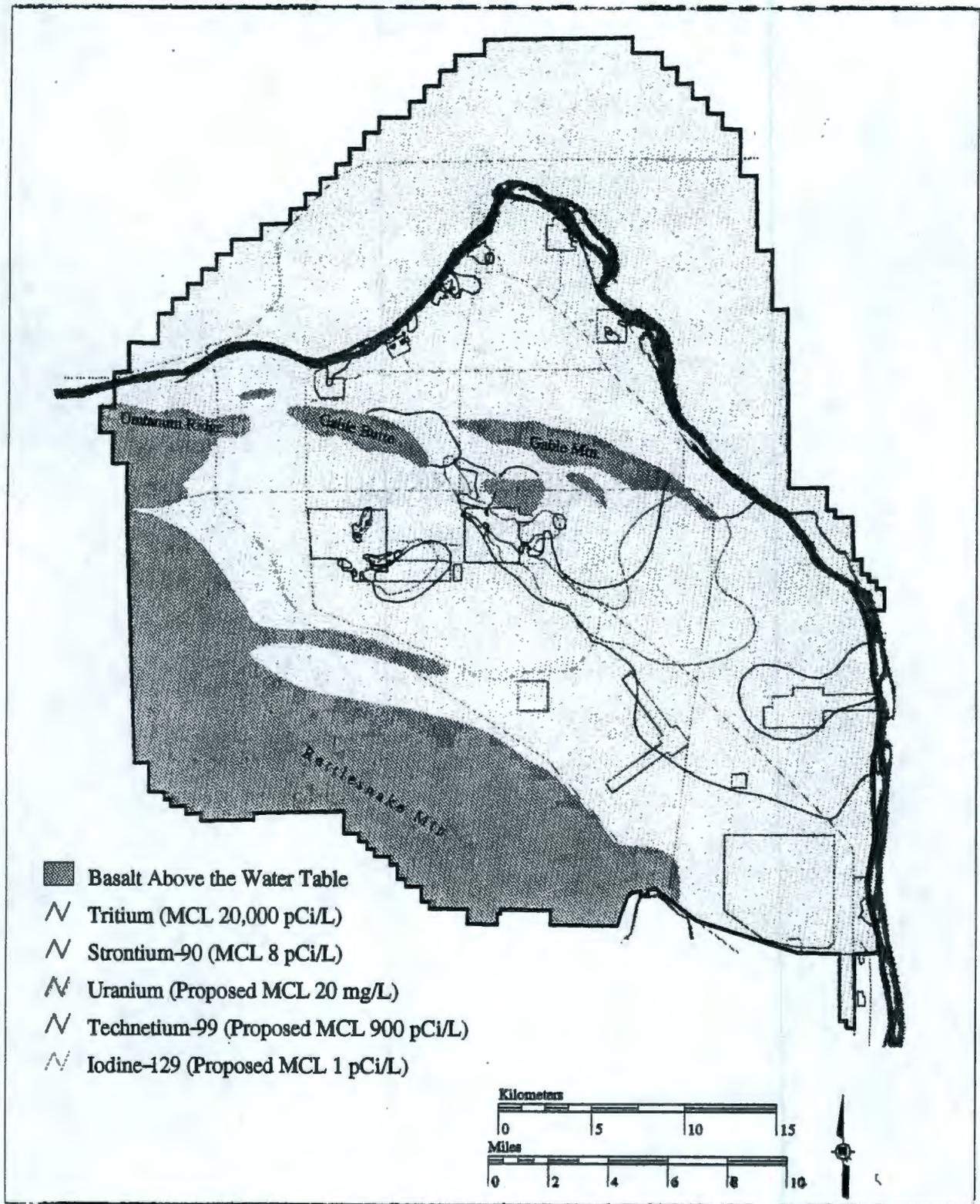
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3

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



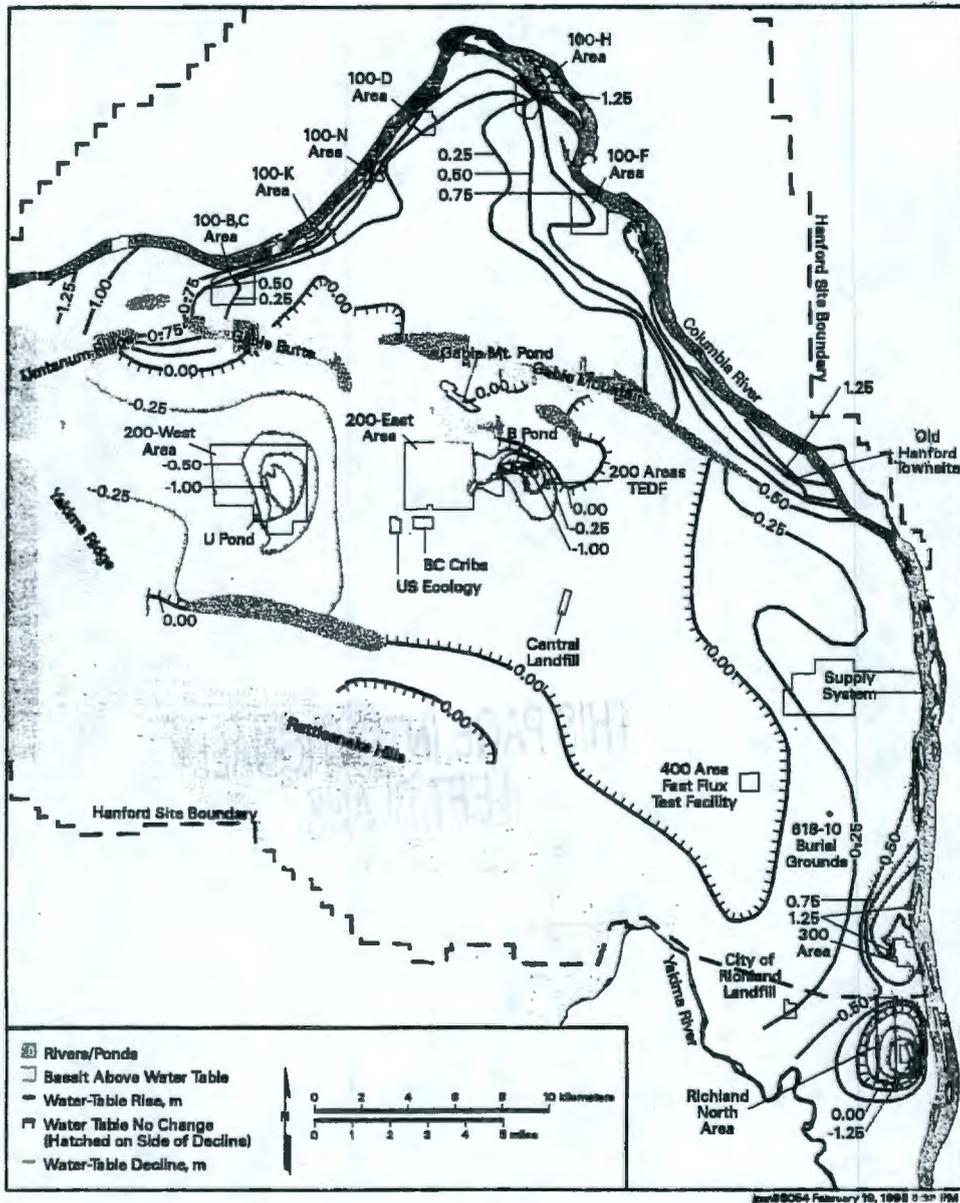
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1 **Figure ES-6. Distribution of Radionuclides of Concern in**  
 3 **Groundwater Within the Hanford Site.**



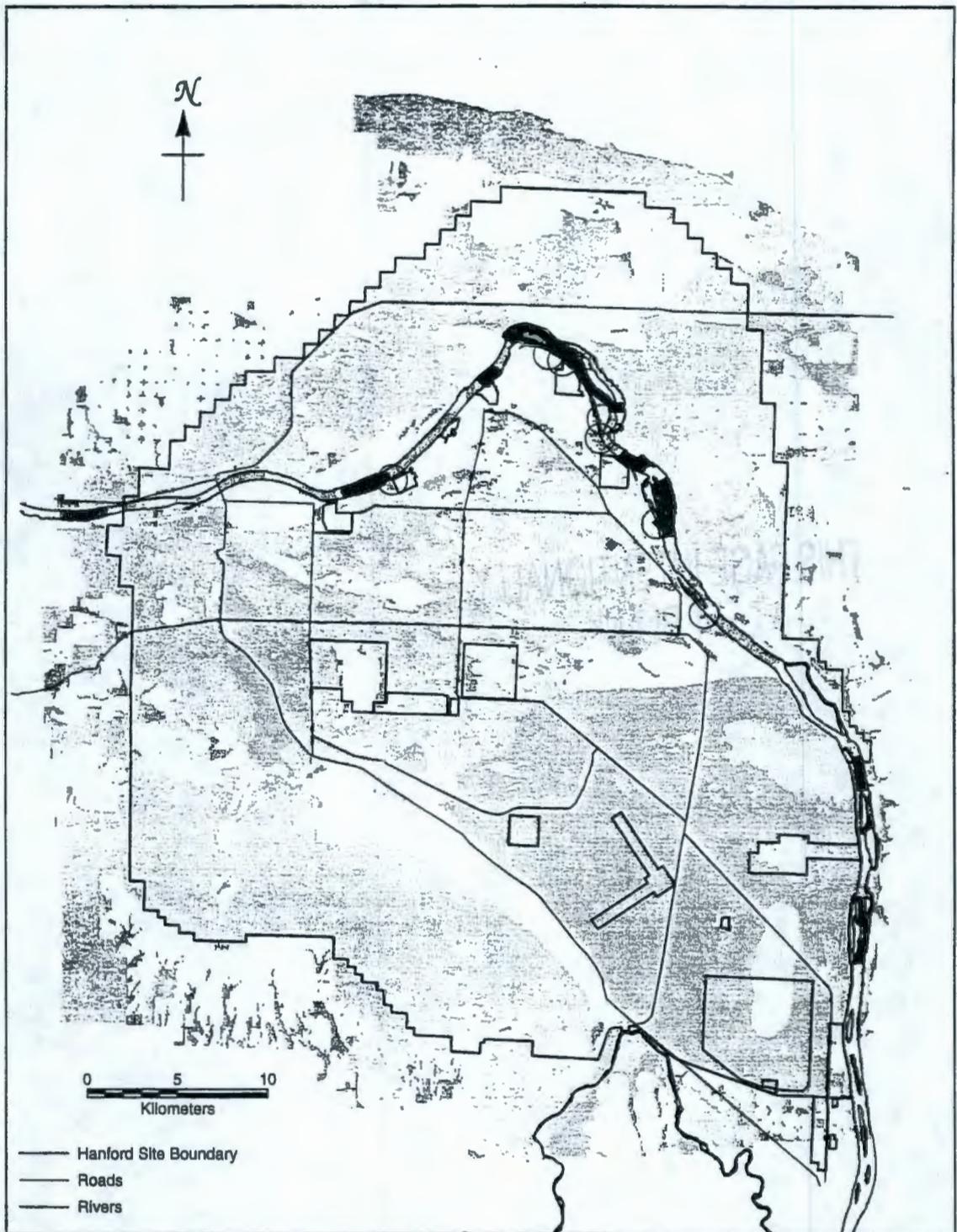
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**Figure ES-7. Watertable Change Map for 1996 - 1997.**



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

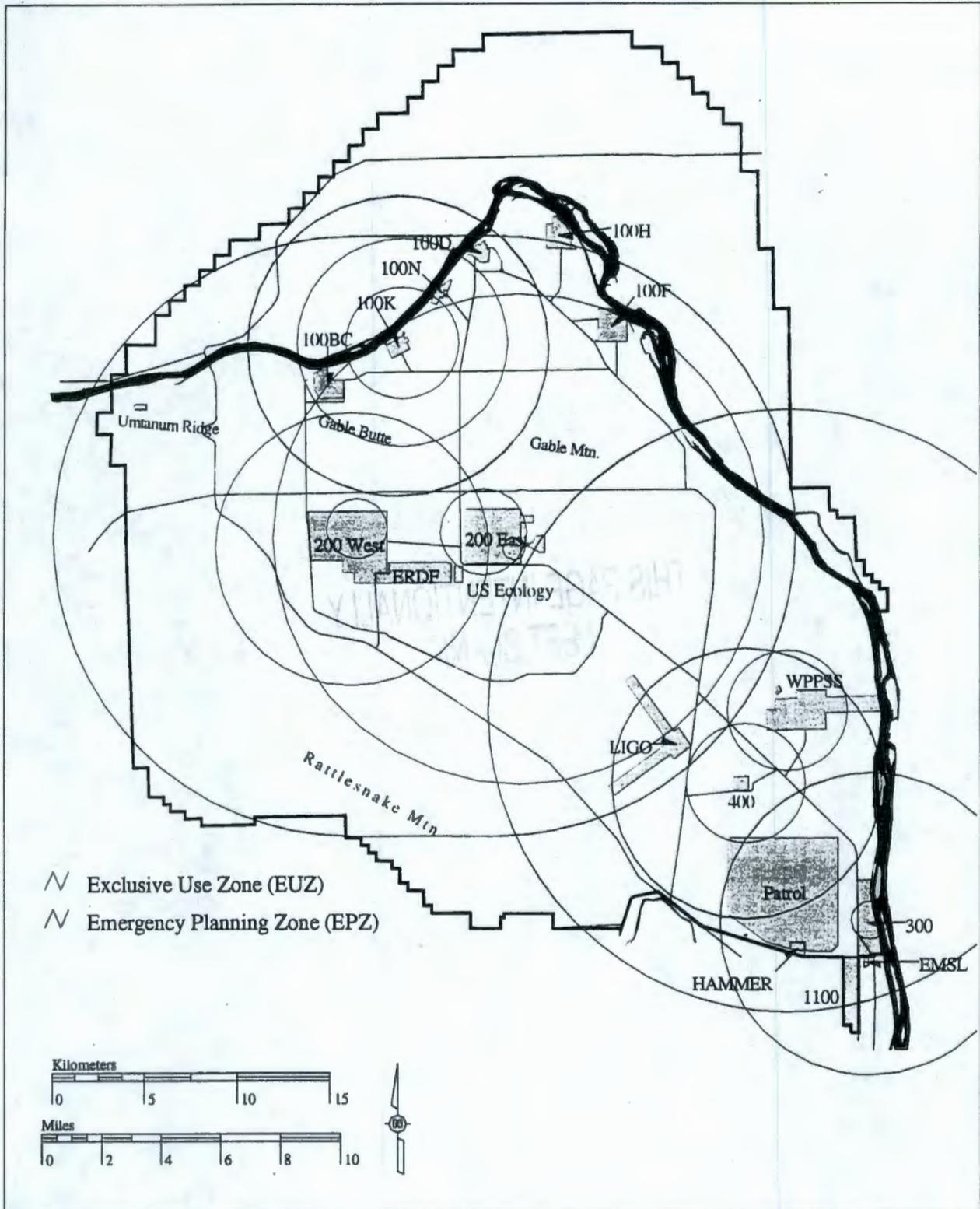


Map Created: September 1996/Pacific Northwest National Laboratory

- Level II Resources
- Level III Resources (Species-Based Resources Not Separately Shown)
- Level IV Habitat-Based Resources
- Level IV Species-Based Resources

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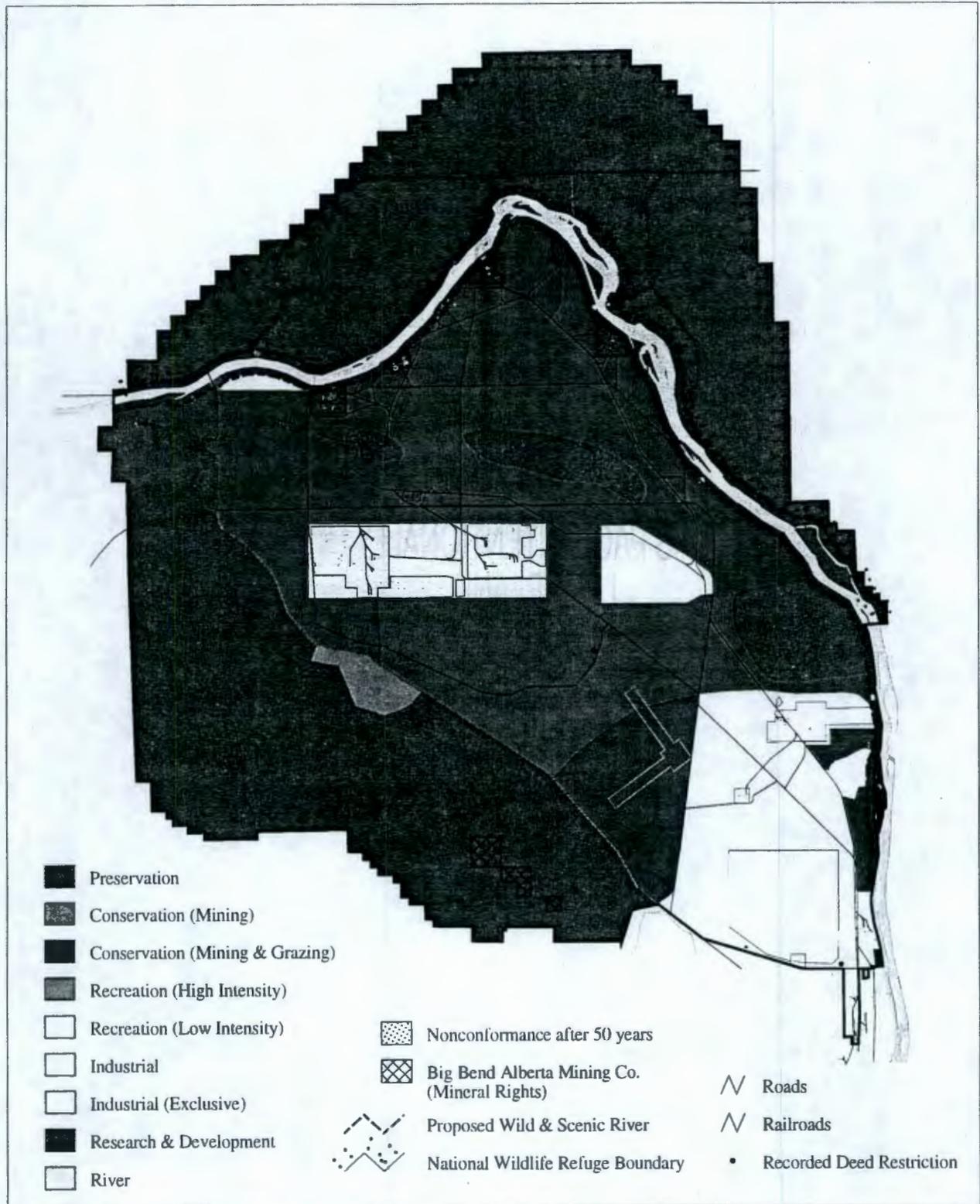
**Figure ES-9. Protective Safety Buffer Zones.**



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**Figure ES-10. DOE Preferred Alternative.**



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1 **ES3.3 Alternative One**

2  
3 Alternative One represents a Federal stewardship role for managing valuable national  
4 resources on the Hanford Site. This alternative addresses these national resources (i.e.,  
5 ecological, historic, cultural, and economic resources) in a regional context, and would be used  
6 to enlarge an existing Federal Wildlife Refuge. Figures ES-11 and ES-12 show how the  
7 Hanford Site has become a regional preserve for shrub-steppe species by presenting the  
8 historic and current distributions. Figure ES-13 is a map of Alternative One.

9  
10 **ES3.3.1 Wahluke Slope**

11  
12 The land-use designation for the Wahluke Slope under Alternative One would be  
13 Preservation. The Wahluke Slope is currently administered for wildlife and recreation as the  
14 Saddle Mountain National Wildlife Refuge and the Wahluke State Wildlife Recreation Area  
15 under permits granted by DOE to the USFWS and WDFW, respectively. Management of the  
16 Wahluke Slope would be consolidated under the USFWS as a portion of the Saddle Mountain  
17 National Wildlife Refuge.

18  
19 The Saddle Mountain National Wildlife Refuge would be designated Preservation, which  
20 is consistent with the current administered land use. Preservation would provide a protective  
21 safety buffer zone for remedial activities in the 100 Area. These activities are expected to  
22 continue for the planning period, and would continue to provide a sanctuary for shrub-steppe  
23 dependent species that inhabit the area. Preservation would also prevent activities within the  
24 BoR's Red Zone (an area where irrigation is restricted because it accelerates mud slides along  
25 the Columbia River) that could jeopardize stability of the White Bluffs. Preservation would not  
26 interfere with the BoR's management of the Columbia Basin Project's irrigation wasteways  
27 because they would be considered a pre-existing, nonconforming use. An agreement would be  
28 established by the DOI between its four agencies (i.e., USFWS, BoR, NPS, and BLM) to enable  
29 all to fulfill their congressionally mandated missions on the Wahluke Slope.

30  
31 **ES3.3.2 Columbia River Corridor**

32  
33 Land-use designations for the Columbia River Corridor under Alternative One would  
34 include High-Intensity Recreation, Low-Intensity Recreation, Conservation (Mining), and  
35 Preservation.

36  
37 The Columbia River islands within the Hanford Site boundary would be designated for  
38 Preservation and included in the Saddle Mountain National Wildlife Refuge to maintain  
39 important areas for wildlife. The Columbia River Corridor itself includes Low-Intensity  
40 Recreation, High-Intensity Recreation, Conservation (Mining), and Preservation land-use  
41 designations.

42  
43 The 100 Areas would include High-Intensity Recreation, Conservation (Mining), and  
44 Preservation land-use designations. The B Reactor would be designated High-Intensity  
45 Recreation to allow tourism of the Federally registered landmark, and would be consistent with  
46 the B Reactor museum proposal. Conservation (Mining) would provide local areas where  
47 backfill and contouring materials could be obtained to protect the radioactive contamination that  
48 would remain below 4.6 m (15 ft) in the 100 Areas vadose (the soil above groundwater) zone.  
49 During the planning period for this document (at least the next 50 years), the spent fuel will be  
50 removed from the K Basins. Associated environmental risks were evaluated in the K Basin EIS.

1 **ES3.3.3 Central Plateau**

2  
3 The Central Plateau would include Industrial-Exclusive and Preservation land-use  
4 designations. Research and development projects specific to DOE's waste management  
5 activities would be allowed. Lands located to the west of the 200 West Area within the Central  
6 Plateau geographic area that contain high-quality mature sagebrush would be designated as  
7 Preservation. This designation encourages siting of new projects between the 200 East and  
8 200 West Areas.  
9

10 **ES3.3.4 All Other Areas**

11  
12 The All Other Areas geographic area would include Industrial, Research and  
13 Development, Low-Intensity Recreation, Conservation (Mining), and Preservation land-use  
14 designations. All development would occur south of Energy Northwest (formerly WPPSS).  
15 This would include transition of existing facilities in the 300 and 400 Areas, and the Energy  
16 Northwest site to Industrial, and Research and Development designations. The majority of the  
17 non-Federal uses would occur offsite or within a portion of the area identified by the City of  
18 Richland's Urban Growth Area (UGA) boundary in the southeast portion of the Site. Wildlife  
19 corridors designated as Preservation would be located around this industrial development to  
20 allow wildlife movements between the ALE Reserve, the Columbia River, and the Saddle  
21 Mountain National Wildlife Refuge. Between the western boundary and State Highway 240, a  
22 wildlife corridor would run north from the ALE Reserve to the Columbia River. This  
23 northwestern wildlife corridor would include the areas known as McGee Ranch and the  
24 Riverland.  
25

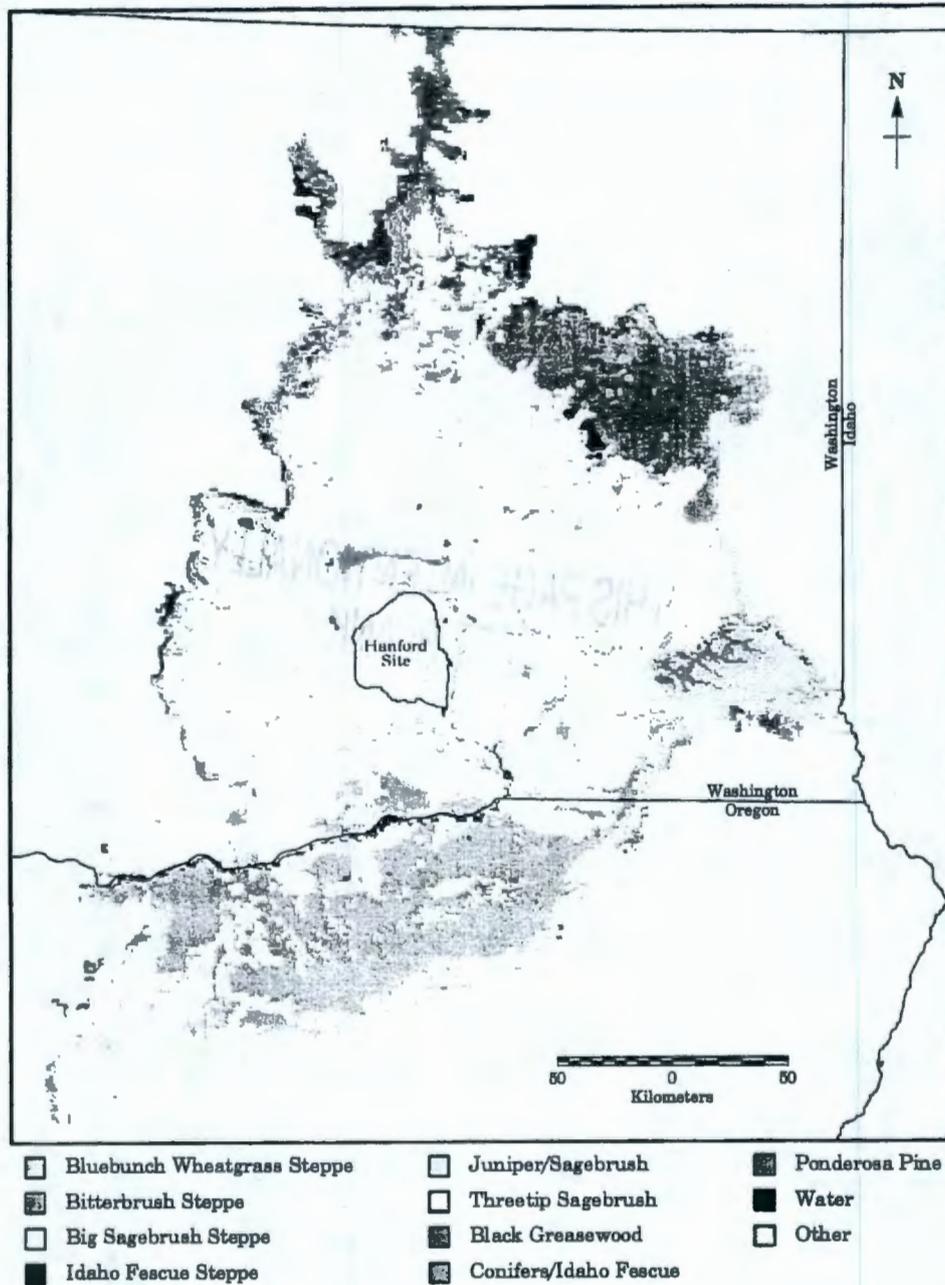
26 Within the southeastern wildlife corridor north of the Yakima River, a small area would  
27 be designated Conservation (Mining) to allow potential extraction of geologic materials for use  
28 in the 200 Areas remedial efforts. Considering this as a quarry site for basalt and soil provides  
29 DOE with the option to designate Gable Mountain, Gable Butte, and West Haven as  
30 Preservation because of their significant cultural value; and also to designate, as Preservation,  
31 the McGee Ranch site (which is DOE land north and west of Highway 24 and south of the  
32 Columbia River) and all of the ALE Reserve. This Preservation designation, and including the  
33 McGee Ranch site as part of the expansion of the Saddle Mountain National Wildlife Refuge,  
34 would allow consistent management of a large block of habitat and help preserve and protect  
35 an important habitat link between the Hanford Site and the Yakima Training Center.  
36

37 Just west of the Industrial designation is an extensive tract of seral shrub-steppe habitat  
38 that has been designated as Conservation (Mining). As the canopy cover increases, this seral  
39 shrub-steppe habitat will become more important for shrub-steppe dependent species as  
40 additional shrub-steppe habitat is destroyed off-site.  
41

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

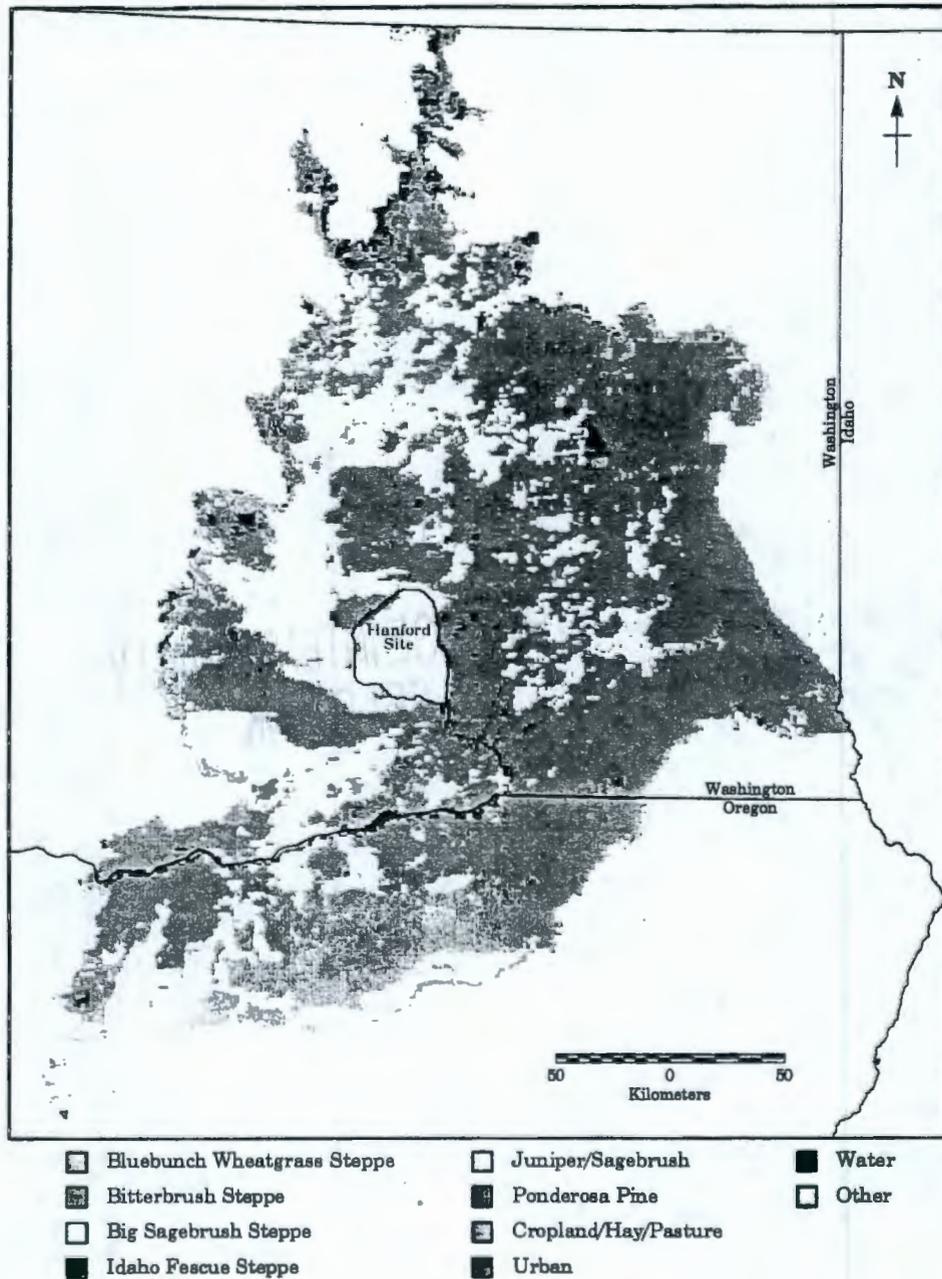
43  
44 The ALE Reserve geographic area would be designated Preservation consistent with  
45 the management of the expanded Saddle Mountain National Wildlife Refuge. Preservation,  
46 and management of the ALE Reserve as an expansion of the Saddle Mountain National Wildlife  
47 Refuge would protect the rare and high quality shrub-steppe plant communities, and unique and  
48 rare fauna that reside on this portion of the Site. Many of these plant communities and fauna  
49 are found nowhere else in the state of Washington or in the Columbia Basin ecoregion.  
50  
51

1 **Figure ES-11. Historic Distribution and Extent of Land**  
 2 **Cover Classes Within a Portion of the Columbia Basin**  
 3 **Ecoregion.**  
 4



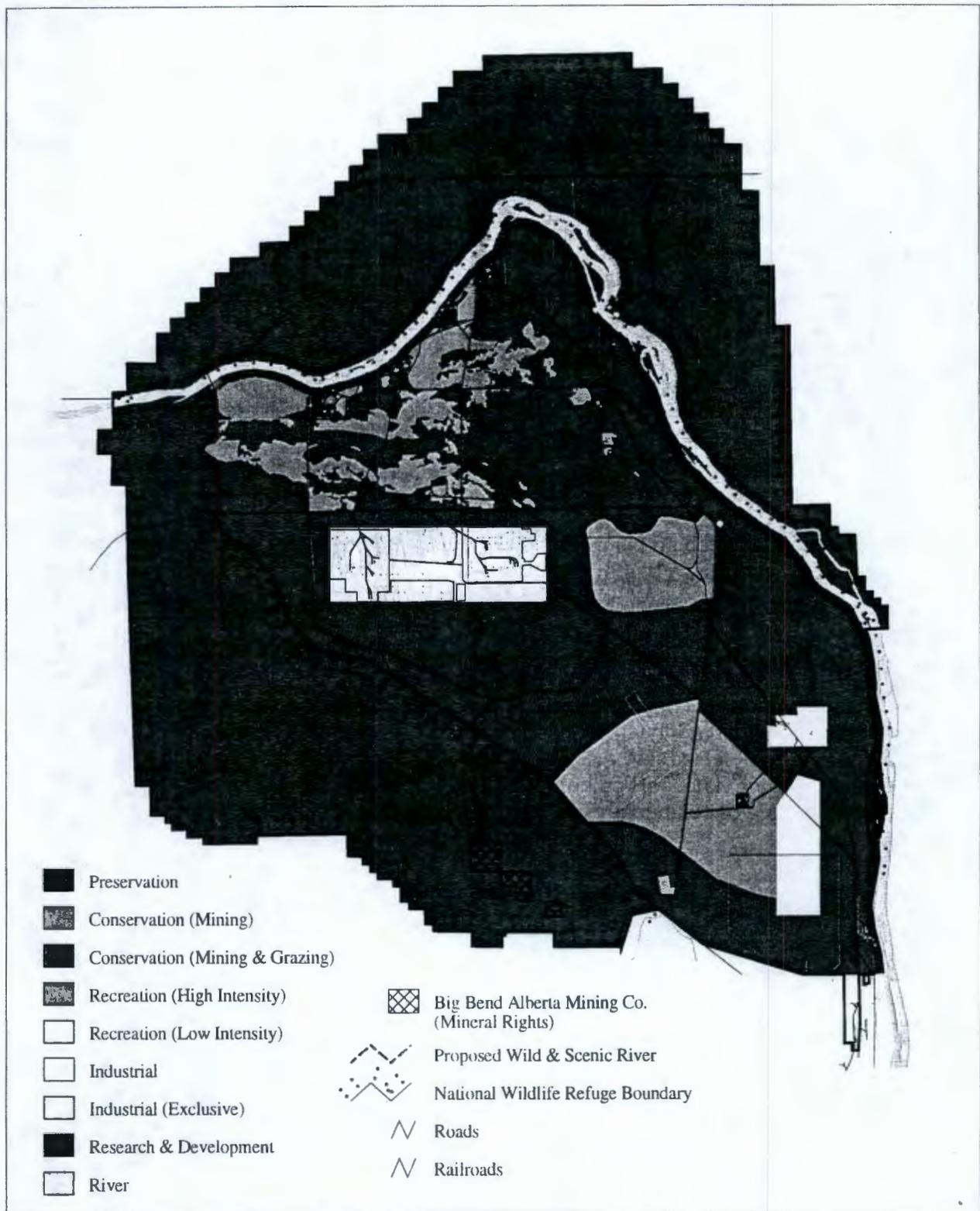
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1 **Figure ES-12. Current Distribution and Extent of Land**  
 2 **Cover Classes Within a Portion of the Columbia Basin**  
 3 **Ecoregion.**  
 4



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**Figure ES-13. Alternative One.**



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1 **ES3.4 Alternative Two**

2  
3 Alternative Two presents the vision of the Nez Perce Tribe Department of Environmental  
4 Restoration and Waste Management. This vision calls for the preservation of the natural and  
5 cultural resources at Hanford. Traditional tribal use is consistent with the Preservation land-use  
6 designation. Figure ES-14 is a map of Alternative Two.

7  
8 **ES3.4.1 Wahluke Slope**

9 Alternative Two would designate the entire Wahluke Slope as Preservation.

10  
11  
12 **ES3.4.2 Columbia River Corridor**

13  
14 The Columbia River Corridor would include High-Intensity Recreation, Low-Intensity  
15 Recreation, Research and Development, and Preservation land-use designations. The  
16 Columbia River (surface water only) would be designated for Low-Intensity Recreation. The  
17 river islands would be designated as Preservation. The B Reactor and surrounding area would  
18 be designed for High-Intensity Recreation, and would allow conversion of the reactor into a  
19 museum. The K Reactor area would be designated for Research and Development and could  
20 be used by Tribal governments and others for fish farming or for aquaculture and aquatic  
21 research. The remainder of the land within the 100 Areas would be designated Preservation.

22  
23 **ES3.4.3 Central Plateau**

24  
25 Lands within the Central Plateau geographic area would be designated as Industrial-  
26 Exclusive, allowing for continued management of radioactive and hazardous waste and other  
27 related and compatible uses.

28  
29 **ES3.4.4 All Other Areas**

30  
31 The All Other Areas would include Industrial, Research and Development, and  
32 Preservation designations. Alternative Two designates the City of Richland UGA, the 400 Area  
33 (including the Fast Flux Test Facility [FFTF]), and the Energy Northwest (formerly WPPSS) site  
34 as Industrial. The area around LIGO would be designated as Research and Development. The  
35 remainder of the All Other Areas would be designated as Preservation to protect natural,  
36 aesthetic, geologic, cultural, and archaeological features.

37  
38 **ES3.4.5 Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE Reserve)**

39  
40 The ALE Reserve geographic area would be designated as Preservation in accordance  
41 with its management as the Rattlesnake Hills Research Natural Area.

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1 **ES3.5 Alternative Three**

2  
3 Benton, Franklin, and Grant counties and the City of Richland contain portions of the  
4 Hanford Site. Alternative Three represents the planning efforts of these local governments.  
5 The procedures used by these governments to develop Alternative Three vary by each planning  
6 jurisdiction, as follows:  
7

- 8 • Benton County is preparing a comprehensive land-use plan that covers the entire  
9 county, which includes a portion of the Hanford Site. As part of its planning effort,  
10 Benton County has developed a proposed critical areas map, which depicts lands  
11 identified as critical areas under the GMA (Figure ES-15). Critical areas include  
12 wetlands areas with a critical recharging effect on aquifers used for potable water,  
13 fish and wildlife habitat conservation areas, frequently flooded areas, and  
14 geologically hazardous areas.  
15
- 16 • The City of Richland plans in coordination with Benton County under the GMA.  
17 Richland is greatly influenced by activities at the Hanford Site and has gone through  
18 several boom-and-bust cycles in response to employment levels at Hanford. Land  
19 use at Hanford has the potential to affect the economic development of Richland.  
20 The city currently provides services such as water, electricity, and sanitary sewers to  
21 the southern portion of the Hanford Site. The City of Richland has identified portions  
22 of the southern Hanford Site (Figure ES-16) suitable for industrial development and  
23 possible annexation.  
24
- 25 • The designations in Franklin County result from a land-use analysis conducted by  
26 the Franklin County Planning Department.  
27
- 28 • The designations in Grant County reflect the Wahluke 2000 Plan prepared by  
29 farming interests in 1992 and supported by Grant County (Figure ES-17).  
30

31 Alternative Three would accommodate both future Federal missions and private  
32 activities such as business-related industry and research and development enterprises in the  
33 southeastern portion of the Site. Accommodation for the expansion of public and commercial  
34 recreational activities would be focused on the northern portion of the Site (i.e., primarily in the  
35 vicinity of the Vernita Bridge). The Conservation (Mining) designation would extend over most  
36 geographic areas except the southern portion of the Hanford Site and the Wahluke Slope.  
37 Figure ES-18 is a map of Alternative Three.  
38

39 **ES3.5.1 Wahluke Slope**

40  
41 Approximately two-thirds of the Wahluke Slope would be designated as Agricultural.  
42 Land designated as Agricultural within the "Red Zone" would be conserved under a "no-action"  
43 scenario pending the completion of geotechnical studies analyzing the impacts of irrigation on  
44 the White Bluffs and the Columbia River. Approximately one-third of the Wahluke Slope is  
45 designated as Conservation, providing land for wildlife and Low-Intensity Recreation.  
46 Approximately 261 ha (645 ac) of BoR wetlands would be designated as Preservation.  
47

48 **ES3.5.2 Columbia River Corridor**

49  
50 The Preservation land-use designation would extend 0.4 km (0.25 mi) from the average  
51 high-water line of the river. In Franklin and Grant counties, the boundary would extend further  
52 inland to include sensitive features such as the White Bluffs and several upland wetlands.

1 Permitted uses would be similar to those within the Conservation land-use designation, except  
2 mining would be allowed as a conditionally permitted use. Agriculture would be prohibited.  
3

4 The areas outside of the KE, KW, N, D, DR, and H Reactor sites would be designated  
5 as Low-Intensity Recreation. A hiking and biking recreational trail along the entire river corridor  
6 would extend from North Richland to the Vernita Bridge.  
7

### 8 **ES3.5.3 Central Plateau**

9  
10 The DOE would be expected to continue all waste management and disposal activities  
11 in the Central Plateau. The Central Plateau would be designated for Industrial-Exclusive Use.  
12

### 13 **ES3.5.4 All Other Areas**

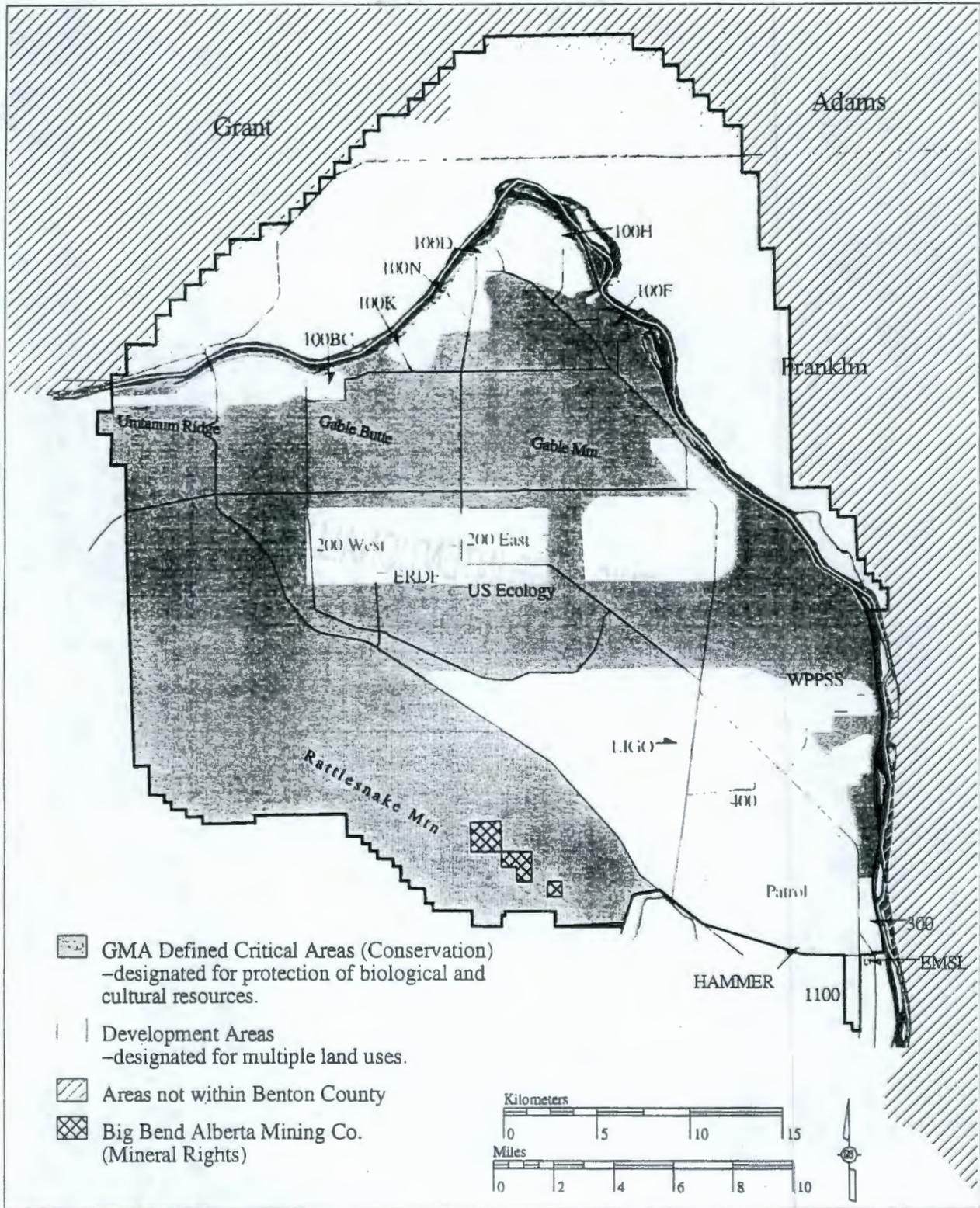
14  
15 The majority of the All Other Areas geographic area would be designated Conservation  
16 (Mining). Within the Conservation land-use designation, mining would be allowed as a  
17 conditionally permitted use. Agricultural uses would be prohibited. A small area along the  
18 southern boundary of the Site near the Yakima River would be designated High-Intensity  
19 Recreation. The area adjacent to the Vernita Rest Stop, east of State Highway 24 (which  
20 includes the B Reactor Site) would also be designated as High-Intensity Recreation. The strip  
21 designated for the west 135 ha (333 ac) of the Vernita Terrace would be designated Low-  
22 Intensity Recreation, primarily for limited activities such as biking, hiking, fishing, hunting, boat  
23 launching facilities, primitive camping, and nature viewing.  
24

25 Areas north of the City of Richland would be designated as Industrial and Research and  
26 Development.  
27

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

29  
30 The ALE Reserve would be designated as Conservation (Mining) under Alternative  
31 Three.  
32  
33

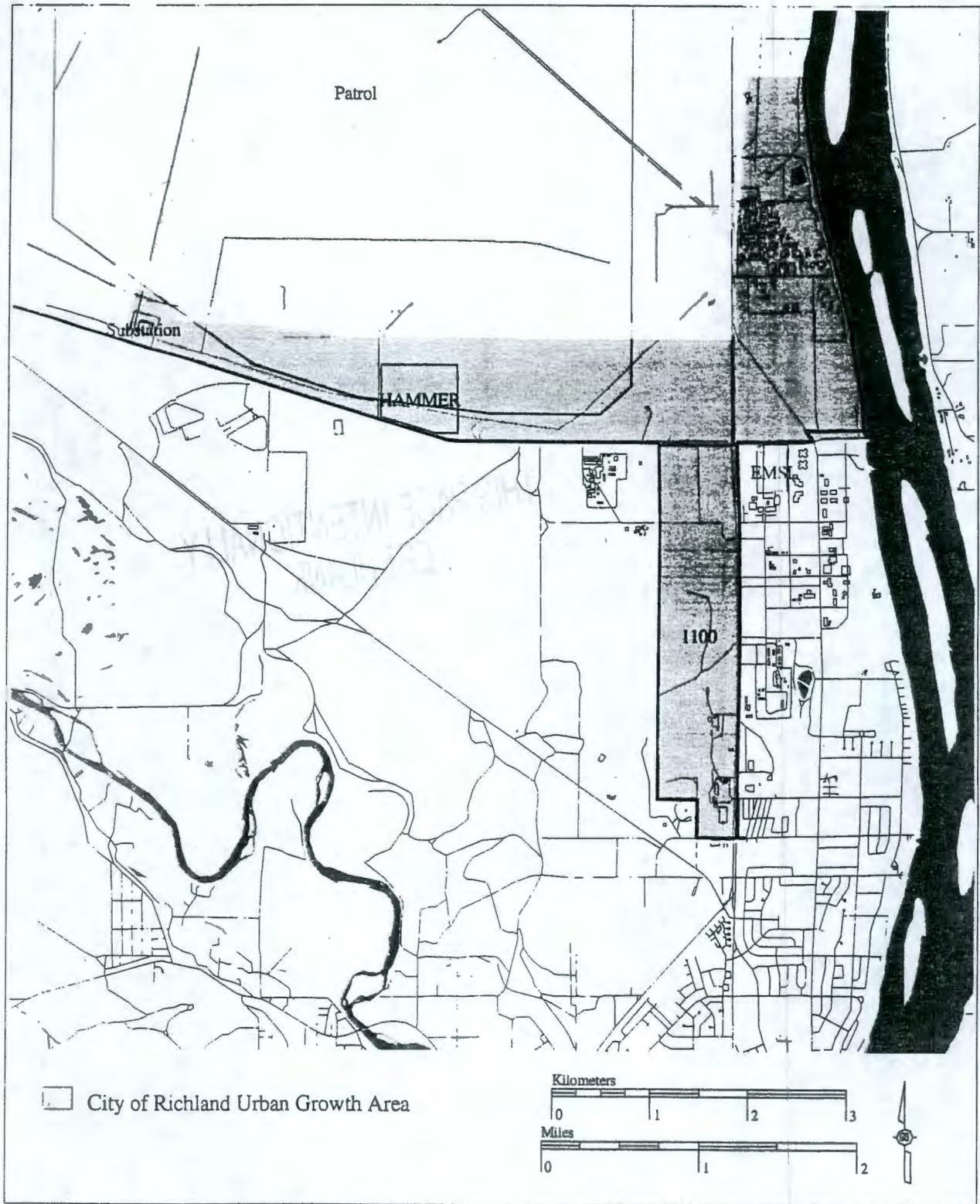
**Figure ES-15. Benton County Proposed Critical Areas Map.**



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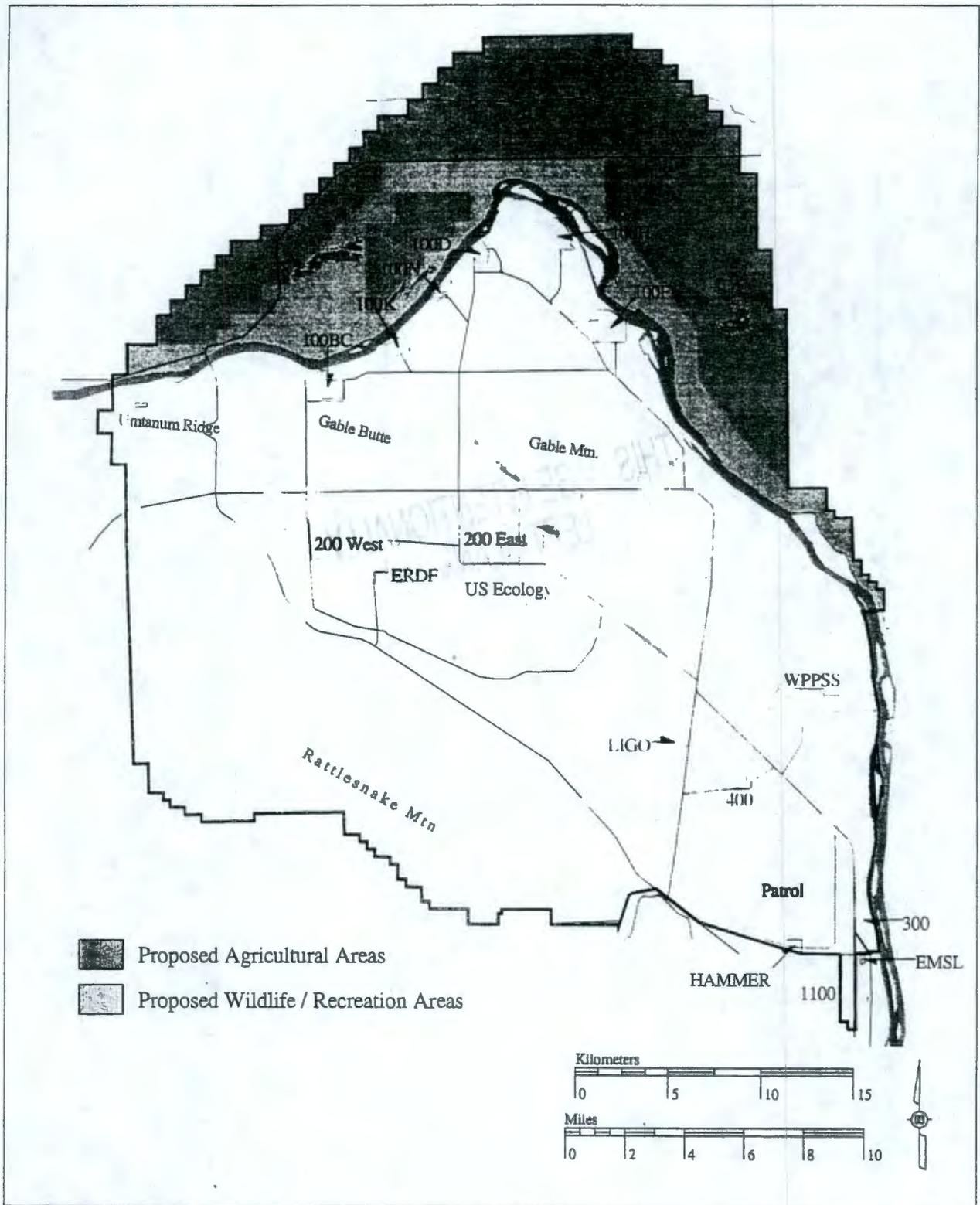
**Figure ES-16. City of Richland Urban Growth Area.**



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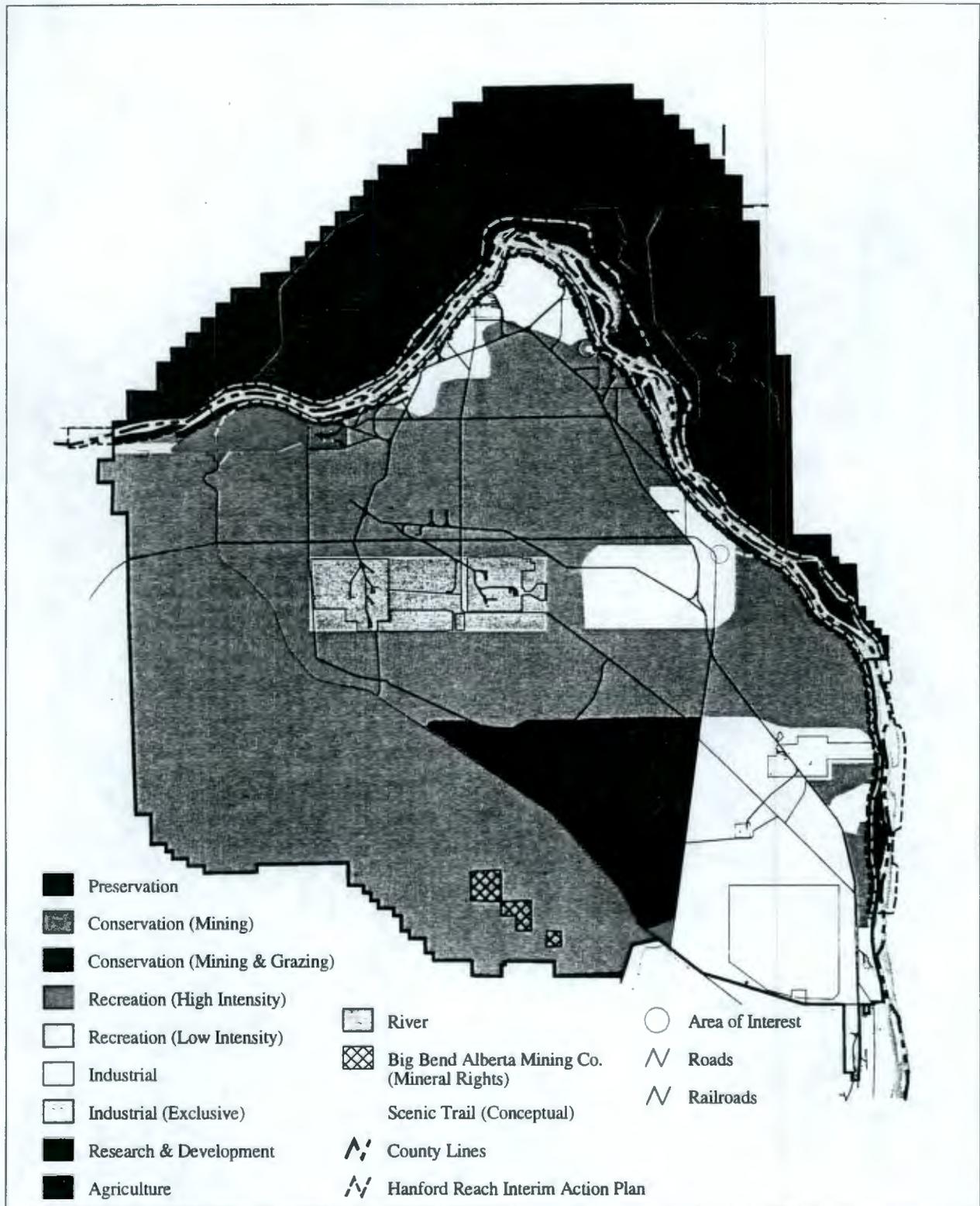
**Figure ES-17. Wahluke 2000 Plan Map.**



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**Figure ES-18. Alternative Three.**



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1 **ES3.6 Alternative Four**

2  
3 Alternative Four represents the vision of the CTUIR for the management of the Hanford  
4 Site for the next 50 years. In the view of the CTUIR, the greatest value provided to the region  
5 and the nation by the Hanford Site is its role as a natural resources reserve. The Hanford Site  
6 contains numerous places of religious importance to members of the CTUIR who practice  
7 traditional Indian religions. These places include the major basalt outcrops, the active dunes  
8 area, and other sites. Protection of these sites and of Tribal governments' access to these sites  
9 are of great important to the CTUIR and its members (as well as to other Hanford-affected  
10 Tribal governments) and will be an issue of great importance. Figure ES-19 is a map of  
11 Alternative Four.

12  
13 **ES3.6.1 Wahluke Slope**

14  
15 Alternative Four would manage the entire Wahluke Slope area as Preservation. Under  
16 the Preservation designation, grazing would not be allowed.

17  
18 **ES3.6.2 Columbia River Corridor**

19  
20 Alternative Four would designate almost the entire Columbia River Corridor as  
21 Preservation. The Preservation designation would allow managed recreation within the  
22 Corridor. This activity would include the continued operation of the White Bluffs boat launch on  
23 the east side of the river. A High-Intensity Recreation public boat launch would be located near  
24 the Vernita Bridge on the south side of the river. Alternative Four would also provide another  
25 High-Intensity Recreation boat launch, located at the White Bluffs boat launch on the Benton  
26 County side of the river, to support Tribal treaty-reserved fishing activity throughout the Hanford  
27 Reach.

28  
29 **ES3.6.3 Central Plateau**

30  
31 The Central Plateau would be used for waste management activities. All permanent  
32 waste disposal at the Hanford Site and research and development activities associated with  
33 waste management would take place within the Central Plateau.

34  
35 **ES3.6.4 All Other Areas**

36  
37 While Low-Intensity Recreation generally does not appear as a separate land use in this  
38 geographic area, it is anticipated that compatible Low-Intensity Recreation would be established  
39 throughout much of the All Other Areas geographic regions.

40  
41 Alternative Four designates the area within 3.2 km (2 mi) of the Columbia River as  
42 Preservation to protect archaeological resources. Areas north of Gable Butte and Gable  
43 Mountain would be designated Preservation to protect sagebrush-steppe habitat. The area  
44 north of the ALE Reserve and south of Umtanum Ridge (also known as McGee Ranch) would  
45 be designated as Preservation to avoid habitat fragmentation and to provide a wildlife corridor  
46 between Hanford and the Yakima Training Center.

47  
48 Gable Mountain in the east and moving west through Gable Butte, and Umtanum Ridge  
49 would be designated Preservation because of their cultural and biological importance.  
50 Alternative Four also recognizes the religious, cultural, and habitat significance of active dunes  
51 north of Energy Northwest (formerly WPPSS) by designating them as Preservation.

1 Alternative Four designates a large area near the Central Plateau and between the  
2 Plateau and the southeastern border of the Hanford Site as Conservation (Mining). This area  
3 contains large areas of high quality mature sagebrush communities; therefore, DOE would  
4 need to make prudent choices regarding the removal of needed material. If these geologic  
5 materials are not needed, the land-use designation for this area should revert to Preservation.  
6

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

10  
11 Alternative Four designates a 3.2 km (2 mi) corridor along the Yakima River as  
12 Preservation because of the density of archaeological sites and the area's value as a wildlife  
13 corridor.  
14

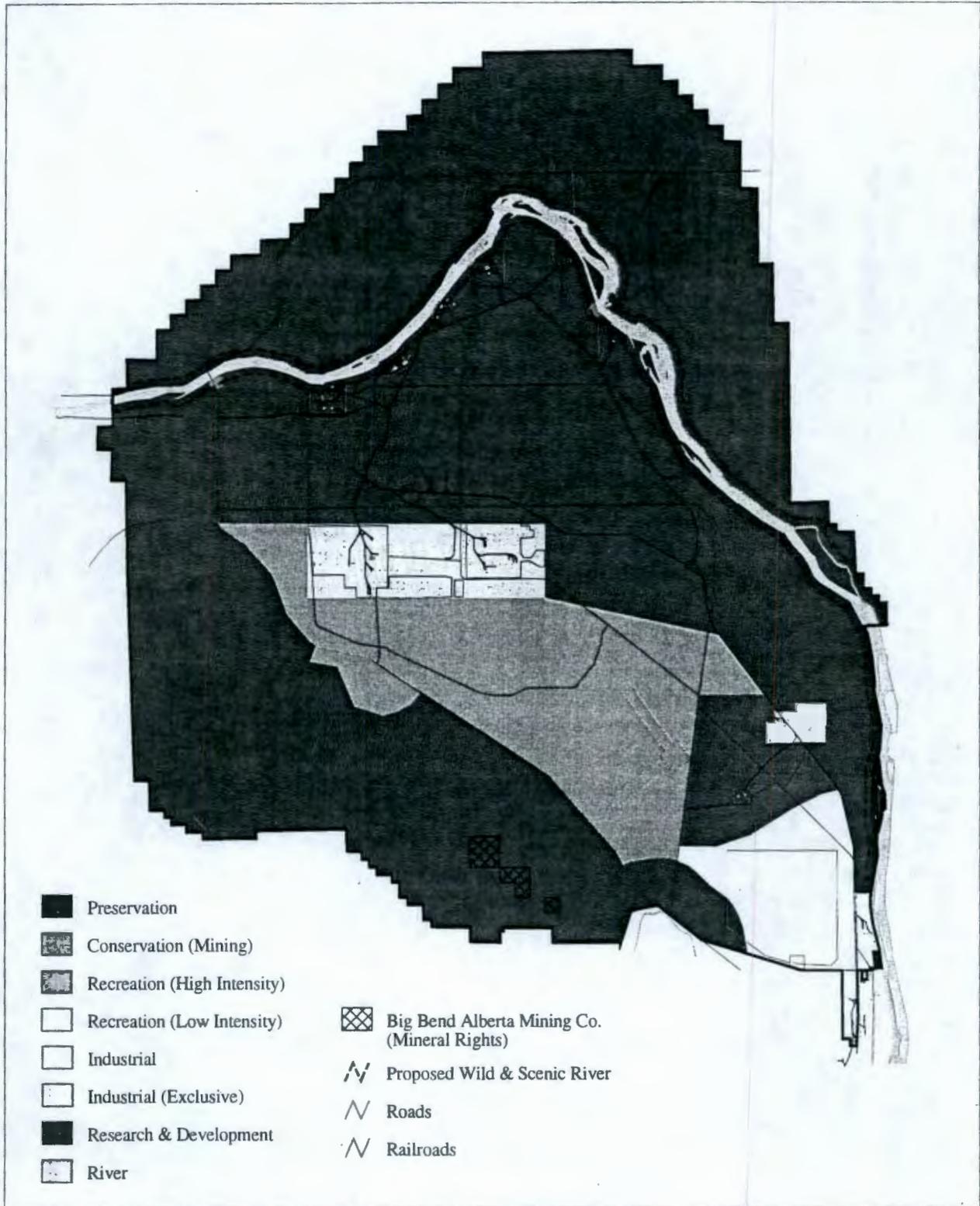
#### 15 **ES3.6.5 Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE Reserve)**

16  
17 Alternative Four would continue to manage the ALE Reserve in a manner consistent  
18 with the Preservation designation. The sole exception is an area of the ALE Reserve bordering  
19 State Highway 240 near the 200 West Area that would be designated Conservation (Mining). If  
20 the site is not used as a source for waste site capping material, the land-use designation should  
21 revert to Preservation.  
22

### 23 24 **ES3.7 Comparisons of Affected Areas by Alternatives**

25  
26 Table ES-2 shows comparisons of the affected areas by alternative, Table ES-3 shows  
27 the potential realm of impacts from each of the land-use designations. Table ES-5  
28 (immediately following Section ES.5.4.4) shows a summary of potential impacts to Hanford Site  
29 resources.  
30

**Figure ES-19. Alternative Four.**



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

	No-Action*	Preferred Ait.	Ait. 1	Ait. 2	Ait. 3	Ait. 4
<b>Areas in Hectares</b>						
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
<b>**TOTAL</b>	<b>148,080</b>	<b>148,080</b>	<b>148,080</b>	<b>148,080</b>	<b>148,080</b>	<b>148,080</b>
<b>Areas in Acres</b>						
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
<b>TOTAL</b>	<b>365,914</b>	<b>365,914</b>	<b>365,914</b>	<b>365,914</b>	<b>365,914</b>	<b>365,914</b>
* 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 <sup>2</sup> ) of land surface areas, this EIS affects 3642.3 ha (14.1 mi <sup>2</sup> ) 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
<b>Areas in Square Miles</b>						
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
<b>**TOTAL</b>	<b>572</b>	<b>572</b>	<b>572</b>	<b>572</b>	<b>572</b>	<b>572</b>
<b>Percentage of Area</b>						
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%
<b>TOTAL</b>	<b>100.00%</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>
* 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 <sup>2</sup> ) of land surface areas, this EIS affects 3642.3 ha (14.1 mi <sup>2</sup> ) 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.

## 1 **ES4.0 Affected Environment**

2  
3 The Hanford Site lies within the semiarid Pasco Basin of the Columbia Plateau in  
4 southeastern Washington State. The Hanford Site occupies an area of approximately  
5 1,517 km<sup>2</sup> (586 mi<sup>2</sup>) north of the confluence of the Yakima River with the Columbia River. The  
6 Columbia River flows through the northern part of the Hanford Site and, turning south, forms  
7 part of the Hanford Site's eastern boundary. This section of the Columbia River is known as  
8 the Hanford Reach and is the last unimpounded, nontidal segment of the Columbia River in the  
9 United States. The Yakima River runs near the southern boundary and joins the Columbia  
10 River below the City of Richland, which bounds the Hanford Site on the southeast.

11  
12 The production of defense nuclear materials at the Hanford Site since the 1940s has  
13 necessitated the exclusion of public access and most non-government-related development on  
14 the Hanford Site. As a result of its defense-related mission, the Hanford Site has also provided  
15 *de facto* protection of the natural environment and cultural resources; however, the defense  
16 nuclear production mission has also left the Hanford Site with an extensive legacy of waste.  
17 Nuclear weapons material production and associated activities at the Hanford Site during the  
18 past five decades have generated a variety of radioactive, hazardous, and other wastes that  
19 have been disposed of or discharged to the air, soil, and water at the Hanford Site.

### 20 21 22 **ES4.1 Existing Land Uses**

23  
24 For many years, the area along the Columbia River was used extensively by American  
25 Indian tribal members for fishing, hunting, and gathering. Pasturing of livestock became  
26 important in pre-contact times. Land uses at the Hanford Site have changed dramatically over  
27 the past 100 years. By the turn of the century, settlers had moved into the area, developing  
28 irrigated farmland and practicing extensive grazing. In 1943, the Federal government acquired  
29 the Hanford Site for production of nuclear materials to be used in the development of the atomic  
30 bomb.

31  
32 Existing land uses within the vicinity of the Hanford Site include urban and industrial  
33 development, wildlife protection areas, recreation, irrigated and dryland farming, and grazing.  
34 Other land uses in the vicinity of the Hanford Site include a planned, low-level radioactive waste  
35 decontamination, super-compaction, plasma gasification and vitrification unit (operated by Allied  
36 Technology Group Corporation); and a commercial nuclear fuel fabrication facility (operated by  
37 Siemens Power Corporation). Much of the Hanford Site is undeveloped, providing a safety and  
38 security buffer for the smaller areas used for operations.

#### 39 40 **ES4.1.1 Wahuake Slope**

41  
42 The area north of the Columbia River consists of 357 km<sup>2</sup> (138 mi<sup>2</sup>) of relatively  
43 undisturbed or recovering shrub-steppe habitat known as the Wahuake Slope. The northwest  
44 portion of the area is managed by the USFWS as the Saddle Mountain National Wildlife Refuge  
45 under a permit issued by DOE in 1971. The permit conditions require that the refuge remain  
46 closed to the public as a protective perimeter surrounding Hanford operations. The closure has  
47 benefitted migratory birds, such as curlews, and waterfowl.

48  
49 In the northeast portion of the Wahuake Slope, the WDFW operates the Wahuake State  
50 Wildlife Recreation Area, which was established in 1971. The WDFW has leased a total of  
51 approximately 43 ha (107 ac) of the Wahuake State Wildlife Recreation Area for sharecropping.  
52 The purpose of these agricultural leases is to produce food and cover for wildlife and to  
53 manage the land for continued multi-purpose recreation. In addition, the WDFW issued a

1 grazing permit for approximately 3,756 ha (9,280 ac). The Wahluke State Wildlife Recreation  
2 Area is open to the public for recreational uses during daylight hours.  
3

4 The Wahluke Slope once contained small, nonradioactively contaminated sites that  
5 DOE remediated in 1997. The DOE is not planning to alter the current land uses of the  
6 Wahluke Slope and is specifically prohibited from causing any adverse impacts on the values  
7 for which the area is under consideration for Wild and Scenic River or National Wildlife Refuge  
8 status.  
9

#### 10 **ES4.1.2 Columbia River Corridor**

11  
12 The 111.6 km<sup>2</sup> (43.1 mi<sup>2</sup>) Columbia River Corridor, which is adjacent to and runs  
13 through the Hanford Site, is used by the public and Tribes for boating, water skiing, fishing, and  
14 hunting of upland game birds and migratory waterfowl. While public access is allowed on  
15 certain islands, access to other islands and adjacent areas is restricted because of unique  
16 habitats and the presence of cultural resources.  
17

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

27 The area known as the Hanford Reach includes an average of a 402 m (1,320 ft) strip of  
28 public land on either side of the Columbia River. The Hanford Reach is the last unimpounded,  
29 nontidal segment of the Columbia River in the United States. In 1988, Congress passed Public  
30 Law 100-605, *Comprehensive River Conservation Study*, which required the Secretary of the  
31 Interior to prepare an environmental impact study (in consultation with the Secretary of Energy)  
32 to evaluate the outstanding features of the Hanford Reach and its immediate environment.  
33

34 Alternatives for preserving the outstanding features also were examined, including the  
35 designation of the Hanford Reach as part of the National Wild and Scenic Rivers system with  
36 the 1994 Hanford Reach EIS. In 1996 the DOI made a decision for Congressional  
37 consideration in their 1996 Hanford Reach ROD. The ROD recommended that the Hanford  
38 Reach be designated a "recreational river" as defined by the *National Wild and Scenic Rivers*  
39 *Act of 1968*. The ROD also recommended that the remainder of the Wahluke Slope be  
40 established as a National Fish and Wildlife Refuge. Finally, the ROD recommended that the  
41 approximately 728 ha (1,800 ac) of private land located in the Hanford Reach Study Area be  
42 included in the recreational river boundary, but not the refuge boundary. The final designation  
43 will require Congressional legislation.  
44

45 There are two proposals currently under consideration in Congress. The primary  
46 differences between the proposals include the extent of the geographic scope (whether the  
47 Wahluke Slope is addressed in addition to the river corridor), and the designation of the land  
48 manager (i.e., local vs. Federal control).  
49

50 In addition to the proposed Wild and Scenic legislation, discussions have been held to  
51 swap certain parcels of land in the State of Washington from the Secretary of Energy to the  
52 Secretary of the Interior, affecting about 197 km<sup>2</sup> (75 mi<sup>2</sup>) of the Hanford Site. This swap would  
53 consolidate the scattered Benton County portion of Hanford's BLM Public Domain lands, into an  
54 area beginning near 100-D, running south and east along the Columbia River shore, to just

1 north of Energy Northwest (formerly WPPSS) and then west to Gable Mountain. As long as  
2 these lands are needed (i.e., still withdrawn from BLM by DOE), this legislative action would not  
3 affect DOE's administration of the areas involved. The DOE use of withdrawn BLM Public  
4 Domain lands is consistent with most land-use designations with the exceptions of Industrial  
5 Exclusive, Research and Development, or Industrial designations where BLM's multiple-use  
6 mandate would be limited by an extensive infrastructure.

### 7 8 **ES4.1.3 Central Plateau**

9  
10 The 200 East and 200 West Areas occupy approximately 51 km<sup>2</sup> (19.5 mi<sup>2</sup>). Facilities  
11 located in the Central Plateau were built to process irradiated fuel from the production reactors.  
12 The operation of these facilities resulted in the storage, disposal, and unplanned release of  
13 radioactive and nonradioactive waste. The primary land uses are waste operations and  
14 operations support. Deed restrictions or covenants for activities that potentially may extend  
15 beyond 4.6 m (15 ft) below ground surface are expected for CERCLA remediation areas in the  
16 Central Plateau geographic area.

17  
18 In 1964, a 410 ha (1,000 ac) tract was leased to the State of Washington to promote  
19 nuclear-related development. A commercial low-level radioactive waste disposal facility, run by  
20 U.S. Ecology, Inc., currently operates on 41 ha (100 ac) of the leasehold. The rest of the  
21 leasehold was not used by the State, and this portion of the leasehold recently reverted to DOE.  
22 The DOE constructed the Environmental Restoration Disposal Facility (ERDF) on this tract.  
23 The ERDF is operated on the Central Plateau to provide disposal capacity for environmental  
24 remediation waste (e.g., low-level, mixed low-level, and dangerous wastes) generated during  
25 remediation of the 100, 200, and 300 Areas of the Hanford Site. The facility is currently about  
26 65 ha (160 ac) and can be expanded up to 414 ha (1.6 mi<sup>2</sup>) if additional waste disposal capacity  
27 is required.

### 28 29 **ES4.1.4 All Other Areas**

30  
31 The All Other Areas geographic area is 689 km<sup>2</sup> (266 mi<sup>2</sup>) and contains the 300, 400,  
32 and 1100 Areas; Energy Northwest (formerly WPPSS facilities); and a section of land currently  
33 owned by the State of Washington. The DOE prepared an Environmental Assessment (EA)  
34 that resulted in a finding of no significant impact on August 27, 1998 for the transfer of the 1100  
35 Area and the Southern rail connection to the Port of Benton (DOE/RL EA-1260). The Port  
36 officially took ownership and control of the "1100 Area" (consisting of 786 acres, 26 buildings,  
37 and 16 miles of rail tract) on Oct. 1, 1998.

38  
39 The 300 Area, located just north of the City of Richland, covers 1.5 km<sup>2</sup> (0.6 mi<sup>2</sup>) and is  
40 used for research and technology development facilities. The 400 Area, located southeast of  
41 the 200 East Area, is the site of the FFTF, which was used in the testing of breeder reactor  
42 systems and is scheduled to be shut down. Defueling of the FFTF, which was the first major  
43 phase of deactivation, was completed in April 1995. The next deactivation phases are now  
44 under way; however, DOE is also studying if the FFTF reactor could be used to produce  
45 medical isotopes. The primary land use for the 400 Area is reactor operations and irradiation  
46 services with attendant support functions including fuel and target fabrication, processing, and  
47 interim storage.

48  
49 The 1100 Area located north of Richland (now under ownership of the Port of Benton),  
50 served as the central warehousing, vehicle maintenance, and transportation operations center  
51 for the Hanford Site.

52  
53 Other land uses in the All Other Areas geographic area include the Hazardous Materials  
54 Management and Emergency Response (HAMMER) Volpentest Training and Education Center;

1 land that was leased to Energy Northwest (formerly WPPSS) in the 1970s to construct three  
2 commercial power reactors (one plant was completed and is currently operating); the LIGO,  
3 built by the National Science Foundation on the Hanford Site; and a 259 ha (640 ac) section of  
4 land south of the 200 East Area, near State Highway 240, owned by the State of Washington  
5 for the purpose of nonradioactive hazardous waste disposal. This parcel is uncontaminated  
6 (although the underlying groundwater is contaminated) and undeveloped. The deed requires  
7 that the property shall be used only for storage, processing and disposal of hazardous industrial  
8 (non-nuclear) waste, and for related activities. If the property is used for any other purpose,  
9 ownership would revert to the Federal government.

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

11  
12  
13 The Fitzner/Eberhardt Arid Lands Ecology Reserve (also designated the Rattlesnake  
14 Hills Research Natural Area, or the ALE Reserve) encompasses 308.7 km<sup>2</sup> (119.2 mi<sup>2</sup>) in the  
15 southwestern portion of the Hanford Site and is managed as a habitat and wildlife reserve and  
16 environmental research center. A Research Natural Area is a classification used by Federal  
17 land management agencies to designate lands on which various natural features are preserved  
18 in an undisturbed state solely for research and educational purposes. The ALE Reserve  
19 remains the largest Research Natural Area in the State of Washington.

20  
21 The mineral rights to a 518 ha (1,280 ac) area on the ALE Reserve are owned by a  
22 private company. The company has been free to enter this area and explore for oil or gas  
23 since 1977.

24  
25 Because public access to the ALE Reserve has been restricted since 1943, the shrub-  
26 steppe habitat is virtually undisturbed and is part of a much larger Hanford tract of shrub-steppe  
27 vegetation. This geographic area contained a number of small contaminated sites that were  
28 remediated in 1994 and 1995 and have been revegetated. In 1997, DOE granted a permit and  
29 entered into an agreement with USFWS to manage the ALE Reserve consistently with the  
30 existing ALE Facility Management Plan. Under this framework, the USFWS is preparing a CCP  
31 pursuant to the *National Wildlife Refuge System Improvement Act of 1997* to identify refuge  
32 management actions and to bring the ALE into the National Wildlife Refuge System.

#### 33 34 35 **ES4.2** *Hanford Site Land Ownership*

36  
37 The Hanford Site land holdings consist of three different real property classifications:  
38 (1) lands acquired in fee by DOE or its predecessor agencies, (2) BLM-administered Public  
39 Domain lands withdrawn from the Public Domain for use as part of the Hanford Site, and  
40 (3) lands the BoR has withdrawn from the Public Domain or acquired in fee as part of the  
41 Columbia Basin Project (Figure ES-20).

42  
43 The BoR agreed in a MOA to transfer custody, possession, and use of certain acquired  
44 and withdrawn lands situated within the control zone of the Hanford Works to the U.S. Atomic  
45 Energy Commission (AEC) on February 27, 1957. These lands consisted of a checkerboard  
46 pattern of alternating square-mile sections on the Wahluke Slope. The BoR retained the right  
47 to construct, operate, and maintain the Wahluke Canal and related facilities and any necessary  
48 wasteways and drainage ways through the Wahluke Slope in connection with irrigation of lands  
49 outside of the control zone. These lands were included in the South Columbia Basin Irrigation  
50 District and the East Columbia Irrigation District at the time of district formation. In the MOA,  
51 the BoR identified a continued interest in development of irrigable lands on the Wahluke Slope  
52 as part of the Columbia Basin Project. The AEC acknowledged the interest of the BoR and  
53 reaffirmed a policy of keeping DOE land ownership and restrictions of land use on the Wahluke  
54 Slope to a minimum.

1 The BoR continues to retain an interest in the ultimate development of the irrigable  
2 lands within the Wahluke Slope as part of the Columbia Basin Project. The interest of the BoR  
3 pertains not only to irrigation development, but also to other project purposes (e.g., fish and  
4 wildlife protection) and to resource management and environmental concerns. The BoR  
5 maintains that the agreement with the AEC assures return of the lands when the lands are no  
6 longer necessary to support DOE's mission for the Hanford Site. Furthermore, the BoR would  
7 not concur with any change in the present use of the lands until technical and environmental  
8 studies were completed.  
9

10 The alternating square-mile sections that would eventually revert to the BLM or BoR are  
11 an important consideration that complicates land-use planning. Because the lands are owned  
12 by another government agency (BLM or BoR), DOE cannot authorize uses of the property  
13 beyond the mission needs of DOE. Typically, after getting the land back, the BLM evaluates  
14 current use(s) of the land, compatibility of uses, and suitability of the land for different uses (i.e.,  
15 mining, grazing, recreation, and preservation). When DOE relinquishes its withdrawals on  
16 lands that were historically Federal, those lands withdrawn only by DOE would revert to the  
17 Public Domain and management by BLM. Those lands withdrawn by the overlapping DOE and  
18 BoR withdrawals would remain withdrawn and managed by the BoR.  
19

20 The BoR's use of the withdrawn Public Domain lands after the relinquishment of DOE's  
21 overlapping withdrawal must be consistent with the purposes for which they were originally  
22 withdrawn from BLM by BoR. If they are not, the BoR would be expected to relinquish or  
23 renegotiate its withdrawal notice under the *Federal Land Policy and Management Act of 1976*  
24 and the lands could be returned to the Public Domain for BLM management.  
25  
26

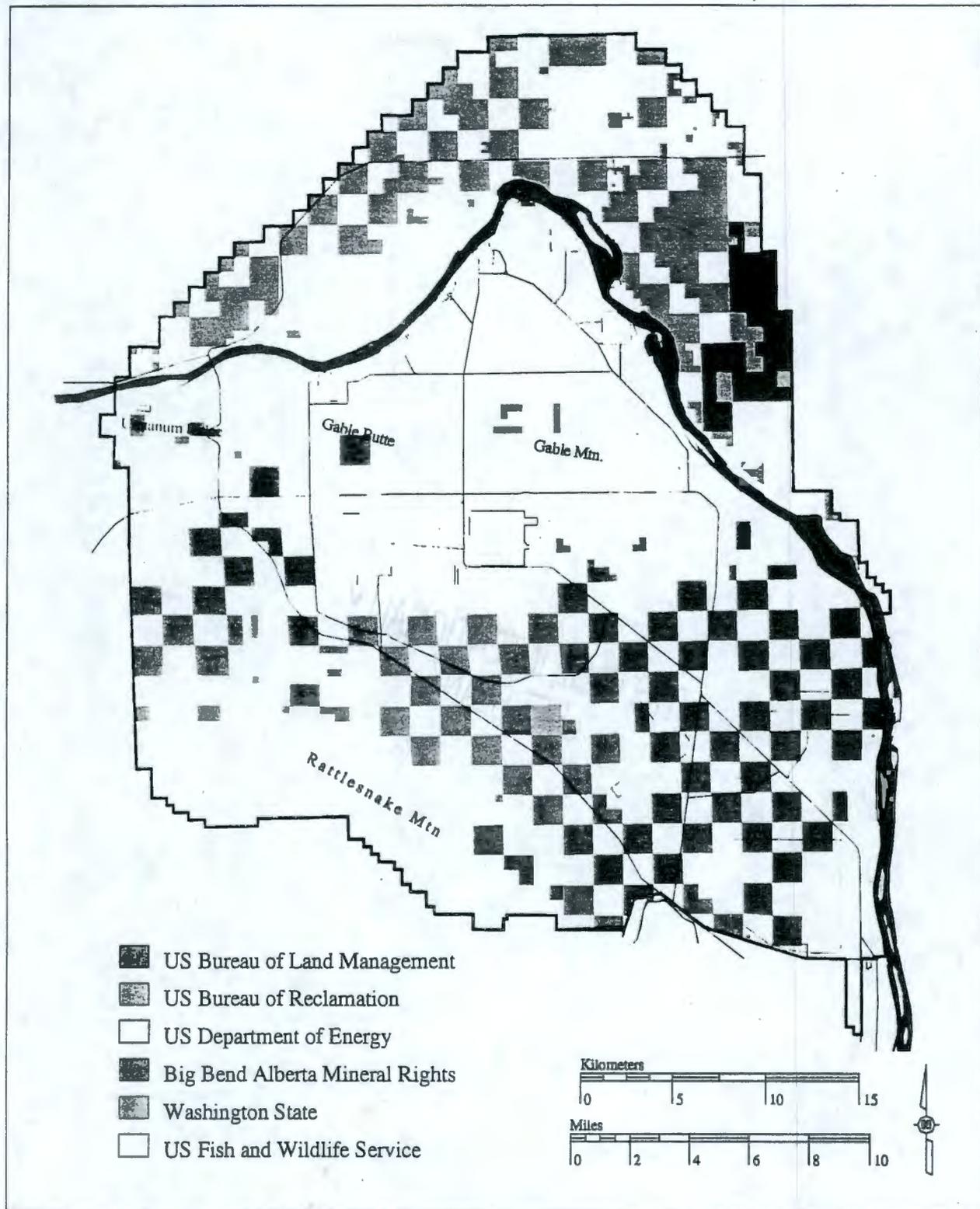
### 27 **ES4.3 Geological and Soil Resources**

28

29 The Hanford Site lies within the Columbia intermountain physiographic province, which  
30 is bordered on the north and east by the Rocky Mountains and on the west by the Cascade  
31 Range. The dominant geologic characteristics of this province are the thick accumulation of  
32 basaltic lava flows.  
33

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

**Figure ES-20. Hanford Site Land Ownership.**



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1 Natural gas was discovered on Rattlesnake Mountain in 1913. The small, shallow field  
2 was developed in 1929 and produced natural gas until the field was closed in 1941. The  
3 mineral rights to a 518 ha (1,280 ac) area of the ALE Reserve are still owned by a private  
4 company.  
5

6 The Hanford Dune Field, located north of WNP-2, is one of three great dune fields in the  
7 Columbia River Basin. The Heritage Conservation and Recreation Service recommended  
8 inclusion of the dunes in the National Natural Landmark System.  
9

10 Earthquake hazards are relatively low. Several major volcanos are located in the  
11 Cascade Range to the west of the Hanford Site. Mount St. Helens is located approximately  
12 220 km (136 mi) west-southwest of the Hanford Site. The major concern is that ashfall could  
13 disrupt communication and travel on the Site.  
14

15 There are 15 different soil types on the Hanford Site that vary from sand to silt loam.  
16 The most common soil type is Quincy sand. Because of the recent Missoula Floods and dry  
17 climate, pedogenesis in the area has not yet created a readily available clay that could be used  
18 for remedial action landfill covers. No soils on the Hanford Site are currently classified as prime  
19 or unique farmlands because they would require irrigation.  
20  
21

#### 22 **ES4.4 Water Resources**

23

24 Primary surface-water features associated with the Hanford Site are the Columbia and  
25 Yakima Rivers. In addition, several surface ponds and ditches are associated with Hanford Site  
26 operation (Figure ES-22). Cold Creek and its tributaries are ephemeral springs within the  
27 Yakima River drainage. Rattlesnake Springs, located on the western portion of the Site, forms  
28 a small surface stream that flows for approximately 3 km (1.9 mi) before disappearing into the  
29 ground.  
30

31 Wetlands include transitional lands occurring between terrestrial and aquatic  
32 ecosystems (Figure ES-23) where the water table usually is close to the surface or where  
33 shallow water covers the surface. The primary jurisdictional wetlands found on the Hanford Site  
34 occur along the Hanford Reach and include the riparian and riverine habitats located along the  
35 river shoreline. Riparian habitat includes the uplands immediately adjacent to the Hanford  
36 Reach or its backwater sloughs and supports vegetation typical of a high water table. Common  
37 riparian species found along the Hanford Reach include a variety of woody and herbaceous  
38 plant species.  
39

40 Flow along the Hanford Reach is controlled by the Priest Rapids Dam. The likelihood of  
41 recurrence of large-scale flooding has been reduced by the construction of flood control and  
42 water storage dams upstream of the Hanford Site (Figure ES-24). Artificial wetlands (caused  
43 by irrigation) exist on the Wahluke Slope. Ecology has classified the Hanford Reach as Class A  
44 (Excellent). Class A waters are suitable for essentially all uses, including drinking water,  
45 recreation, and wildlife habitat. Potential well head protection areas would be associated with  
46 areas of high recharge potential (Figure ES-25). Radionuclide concentrations in the Columbia  
47 River are well below drinking water standards at all monitoring locations.  
48

49 The quality of the groundwater at the Hanford Site has been affected by activities  
50 related to the production of nuclear materials. Large areas underlying the Hanford Site have  
51 elevated levels of both radiological and nonradiological constituents.  
52

1 Water use in the area is primarily from surface diversion, with groundwater sources  
2 accounting for less than 10 percent of the total use. The first downstream drinking water intake  
3 below the Hanford Site is the City of Richland's intake.  
4

5 The Hanford Site and the Department of Defense Yakima Training Center (located to  
6 the west of the Hanford Site) contain the largest remaining remnant of shrub-steppe vegetation  
7 in the Columbia Basin. Washington State is rapidly losing shrub-steppe habitat. The State of  
8 Washington has designated shrub-steppe habitat as priority habitat because shrub-steppe  
9 areas possess unique or significant value to many species. The DOI National Biological  
10 Service identifies native shrub and grassland steppe in Washington and Oregon as endangered  
11 ecosystem (with an 85 to 98 percent decline). The ALE Reserve supports one of the largest  
12 remnants of relatively undisturbed shrub-steppe ecosystem in the State of Washington. A herd  
13 of approximately 800 Rocky Mountain elk is present on the ALE Reserve.  
14

#### 15 **ES4.5 Air Resources**

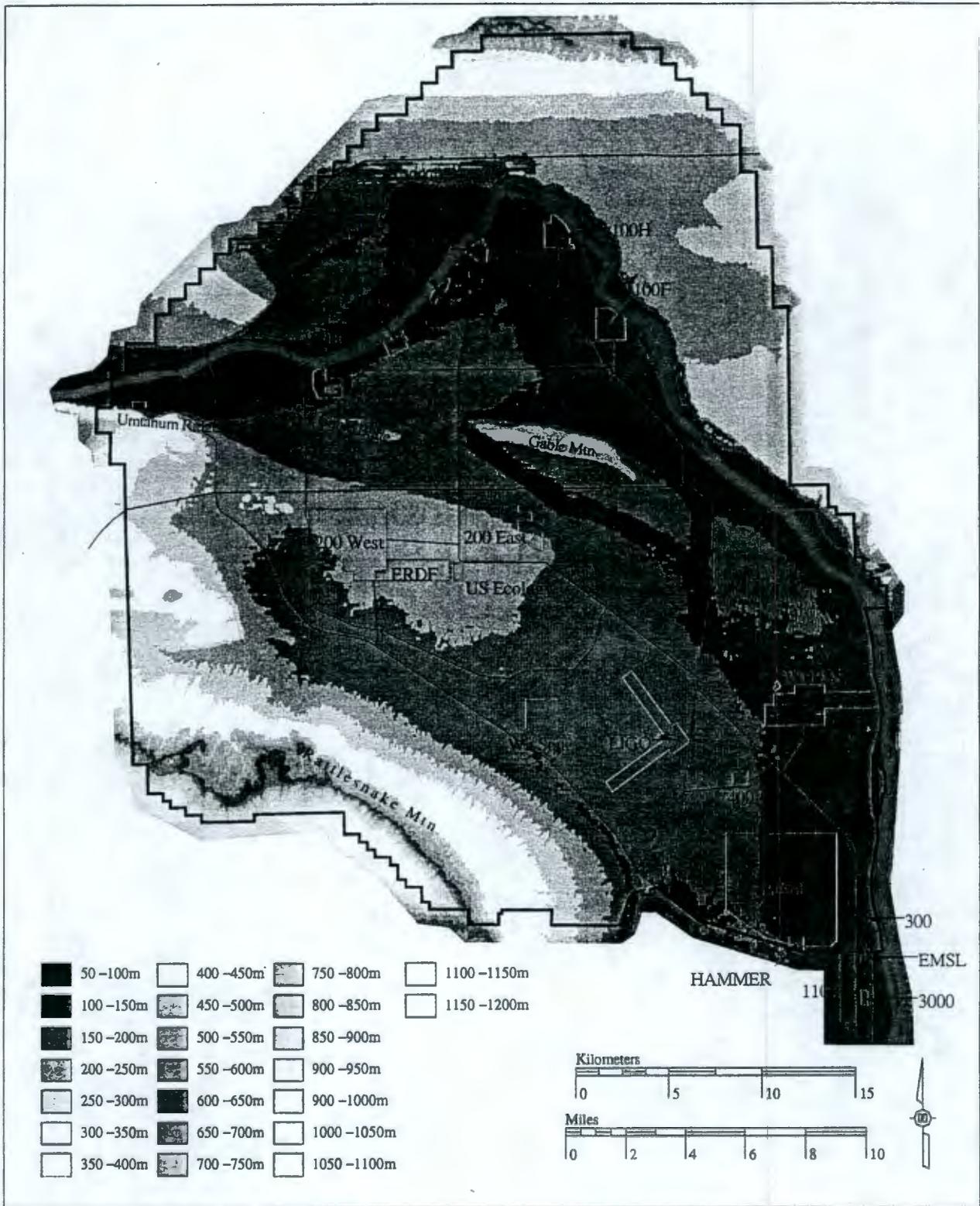
16  
17 The Hanford Site climate is semiarid with an average annual precipitation of 16 cm  
18 (6.3 in). Summers are warm and dry with abundant sunshine. Prevailing wind directions are  
19 from the northwest during all months of the year. Regional air quality is generally good.  
20 Particulate standards have been exceeded 20 times in the last 10 years due to blowing dust.  
21

#### 22 **ES4.6 Biological Resources**

23  
24 As a Federal land manager, DOE is responsible for conserving fish, wildlife, and plant  
25 populations and their habitats on the Hanford Site. Information about these natural resources is  
26 presented below. The WDFW identifies priority habitats and priority species within Washington  
27 State (Figures ES-26, ES-27, and ES-28). Counties and cities may use information prepared  
28 by the WDFW to classify and designate locally important habitats and species. While these  
29 priorities are those of the Department, they and the data on which they are based may be  
30 considered by counties and cities when developing their land-use plans under the GMA.  
31

32 The Hanford Site is a relatively large, mostly undisturbed area of shrub-steppe habitat  
33 containing numerous plant and animal species adapted to the semiarid environment of the  
34 region characterized as a shrub-steppe ecosystem. In the early 1800s, the dominant plant in  
35 the area was big sagebrush with an understory of perennial bunchgrasses, especially  
36 Sandberg's bluegrass and bluebunch wheatgrass. With the advent of settlement that brought  
37 increased livestock grazing and crop raising, the natural vegetation has been invaded by non-  
38 native annual species, especially cheatgrass. The dryland areas of the Hanford Site were  
39 treeless in the years before land settlement; however, trees were planted and irrigated on most  
40 of the farms to provide windbreaks and shade. Some of the trees died when the farms were  
41 abandoned in 1943. Today these trees serve as nesting platforms for several species of birds  
42 (e.g., hawks, owls, ravens, magpies, and great blue herons), and as night roosts for wintering  
43 bald eagles.  
44  
45  
46

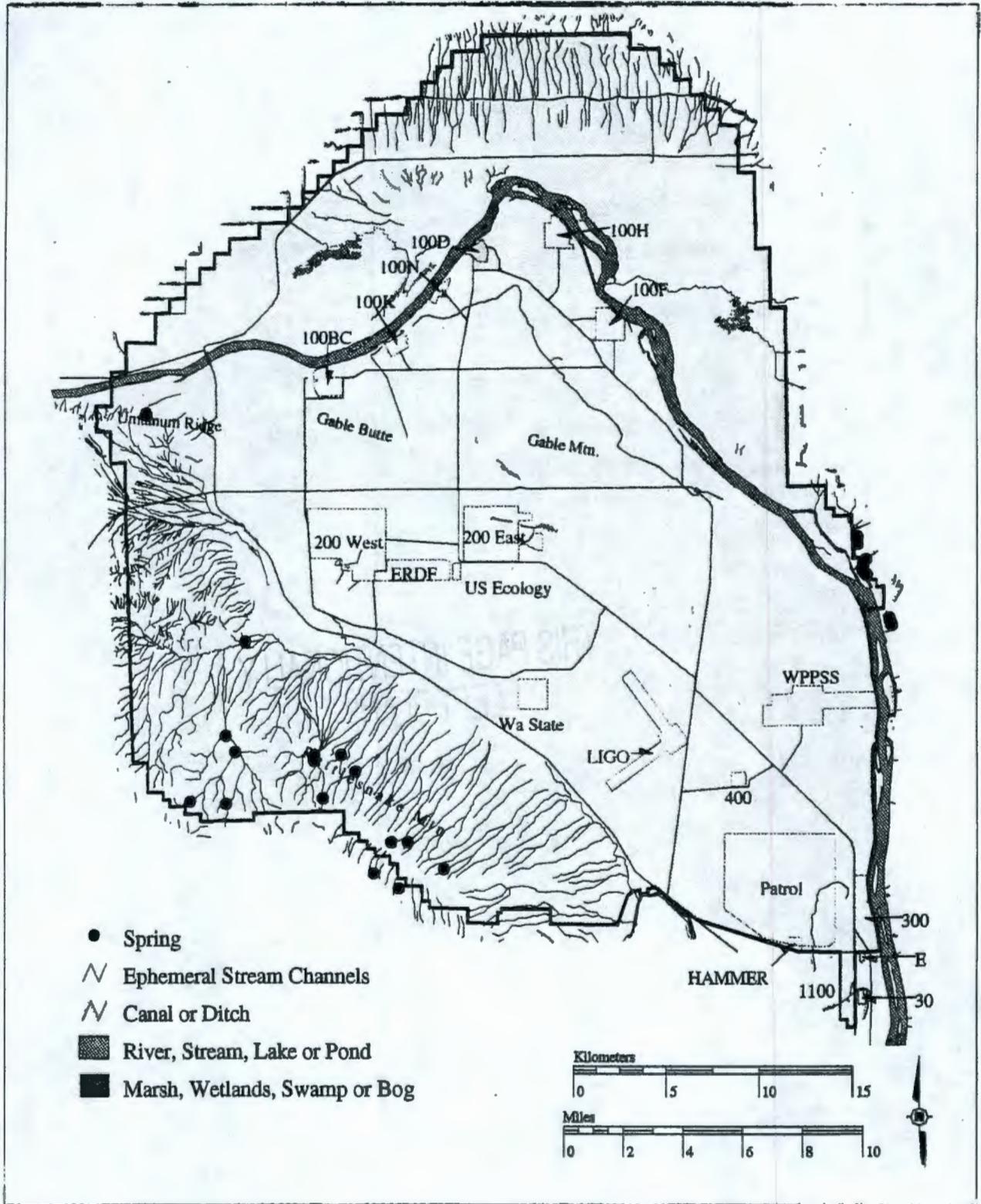
**Figure ES-21. Topography of the Hanford Site.**



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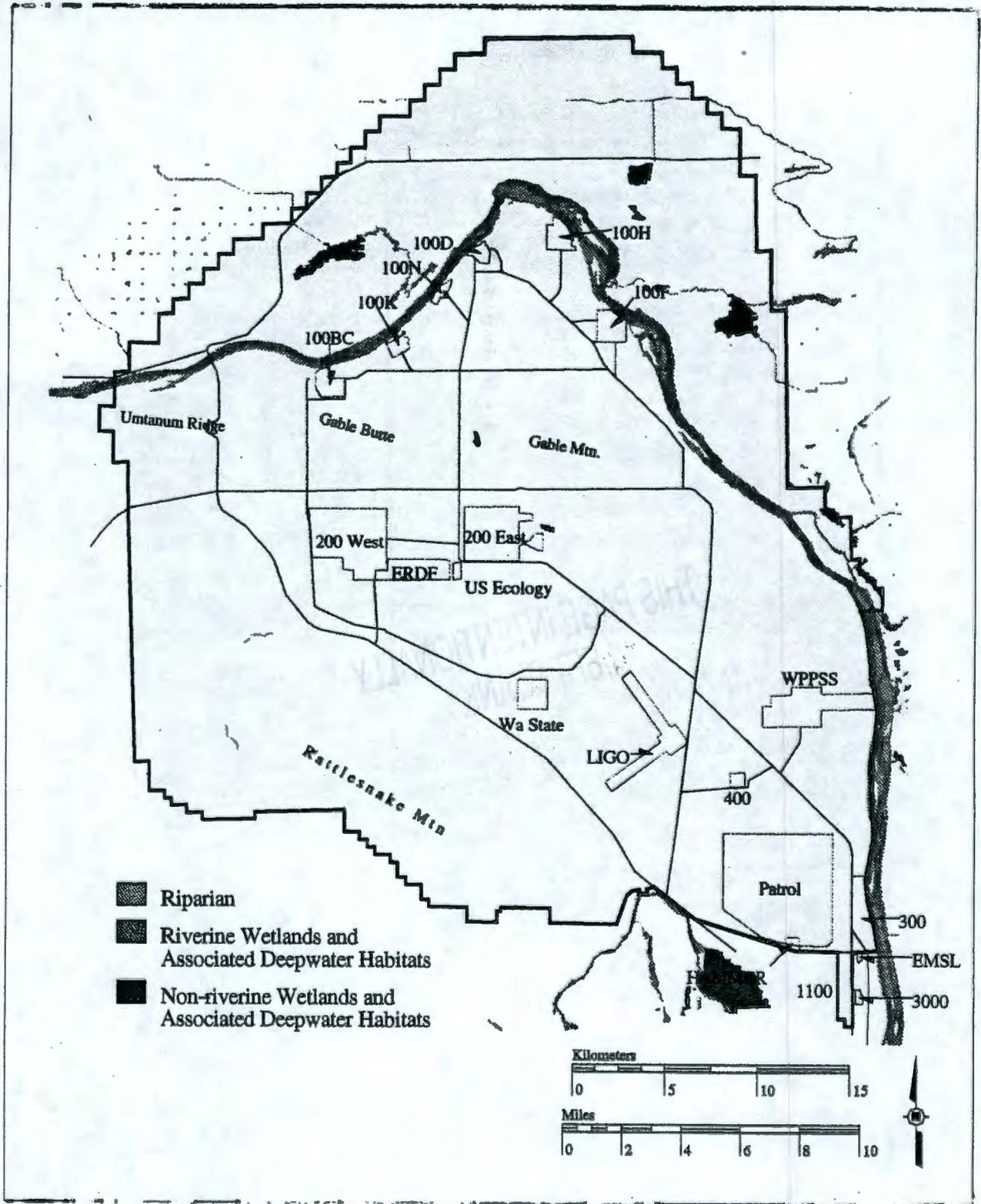
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**Figure ES-22. Surface Water on the Hanford Site.**



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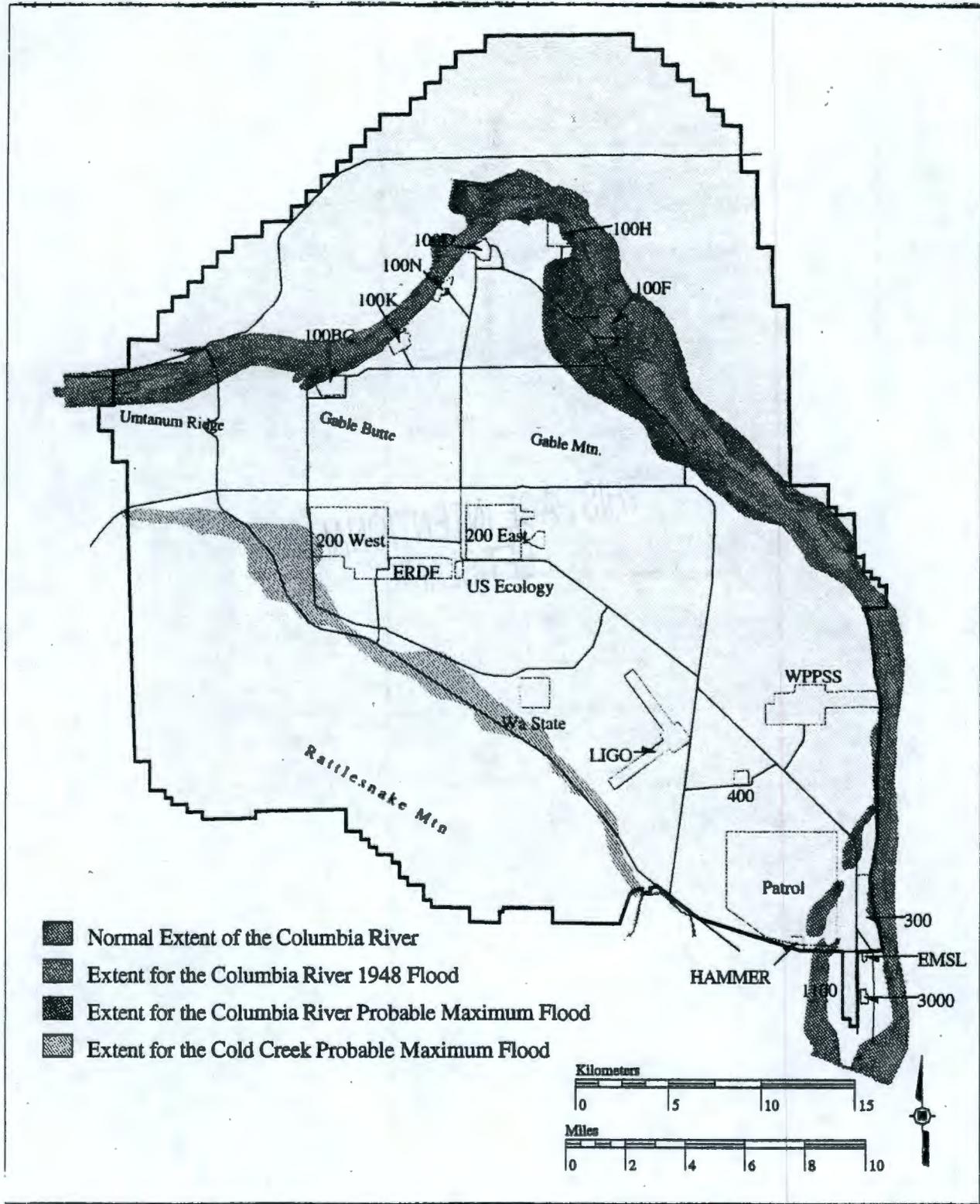
**Figure ES-23. Wetlands on the Hanford Site.**



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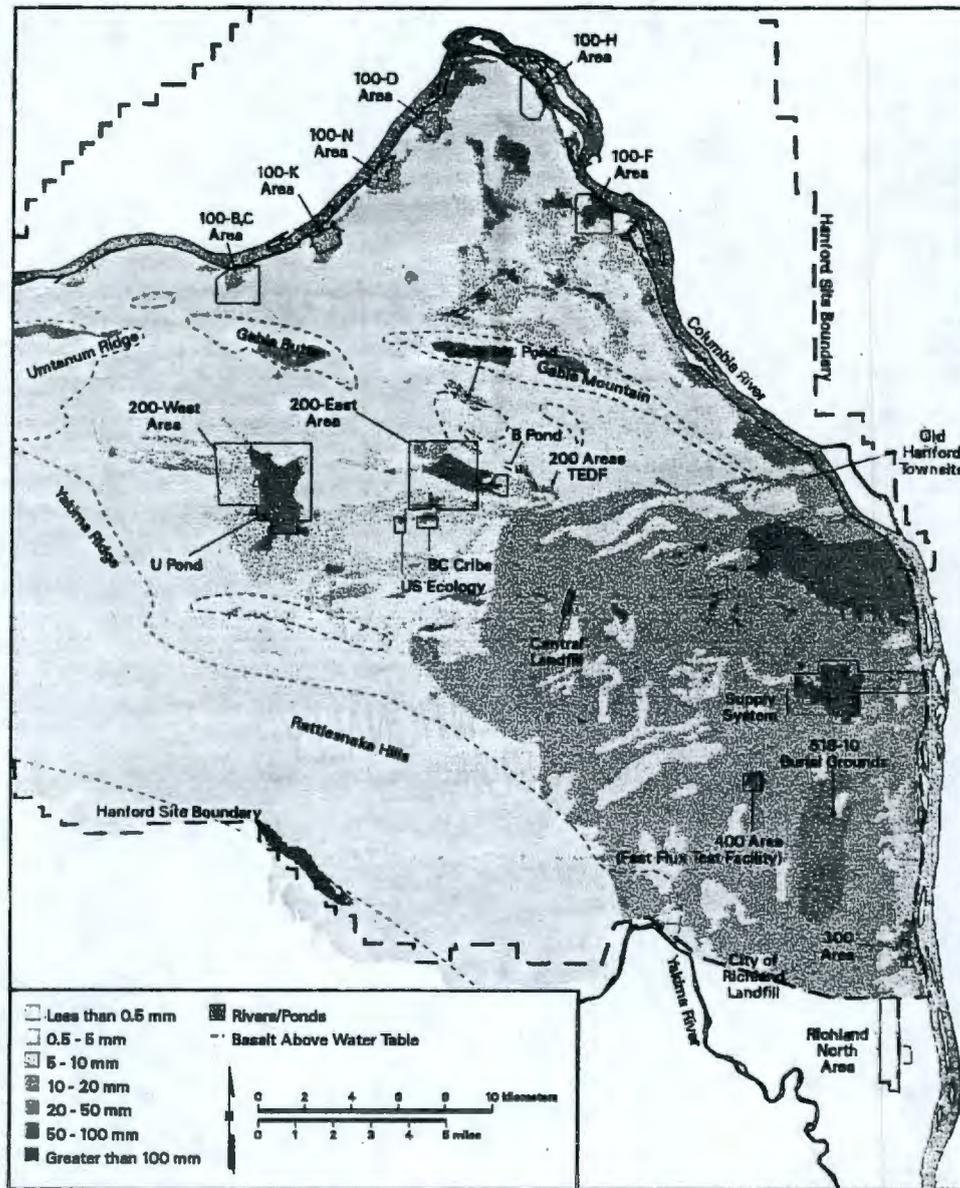
1  
2  
3  
4

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



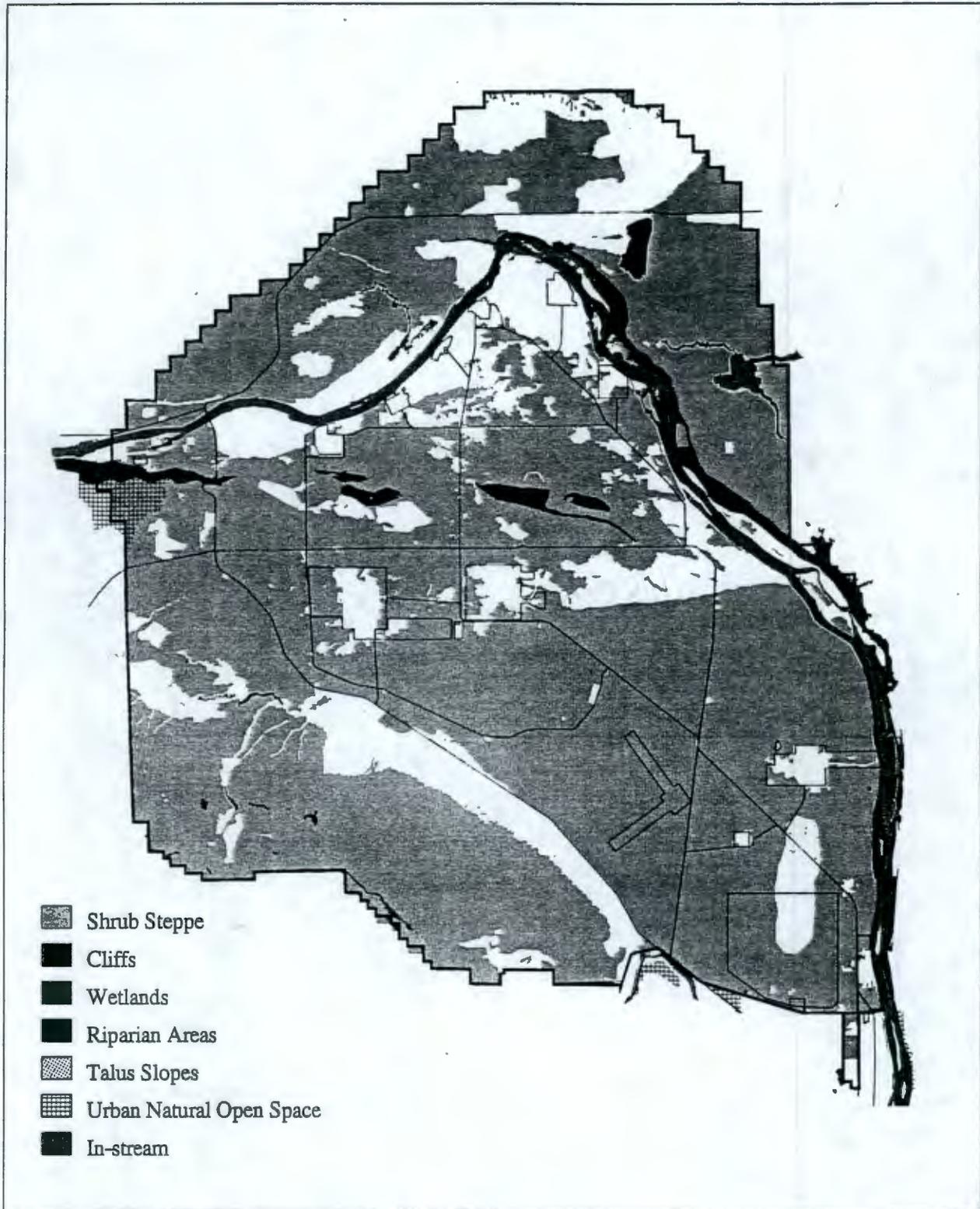
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1 **Figure ES-25. Estimated Recharge from Infiltration of**  
 3 **Precipitation and Irrigation on the Hanford Site.**



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

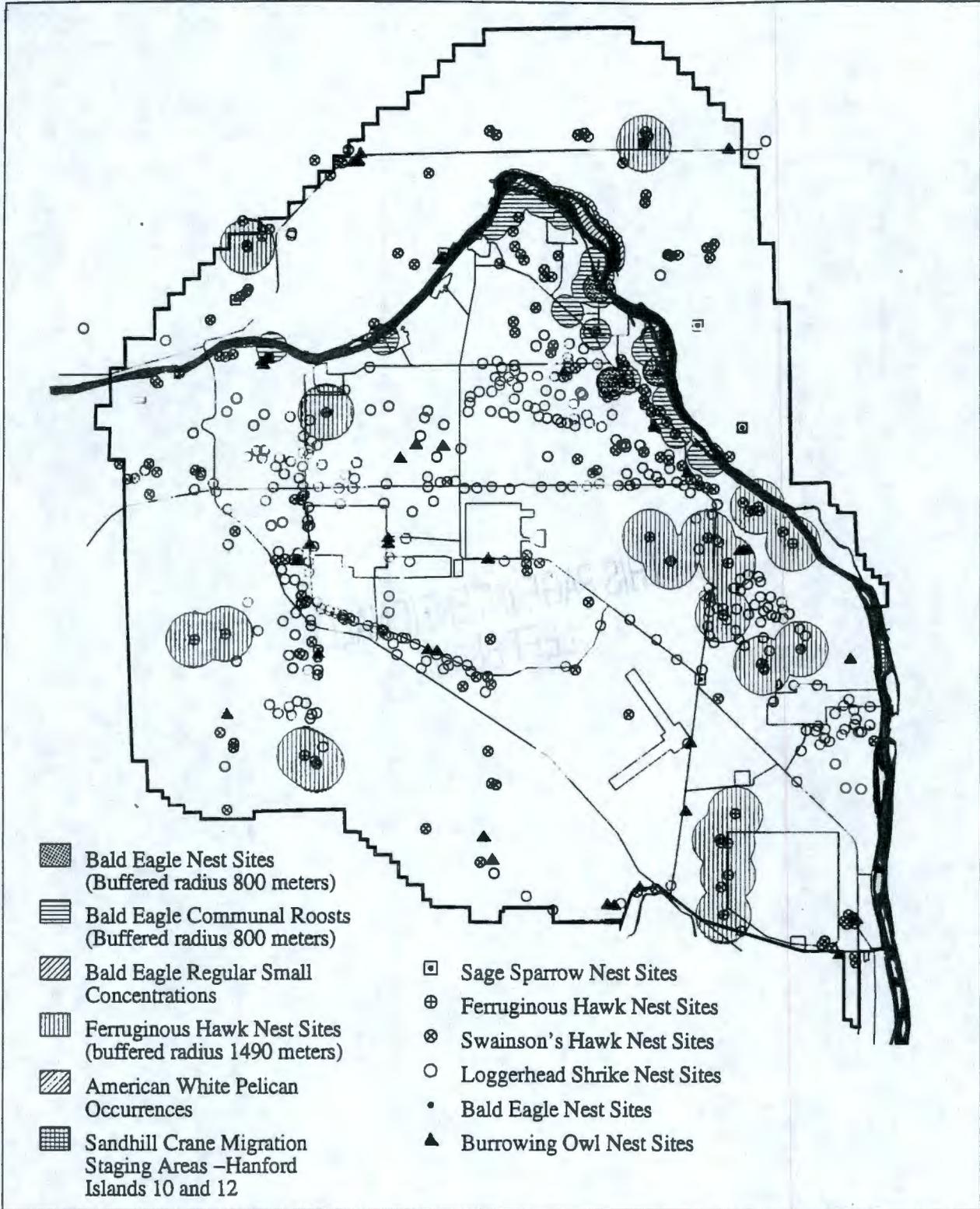


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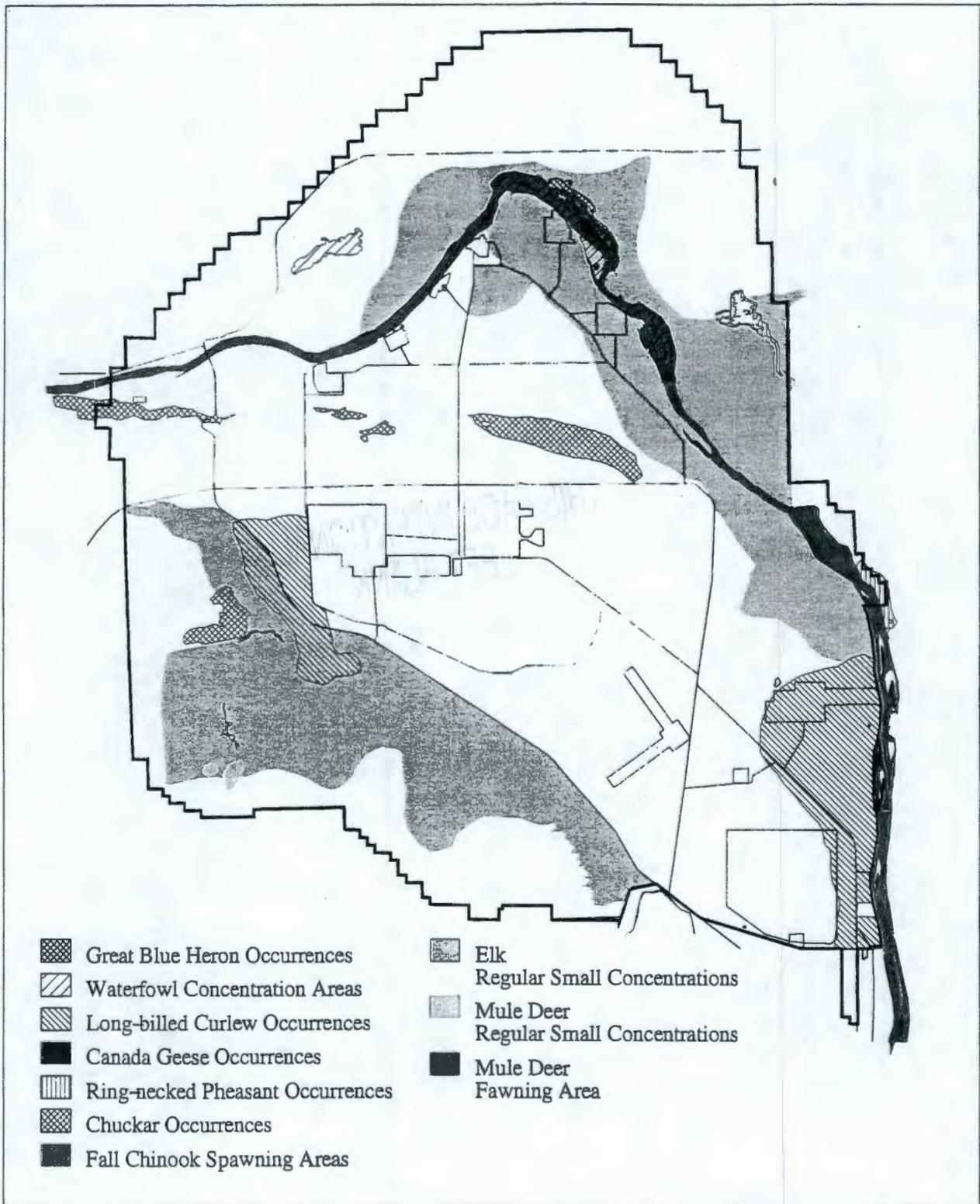
**Figure ES-27. WDFW Priority Species: State Listed and Candidate.**



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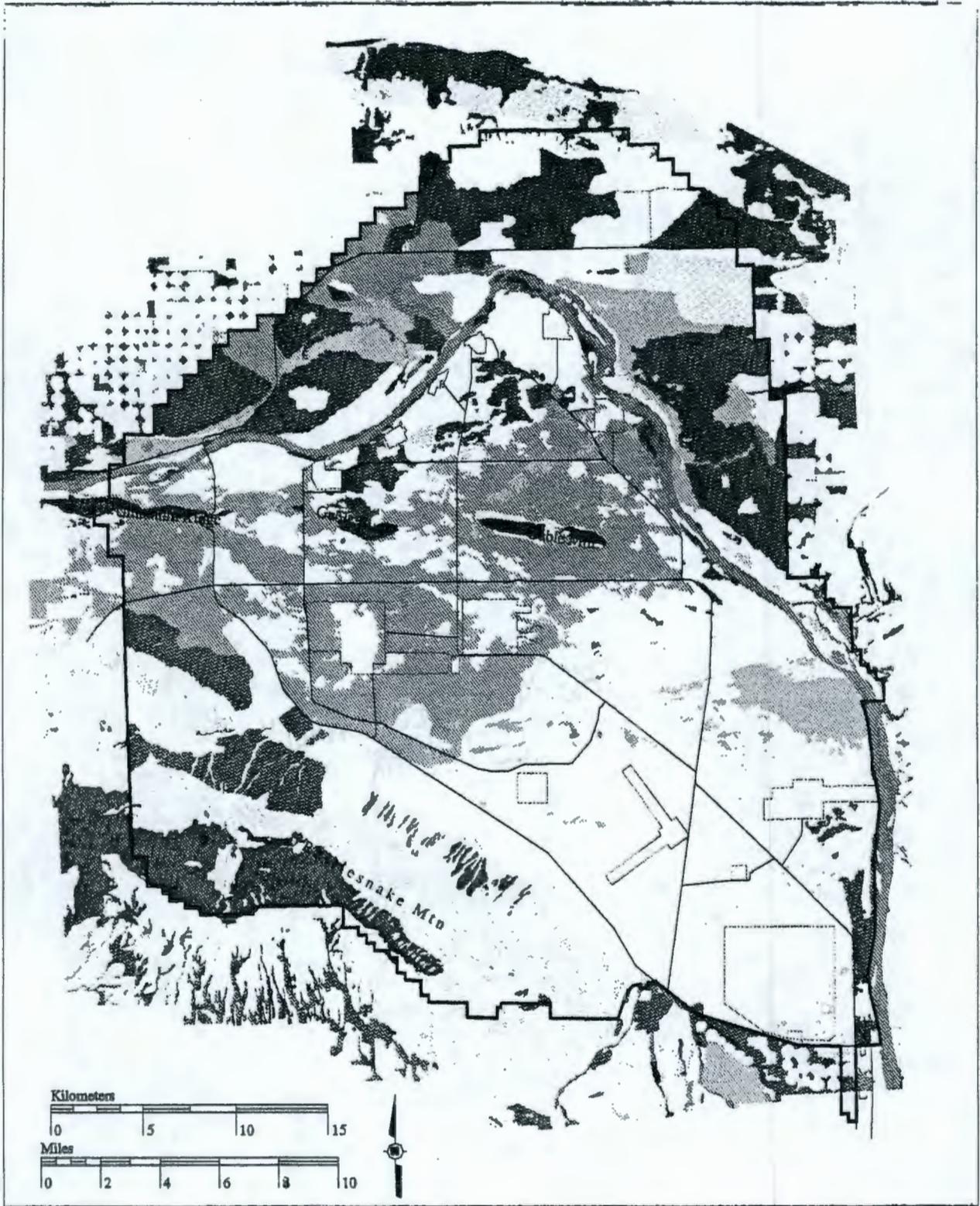
1 **Figure ES-28. WDFW Priority Species: Vulnerable**  
 2 **Aggregations and Species of Recreation, Commercial,**  
 3 **and/or Tribal Importance.**



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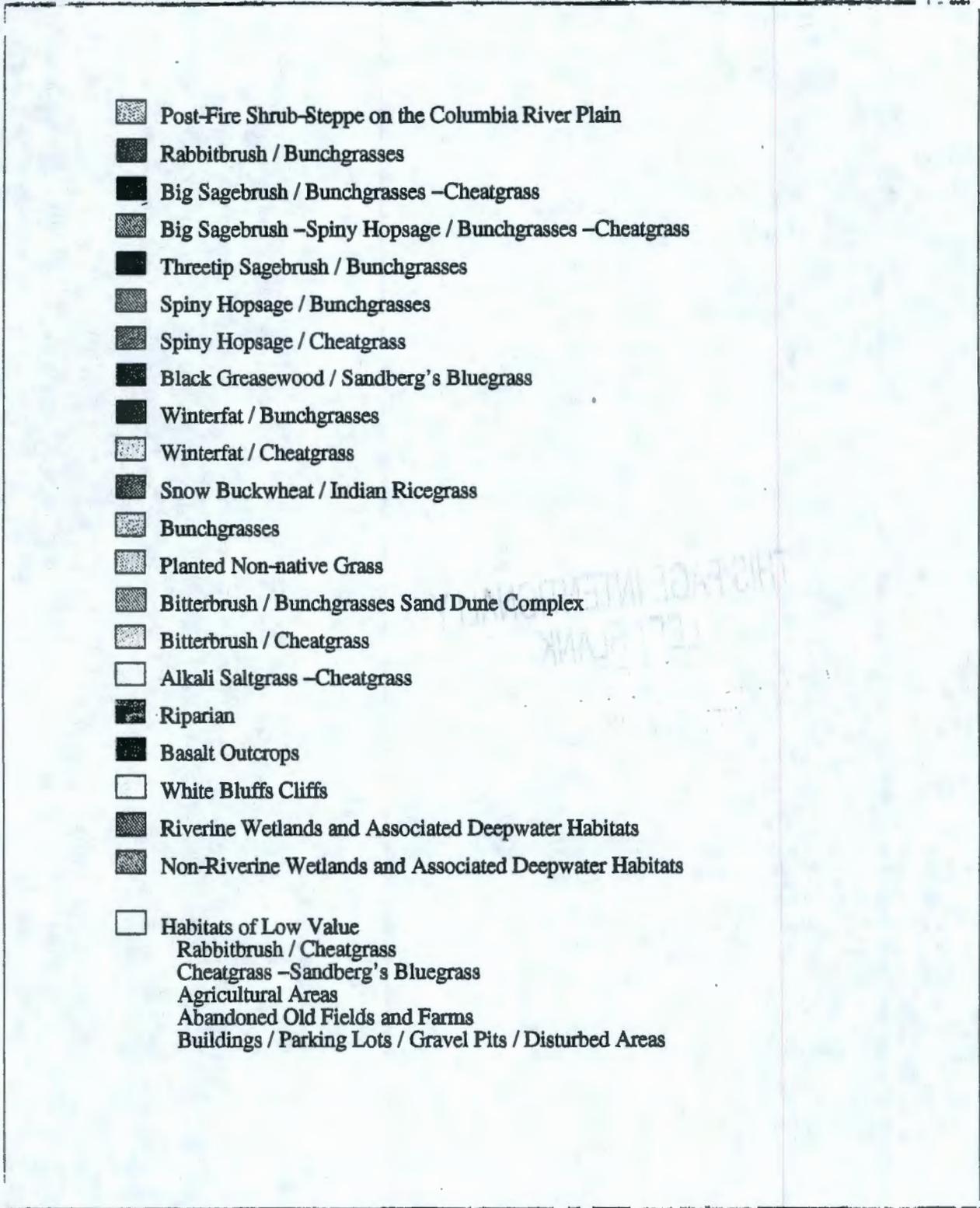
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1 **Figure ES-29. Plant Communities of Concern on the**  
3 **Hanford Site.**



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



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

7  
8 Mule deer are found throughout the Hanford Site, although areas of the highest  
9 concentrations are on the ALE Reserve and along the Columbia River. Islands in the Hanford  
10 Reach are used extensively as fawning sites by deer.

11  
12 There are three species of birds and one fish species that are on the Federal List of  
13 Endangered and Threatened Species, and several species of plants and animals are under  
14 consideration for formal listing by the State of Washington. State endangered plants and state  
15 threatened plants are found on the Hanford site. The state endangered plants are the northern  
16 wormwood and the Columbia yellowcress; state-threatened plants are the Columbia milk-vetch,  
17 Hoover's desert-parsley, and white eatonella. State-sensitive plant species occurring along the  
18 Hanford Reach include Piper's daisy, the southern mudwort, dense sedge, shining flatsedge,  
19 false pimpernel, gray crypthana, and the dwarf evening primrose.

20  
21 The Columbia River and other water bodies on the Hanford Site provide valuable habitat  
22 for aquatic organisms. The Hanford Reach represents the only remaining significant  
23 mainstream Columbia River spawning habitat for stocks of upriver bright fall chinook salmon  
24 and white sturgeon (Figure ES-30). The Upper Columbia River spring run chinook salmon (E-  
25 3/99), Middle Columbia River steelhead (T-3/99) and Upper Columbia River steelhead (E-8/97)  
26 have been placed under the protection of the Endangered Species Act. These fish spawn in or  
27 migrate through the Hanford Reach.

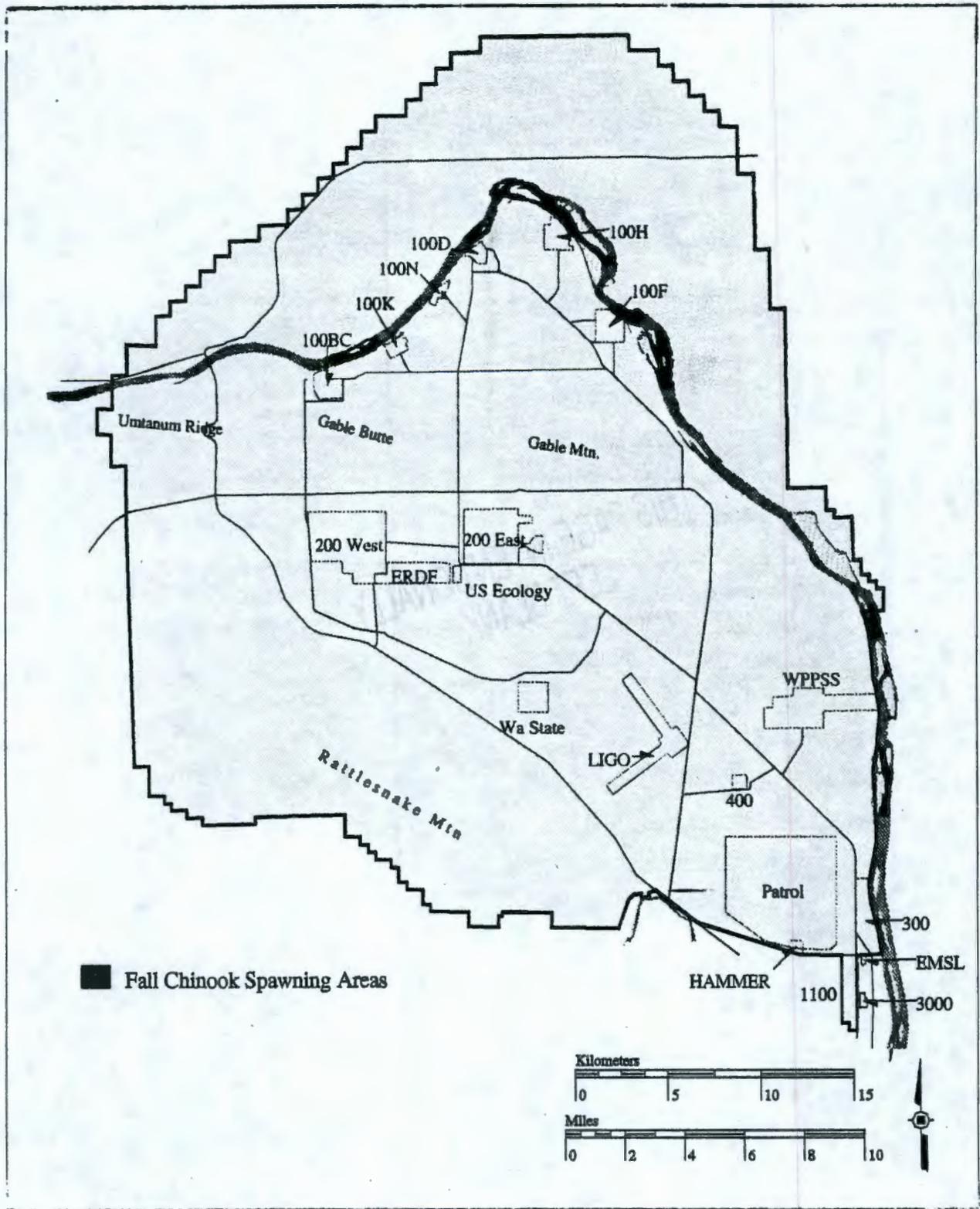
28  
29 The DOE is currently in the process of developing and implementing an overall  
30 management strategy for the conservation of fish, wildlife, and plant populations and their  
31 habitats on the Hanford Site. The BRMaP provides a broad, but comprehensive, direction that  
32 specifies DOE biological habitat resources policies, goals, and objectives; and prescribes how  
33 they will be met.

#### 34 35 36 **ES4.7 Cultural Resources**

37  
38 The Hanford Site is rich in cultural resources, with well-preserved archaeological sites.  
39 The Draft *Hanford Cultural Resources Management Plan* was developed to establish guidance  
40 for the identification and management of archaeological, historic, and traditional cultural  
41 resources. Hanford Site cultural resources include American Indian historic and prehistoric  
42 sites, historic properties representing early Euro-American settlements, and more recent  
43 structures associated with the Manhattan Project and Cold War eras.

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



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1           Because of the construction of dams and the resulting development elsewhere along the  
2 Columbia River, many of the original cultural resources have been destroyed or are under  
3 water. The Hanford Site is one of the few remaining archaeologically rich areas in the western  
4 Columbia Plateau. Locations along the Columbia River played a central role in the  
5 development of the Washane religion, which is still practiced by American Indian tribal  
6 members in the region. The Hanford Site is considered to be culturally important by many  
7 American Indians. Certain sites demonstrate traditional cultural significance because of  
8 traditional beliefs, religious practices, and cultural practices.  
9

10           Recent historic structures are the defense reactors and associated materials-processing  
11 facilities that are present on the Hanford Site. Plutonium for the first atomic explosion (the  
12 Trinity test) and the bomb that destroyed Nagasaki to end World War II were produced at the  
13 B Reactor on the Hanford Site as part of the Manhattan Project.  
14

## 15 **ES4.8           Socioeconomic Environment**

16  
17  
18           Activity on the Hanford Site plays a dominant role in the socioeconomics of the Tri-Cities  
19 and other parts of Benton and Franklin counties. The Tri-Cities serves as a market center for a  
20 much broader area of eastern Washington and northeastern Oregon. Socioeconomic impacts  
21 of changes at Hanford are mostly confined to the immediate Tri-Cities community and Benton  
22 and Franklin counties (and Yakima County, to a lesser extent).  
23

24           The 1996 estimated population of the three Tri-Cities was as follows: Richland, 35,990;  
25 Pasco, 22,370; and Kennewick, 48,010. Estimates for 1996 placed population totals for Benton  
26 and Franklin counties at 131,000 and 43,700, respectively.  
27

28           Approximately 384,000 people reside within an 80 km (50 mi) radius of the Hanford Site.  
29 The minority population within the area consists of about 95,000 people and represents  
30 approximately 25 percent of the population. The ethnic composition of the minority population  
31 is primarily Hispanic (approximately 80 percent) and American Indian (8 percent). Low-income  
32 population represents approximately 42 percent of the households in the area.  
33

34           Three major sectors have been the principal driving forces of the economy in the  
35 Tri-Cities since the early 1970s:  
36

- 37       • **DOE and Hanford Site contractors** – Approximately 11,400 employees worked for  
38 DOE and its Hanford contractors in 1996. This number is down from over 19,000 in  
39 1994 due to downsizing activities. An additional approximately 2,000 employees  
40 support site cleanup through the "enterprise companies." Future downsizing in  
41 Hanford Site employment is anticipated, although the extent of this downsizing is  
42 unknown at this time.  
43
- 44       • **Energy Northwest (formerly Washington Public Power and Supply System**  
45 **[WPPSS])** – In 1995 and 1996, downsizing activities at Energy Northwest  
46 headquarters decreased employment to about 1,164 workers (down from more than  
47 1,900 in 1994). The decommissioning of the mothballed Energy Northwest plants  
48 (WNP-1 and WNP-4) within the next few years is expected to reduce the number of  
49 employees further.  
50
- 51       • **Agriculture** – In 1995, agricultural activities in Benton and Franklin counties were  
52 responsible for approximately 9,739 jobs, or 12 percent of the total employment in  
53 the area. Area farms and ranches generate a sizable number of jobs in supporting  
54 sectors, such as agricultural services (e.g., application of pesticides and fertilizers or

1 irrigation system development) and sales of farm supplies and equipment. More  
2 than 20 food processors in Benton and Franklin counties produce items such as  
3 potato products, canned fruits and vegetables, wine, and animal feed.  
4

5 Per capita income in 1994 for Benton County was \$22,053, Franklin County was  
6 \$16,999, and Washington State was \$22,526. The median household income in 1994 for  
7 Benton County was estimated to be \$43,684, Franklin County was estimated to be \$31,121,  
8 and the State of Washington was estimated at \$38,094.  
9

10 In 1996, 91 percent of all housing (44,488 total units) in the Tri-Cities was occupied.  
11 Single-unit housing, which represents nearly 59 percent of the total units, has a 95 percent  
12 occupancy rate throughout the Tri-Cities.  
13

14 The Hanford Site infrastructure is a significant resource for furthering industrial  
15 development of the region. Key elements of this infrastructure include facilities, road and rail  
16 systems, utilities, and support services.  
17  
18

## 19 **ES4.9 Visual and Aesthetic Resources**

20  
21 The land in the vicinity of the Hanford Site is generally flat with little relief. Rattlesnake  
22 Mountain, rising to 1,060 m (3,477 ft) above sea level, forms the southeastern boundary of the  
23 Hanford Site. Gable Mountain and Gable Butte are the highest land forms within the Hanford  
24 Site. The view toward Rattlesnake Mountain is aesthetically appealing, particularly in the spring  
25 when wildflowers are in bloom. Large rolling hills are located to the west and north. The  
26 Columbia River, flowing across the northern part of the Hanford Site and forming the Site's  
27 eastern boundary, is scenic with its contrasting blue against a background of brown basaltic  
28 rocks and desert sagebrush. The White Bluffs, steep whitish-brown bluffs adjacent to the  
29 Columbia River, are a striking natural feature of the landscape.  
30  
31

## 32 **ES4.10 Noise**

### 33 **ES4.10.1 Hanford Site Sound Levels**

34  
35  
36 Most industrial facilities on the Hanford Site are located far enough away from the Site  
37 boundary that noise levels at the boundary are not measurable or are barely distinguishable  
38 from background noise levels.  
39  
40

## 41 **ES4.11 Contaminated Areas**

42  
43 Three operating areas of the Hanford Site (the 100, 200, and 300 Areas) are still  
44 included on the EPA's National Priorities List. Radioactive and hazardous materials have been  
45 disposed onsite throughout the period of active Hanford Site operations, resulting in  
46 contamination of the vadose zone and groundwater.  
47

48 The Columbia River has received radiological and chemical contamination as a result of  
49 past operations at the Hanford Site. Sediments in the Columbia River contain low levels of  
50 Hanford radionuclides (e.g., cobalt-60 and europium-154), metals, and radionuclides from  
51 worldwide nuclear weapons testing fallout, which collect in slack water habitats.  
52

1 In the 100 Area, contamination (e.g., strontium-90, tritium, nitrate, and chromium) exists  
2 in some areas of surface soils, subsurface soils, and groundwater.  
3

4 The Central Plateau has been used for fuel reprocessing, waste management, and  
5 disposal activities and is the most extensively contaminated area at the Hanford Site.  
6 Contaminants include extensive groundwater plumes of technetium-99, iodine-129, nitrate,  
7 tritium, uranium, and chlorinated hydrocarbons (e.g., carbon tetrachloride, chloroform, and  
8 trichloroethylene).  
9

10 The 600 Area presents a diverse range of existing contamination. Portions of the  
11 600 Area vadose zone are essentially uncontaminated, while nearby operating areas, such as  
12 the 300 Area, present significant environmental remediation challenges. Extensive  
13 groundwater contamination (e.g., nitrate, tritium, technetium-99, and iodine-129) is present in  
14 the 600 Area.  
15

#### 16 **ES4.12 Hanford Site Protective Safety Buffer Zones**

17

18 Existing and planned waste disposal sites, waste processing facilities, and hazardous or  
19 radiological materials storage facilities are found throughout the Hanford Site. To protect the  
20 public from routine or accidental releases of radiological contaminants and/or hazardous  
21 materials, the use of protective buffer zones surrounding the waste remediation, processing,  
22 and disposal areas is required by DOE O 151.1 - *Comprehensive Emergency Management*  
23 *System*, Occupational Safety & Health Administration (OSHA) Regulations 29 CFR 1910.120 -  
24 *Hazardous Waste Operations and Emergency Response*, and OSHA 29 CFR 1910.119 -  
25 *Process Safety Management (PSM) Rule*.  
26

27 These buffer zones limit public exposure to radiological and hazardous chemicals from  
28 routine operations and accidents. A methodology was developed to determine the location,  
29 size, shape, and characteristics of the buffer zones needed for the Hanford Site, using existing  
30 safety analysis reports, hazard assessments, and emergency planning zone studies. This  
31 methodology allows decision makers to restrict potential land uses in areas where hazardous or  
32 radioactive material handling could pose an unacceptable risk to human health.  
33

34 Buffer zones necessary to protect human health and safety in potential accidents are  
35 divided into two main components – an inner exclusion zone or an exclusive use zone (EUZ)  
36 and an emergency planning zone (EPZ) (see Figure ES-9).  
37

- 38 • The EUZ is an area designated for operation activities associated with a waste site  
39 or facility. Each DOE nuclear facility is required to maintain a public buffer zone  
40 where 25 rem would not be exceeded in the event of an unmitigated accident  
41 (DOE O 420.1). The EUZ is reserved for DOE or other hazardous operations with  
42 severely restricted public access. This zone extends from the facility fence line to a  
43 distance at which threats to the public from routine and accidental releases diminish  
44 to the point where public access can be routinely allowed. It is inside the EPZ and is  
45 equivalent to the exclusion zone boundary required by DOE's "Comprehensive  
46 Emergency Management System Order" (DOE O 151.1).  
47
- 48 • The EPZ is an area surrounding a facility for which emergency planning and  
49 preparedness efforts are carried out to ensure that prompt and effective actions can  
50 be taken to minimize the impact to onsite personnel, public health and safety, and  
51 the environment in the event of an operational emergency. The EPZ begins at the  
52 boundary of the facility and ends at a distance for which special planning and  
53 preparedness efforts are no longer required. Access restrictions are not required

1 within an EPZ; however, DOE would be responsible for ensuring adequate planning  
2 and preparedness efforts for every person within the zone.  
3

4 In addition to DOE's need for land to isolate from the public hazardous processes and  
5 facilities that could produce a 25 rem radiological dose under any accident conditions, the  
6 current site boundary has been used to identify and design safety class systems, structures and  
7 components that are required to keep any accident from exceeding 500 mrem at the site  
8 boundary. The current site boundary is also the point-of-compliance for protection of the public  
9 to assure that routine releases from all DOE activities are less than 100 mrem (DOE O 5400.5),  
10 and that not more than 10 mrem is from airborne sources (40 CFR 61) or that not more than  
11 4 mrem are from groundwater sources (40 CFR 141). In addition to radiological accident con-  
12 ditions, DOE also uses the current site boundary to protect the public from potential hazardous  
13 chemical accidents such as a chlorine gas leak. If the CLUP policies and implementing  
14 procedures on EUZs are adopted in the ROD, DOE expects to use DOE's annual review of  
15 safety and environmental permitting documentation to be the basis for EUZ policy (see Chapter  
16 ES-6).  
17  
18

## 19 **ES5.0 Environmental Consequences**

20  
21 The future land-use alternatives developed by DOE and the cooperating agencies and  
22 consulting Tribal governments would have impacts to natural and cultural resources and could  
23 affect the socioeconomic environment in the region. The potential environmental impacts of  
24 each land use would depend on its nature, location, and amount of land affected. With the  
25 exception of the No-Action Alternative, impacts would be mitigated by the proposed CLUP  
26 Policies and implementing procedures. The reader should keep in mind that the impacts  
27 presented here are the most severe, reasonably foreseeable, impacts that could result without  
28 the mitigation of CLUP Policies and implementing procedures. For this reason, alternatives that  
29 rely heavily on CLUP Policies and implementing procedures for mitigation (e.g., Alternative  
30 Three) will show greater impacts than alternatives that rely on land-use designations (e.g.,  
31 Alternative Two) for mitigation. The proper execution of the proposed CLUP Policies and  
32 implementing procedures would bring the potential impacts of the alternatives closer together.  
33  
34

### 35 **ES5.1 Analysis Approach**

#### 36 **ES5.1.1 Methods and Assumptions for Estimating Environmental Impacts**

37  
38 The analysis of impacts of alternatives focused on important resource elements are as  
39 follows:  
40

- 41  
42 • **Key resources**, such as surface water (e.g., the Columbia River), groundwater, and  
43 geologic resources
- 44  
45 • **Unique features**, such as basalt outcrops, sand dunes and ripple marks, vistas,  
46 viewsheds, archaeological and historic sites, and areas of cultural and religious  
47 importance to American Indians
- 48  
49 • **Species and habitats**, such as plant communities of concern, wildlife and wildlife  
50 habitat, aquatic species and habitat, wetlands, and biodiversity.

51  
52 Plant communities of concern were identified using the classification under the BRMaP:  
53

- 1 • **Level I** – Biological resources that require some level of status monitoring because  
2 of the recreational, commercial, or ecological role or previous protection status  
3  
4 • **Level II** – Biological resources that require consideration of compliance with laws  
5 such as NEPA and CERCLA  
6  
7 • **Level III** – Biological resources that require mitigation because the resource is listed  
8 by the State of Washington, is a candidate for Federal or state listing, has unique or  
9 significant value, has a special administrative designation, or is environmentally  
10 sensitive  
11  
12 • **Level IV** – Biological resources that justify preservation because these resources  
13 are Federally protected or have regional and national significance. These include  
14 high quality or rare plant communities, habitats, and species.  
15

16 The possible impacts under the nine land-use designations were organized into five  
17 impacting activities:  
18

- 19 • Mining  
20 • Livestock grazing  
21 • Cultivated agriculture  
22 • Development  
23 • Recreation.  
24

25 These five impacting activities were used to identify and describe the potential impacts to  
26 resource elements under each land-use designation.  
27

### 28 **ES5.1.2 Methods and Assumptions for Estimating Socioeconomic Impacts**

29

30 The socioeconomic analysis focused on opportunities for economic development.  
31

32 **ES5.1.2.1 Industrial Land Use.** The socioeconomic impacts of the Industrial land use  
33 designation were evaluated by comparing the industrial use land area under each alternative to  
34 the estimated land needed for industrial development. The Benton County Planning  
35 Department estimated industrial land development needs for the next 50 years to be 1,620 ha  
36 (4,050 ac).  
37

38 The area of land designated for Industrial was then correlated with potential employment  
39 levels expressed as three ranges: less than 100 employees, 100 to 1,000 employees, and over  
40 1,000 employees. The potential for future Federally sponsored industrial projects was also  
41 considered by estimating land available for industrial development land in excess of identified  
42 needs.  
43

44 **ES5.1.2.2 Industrial-Exclusive.** The Industrial-Exclusive land-use designation applies to the  
45 Central Plateau, where DOE would continue to manage Hanford Site waste. In general, this  
46 designation involves the same land and activities for all alternatives.  
47

48 **ES5.1.2.3 Agricultural.** The evaluation of these impacts was based on the increase in land  
49 available for agriculture use, as a percentage of agricultural land in Benton, Franklin, and Grant  
50 counties.  
51

52 Three scenarios for agricultural development on the Wahluke Slope were identified:  
53

- 1 • **Scenario 1** – All agricultural lands would be used to produce a mix of crops similar  
2 to those currently produced in the three-county study area. Lands in the BoR's Red  
3 Zone would be used for grazing.
- 4
- 5 • **Scenario 2** – All agricultural lands would be used to produce a mix of crops similar  
6 to those currently produced in the three-county study area.
- 7
- 8 • **Scenario 3** – All agricultural lands would be used to produce specialty crops such as  
9 irrigated fruits and vegetables. Lands in the BoR's Red Zone would be used for  
10 grazing.
- 11

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

16

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

22

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

26

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

32

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

## 36

## 37

## 38 **ES5.2 Human Health Impacts**

39

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

## 44

## 45 **ES5.3 Resource Impacts**

### 46

### 47 **ES5.3.1 Geologic Resources**

48

49 Impacts to unique geologic features would occur from mining under the Conservation  
50 land-use designations. Development under the Industrial, Research and Development, and  
51 High-Intensity Recreation land-use designations could also result in destruction of unique  
52 features. Grazing is not anticipated to have impacts on these features, although overgrazing  
53 could result in increased erosion of some features and terracing on the hillsides.

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

- 5
- 6 • Perform scientific investigation of unique features so the scientific value would not  
7 be lost
- 8
- 9 • Regulate recreational uses to protect areas containing unique geologic features
- 10
- 11 • Employ irrigation methods to minimize groundwater recharge in the White Bluffs  
12 area.
- 13

### 14 **ES5.3.2 Water Resources**

15  
16 Surface water resources could be impacted by future land uses in several ways. Water  
17 quality could be degraded as a result of industrial wastewater discharges or runoff of  
18 agricultural chemicals from cultivated fields or golf courses. Surface water could also be  
19 degraded by livestock congregating in the vicinity of the water during dry periods.

20  
21 Impacts to groundwater could occur as a result of consumptive use or contamination.  
22 Contamination could result from infiltration of chemicals from spills or infiltration of agricultural  
23 chemicals applied to crops, landscaped areas, or golf courses.

24  
25 The CLUP planning process would be used to screen development proposals for  
26 Hanford Site lands. Some activities would not be permitted and others would be required to  
27 incorporate mitigation measures to reduce impacts. Examples of these activities include the  
28 following:

- 29 • Minimize the use of groundwater
- 30
- 31
- 32 • Restrict irrigated agriculture on the Wahluke Slope or require efficient irrigation  
33 methods to protect the White Bluffs
- 34
- 35 • Designate "no-wake" zones along areas of the Columbia River vulnerable to erosion
- 36
- 37

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

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

Characteristic	Fatalities		Employed <sup>1</sup> (thousands)	Fatalities per 100,000 workers <sup>2</sup>	Relative Standard error <sup>3</sup> (percent)
	Number	Percent			
<b>TOTAL</b>	<b>6,112</b>	<b>100</b>	<b>127,997</b>	<b>4.8</b>	<b>.2</b>
<b>Employee Status</b>					
Wage and salary workers	1,207	80	117,329	4.2	.2
Self-employed		20	10,668	11.1	1.1
<b>Gender</b>					
Men	507	92	69,329	8.1	.3
Women		8	58,668	0.9	.4
<b>Age</b>					
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		—	—	—	—
<b>Race</b>					
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	—	—	—
<b>Hispanic origin</b>					
Hispanic		10	11,725	5.3	1.0
<b>Industry</b>					
	5,521				
<b>PRIVATE INDUSTRY</b>					
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 <sup>1</sup> (thousands)	Fatalities per 100,000 workers <sup>2</sup>	Relative Standard error <sup>3</sup> (percent)
	Number	Percent			
1 Transportation by air	88	2	778	14.5	4.0
2 Electric, gas, and sanitary services	267	1	1,066	8.3	3.4
3 Wholesale trade	672	4	4,942	5.4	1.6
4 Retail trade	173	11	21,443	3.1	.7
5 Food stores	98	3	3,507	4.9	1.9
6 Automotive dealers and service stations	166	2	2,165	4.5	2.4
7 Eating and drinking places	114	3	6,483	2.6	1.4
8 Finance, insurance, and real estate	767	2	7,862	1.5	1.2
9 Services	168	13	35,008	2.2	.5
10 Business services	103	3	5,680	3.0	1.5
11 Auto repair, services, and parking	50	2	1,618	6.4	2.8
12 Not reported	591	1	-	-	-
13 <b>GOVERNMENT</b>	<b>178</b>	<b>10</b>	<b>19,525</b>	<b>3.0</b>	<b>.8</b>
14 Federal	127	3	4,583	3.9	1.6
15 State	284	2	5,150	2.5	1.5
16 Local	711	5	9,791	2.9	1.1
17 Managerial and professional specialty occupations	437	12	36,497	1.9	.5
18 Executive, administrative, and managerial occupations	75	7	17,746	2.5	.8
19 Managers, food serving and lodging establishments	274	1	1,383	5.4	3.0
20 Professional specialty	761	4	18,752	1.5	.8
21 Technical, sales, and administrative support occupations	163	12	37,683	2.0	.5
22 Technicians and related support occupations	100	3	3,926	4.2	1.8
23 Airplane pilots and navigators	503	2	114	87.7	10.5
24 Sales occupations	225	8	15,404	3.3	.9
25 Supervisors and proprietors, sales occupations	94	4	4,501	5.0	1.7
26 Cashiers	95	2	2,856	3.3	2.1
27 Administrative support occupations, including clerical	8	2	18,353	0.5	.8
28 Messengers	492	-	175	4.6	8.5
29 Service occupations	248	8	17,177	2.9	.8
30 Protective service occupations	37	4	2,187	11.3	2.4
31 Fire fighting and fire prevention occupations <sup>4</sup>	4	1	270	13.7	6.8
32 Police and detectives	4	114	2	1,057	10.83.4
33 Guards	883	97	2	859	11.33.8
34 Farming, forestry, and fishing occupations	569	14	3,566	24.2	1.9
35 Farm occupations	90	9	2,212	24.8	2.4
36 Groundskeepers and gardeners, except farm	134	1	875	10.3	3.8
37 Forestry and logging occupations	118	2	108	124.1	10.8
38 Timber cutting and logging occupations	72	2	75	157.3	13.0
39 Fishers, hunters, and trappers	72	1	49	146.9	16.0
40 Fishers <sup>5</sup>	1,072	1	47	153.2	16.4
41 Precision production, craft, and repair occupations	282	18	13,587	7.9	.9
42 Mechanics and repairers	35	5	4,521	6.2	1.6
43 Automobile mechanics and apprentices	38	1	889	3.9	3.8
44 Heavy equipment mechanics	592	1	156	24.4	9.0
45 Construction trades	87	10	5,108	11.6	1.5
46 Carpenters and apprentices	98	1	1,220	7.1	3.2
47 Electricians and apprentices	38	2	763	12.8	4.1

**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 <sup>1</sup> (thousands)	Fatalities per 100,000 workers <sup>2</sup>	Relative Standard error <sup>3</sup> (percent)
	Number	Percent			
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	--	--	--

<sup>1</sup> 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.

<sup>2</sup> The rate represents the number of fatal occupational injuries per 100,000 employed workers and was calculated as follows:  $(N/W) \times 100,000$ , 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.

<sup>3</sup> 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:  $31.0 \times .08 \times 1.6 = 4.0$ , 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).

<sup>4</sup> Includes supervisors.

<sup>5</sup> 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

- 1 • Implement water conservation measures wherever possible
- 2
- 3 • Implement spill control and cleanup measures to minimize the risk from accidental
- 4 releases
- 5
- 6 • Manage grazing activities to minimize livestock access to wetlands and riverbanks.
- 7

### 8 **ES5.3.3 Impacts to Biological Resources**

9  
10 Sensitive biological resources are present on the Hanford Site in association with the  
11 Columbia River, basalt outcrops, and other unique features. Biological resource elements  
12 considered for each alternative include terrestrial vegetation and habitat, plant communities of  
13 concern, wildlife and wildlife habitats, aquatic species and habitats, wetlands, and biodiversity.

### 14 **ES5.3.4 Mitigation Measures**

15  
16 The CLUP planning process would screen development proposals for Hanford Site  
17 lands. Some activities would not be permitted and others would be modified or required to  
18 incorporate mitigation measures to reduce impacts. Examples of mitigation measures include  
19 the following:  
20

- 21
- 22 • Eliminate all disturbances around winter roosts for bald eagles and avoid habitat
- 23 alteration within 400 m (0.25 mi) of bald eagle roosts
- 24
- 25 • Minimize disturbance of wetlands and replace disturbed wetlands through purchase,
- 26 construction, or restoration of wetlands
- 27
- 28 • Compensate for adverse impacts to habitats by restoration of comparable habitats
- 29 on the Hanford Site
- 30
- 31 • Revegetate disturbed areas using native vegetation.
- 32

### 33 **ES5.3.5 Cultural Resources**

34  
35 Impacts to cultural resources include damage or destruction of archaeological and  
36 historic sites and artifacts, and disruption of religious and traditional uses of the American  
37 Indians.

38  
39 The CLUP planning process described would screen development proposals for  
40 Hanford Site lands. Some projects would not be permitted and others may be required to  
41 incorporate mitigation measures. Mitigation measures to reduce impacts to cultural resources  
42 include the following:

- 43
- 44 • Survey cultural resources of proposed project locations
- 45
- 46 • Consult with American Indians concerning traditional and religious uses
- 47
- 48 • Consult with DOE's Cultural Resources Program Manager, the Washington State
- 49 Historic Preservation Office, and American Indian tribal representatives concerning
- 50 any survey findings.
- 51

1 **ES5.3.6 Aesthetic Resources**

2  
3 Key aesthetic resources include viewing locations, viewsheds, visibility (ambient air  
4 quality), and ambient noise levels. Impacts to aesthetic resources would result from altering  
5 viewing locations, viewsheds, or visibility through mining or development; releasing atmospheric  
6 pollutants from industrial activities; releasing fugitive dust from construction and agricultural  
7 activities, and resulting new noise impacts from development, mining, or recreation.  
8

9 Under all alternatives, new development projects would be subject to a New Source  
10 Review (*Washington Administrative Code* [WAC] 173-400) that would identify probable air  
11 emissions and air emission control technology required to comply with state air quality  
12 standards.  
13

14 The CLUP planning process would screen development proposals. Proposed projects  
15 would be planned to be consistent with the CLUP policies requiring protection of aesthetic  
16 resources. Potential mitigation measures for aesthetic resources include the following:  
17

- 18 • Implement dust control measures, such as use of water or other dust suppressants
  - 19 • Cover loads when hauling materials away from construction or excavation sites
  - 20 • Site development or mining activities in areas with the least impact on the viewshed
  - 21 • Minimize noise impacts to wildlife.
- 22  
23  
24  
25

26 **ES5.3.7 Socioeconomic Impacts**

27  
28 **ES5.3.7.1 No-Action Alternative.** Under this alternative, facility planning and siting would  
29 continue on a project-by-project basis. The potential socioeconomic impacts from this  
30 alternative cannot be predicted. The lack of a land-use plan may discourage new uses for the  
31 Hanford Site. In the absence of a land-use plan, it is also unlikely that new recreational  
32 opportunities would be developed. It is assumed that this alternative would allow industrial  
33 development and research and development activities to occur in the southern portion of the  
34 600 Area. The impacts of research and development and industrial development could exceed  
35 the City of Richland's capacity to provide supporting infrastructure.  
36

37 **ES5.3.7.2 DOE's Preferred Alternative.** This alternative would increase the land base  
38 available for industrial uses and research and development, which would allow the siting of  
39 manufacturing facilities with a total employment of 1,000 or more. Lands under the Research  
40 and Development land-use designation could support 100 to 300 employees.  
41

42 Future industrial development on Hanford Site lands would require additional  
43 infrastructure such as roads and utilities. Additional industrial development on Hanford Site  
44 lands under the Preferred Alternative could exceed the City of Richland's capacity to provide  
45 supporting infrastructure.  
46

47 The DOE Preferred Alternative would also make much of the Hanford Site available for  
48 grazing and mining. Up to 43,857 ha (108,373 ac) available for grazing, which could support  
49 7,706 Animal Unit Months (AUM) with a value of approximately \$92,472. This alternative could  
50 support existing claims and new claims for sand, gravel, and natural gas development. The  
51 possible socioeconomic effects were not estimated in this analysis.  
52

1 Increased access for recreation under DOE's Preferred Alternative could double the  
2 amount of use and result in an additional \$1.4 million per year to the local area from  
3 recreational spending.  
4

5 **ES5.3.7.3 Alternative One.** Alternative One would create an increased opportunity for  
6 ecotourism with the expansion of an existing Federal wildlife refuge. Alternative One would  
7 allow continued industrial development and limited recreational uses on Hanford Site lands.  
8 The areas allowed for industrial development would exceed the estimated need and would  
9 provide land to support possible future DOE missions. This would allow the siting of several  
10 manufacturing facilities, with a total employment of 100 to 1,000. Additional industrial  
11 development on Hanford Site lands under this alternative could exceed the City of Richland's  
12 capacity to provide supporting infrastructure.  
13

14 Alternative One would allow High-Intensity Recreational uses at the B Reactor and  
15 Vernita Bridge, along with additional boat launches along the Columbia River Corridor, which  
16 would have economic impacts similar to the Preferred Alternative.  
17

18 **ES5.3.7.4 Alternative Two.** Alternative Two would allow limited industrial development and  
19 recreational uses on the Hanford Site and would have the least economic potential of the  
20 alternatives being considered. The relatively small amount of vacant land designated for  
21 industrial development under this alternative would probably limit new industrial employment to  
22 less than 100. The Research and Development land uses would be limited to existing uses at  
23 LIGO and the K Reactor Basins.  
24

25 This alternative would allow High-Intensity Recreation associated with the B Reactor  
26 museum only. It would not increase recreational access to the river. The economic benefit  
27 would be substantially less than those estimated for the recreational uses under the other  
28 alternatives.  
29

30 An economic benefit may be realized from the Preservation land-use designation, which  
31 could increase interest in the Hanford Site in the ecologically based tourism market.  
32

33 **ES5.3.7.5 Alternative Three.** Alternative Three would have the highest potential for economic  
34 development. The economic impact of agricultural development on former Hanford Site lands  
35 would increase from 1.7 to 9.4 percent corresponding to \$16 million to \$88 million (using 1992  
36 prices) in additional revenues. Livestock grazing on the Wahluke Slope would increase the  
37 total grazing by 2 percent with an approximate value of \$15,000.  
38

39 Alternative Three would increase the land base available for industrial and research and  
40 development uses in Benton County in excess of estimated need. This amount of land would  
41 allow the siting of facilities, with a total employment of 1,000 or more. Lands under the  
42 Research and Development land-use designation would support total employment of 300 or  
43 more. Additional industrial development on Hanford Site lands under this alternative could  
44 exceed the City of Richland's capacity to provide supporting infrastructure.  
45

46 High-Intensity Recreational development of the Vernita Terrace may include a golf  
47 course, destination resort, recreational vehicle (RV) park, boat launch, Tribal fishing facilities,  
48 cultural centers, and the B Reactor museum. Such developments combined with expanded  
49 Low-Intensity Recreation areas along the Columbia River and additional High-Intensity  
50 Recreational use near Horn Rapids could contribute to the economy in the study area.  
51

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

1 under Alternative Three could also generate revenues from sport fishing and other day uses  
2 that would be similar to those estimated for the Preferred Alternative.  
3

4 **ES5.3.7.6 Alternative Four.** Land for industrial development would exceed the estimated  
5 need and provide additional land to support possible future DOE missions. This amount of land  
6 would allow the siting of facilities, with a total employment of 100 to 1,000. Land under the  
7 Research and Development land-use designation could support 100 to 300 employees.  
8

9 Alternative Four would provide increased boating access to the Columbia River, which  
10 would generate increased revenues from sport fishing and recreational boating, similar to those  
11 estimated for the Preferred Alternative.  
12

## 13 **ES5.4 Environmental Justice Impacts**

14 Under the Executive Order for Environmental Justice (Executive Order 12898, 59 Fed.  
15 Reg. 32, 1994), Federal agencies are required to identify and address disproportionately high  
16 and adverse human health or environmental effects of programs on minority and low-income  
17 populations.  
18

19 Disproportionately high and adverse human health effects occur when the risk or rate for  
20 a minority population or low-income population from exposure to an environmental hazard  
21 significantly exceeds the risk or rate to the general population and other appropriate  
22 comparison groups. A disproportionately high environmental effect refers to an impact (or risk  
23 of an impact) in a low-income or minority community that significantly exceeds the impact on  
24 the larger community.  
25

26 A total population of approximately 384,000 people reside within an 80 km (50 mi) radius  
27 of the Hanford Site. The minority population within the area consists of approximately 95,000  
28 people and represents approximately 25 percent of the population. The ethnic composition of  
29 the minority population is primarily Hispanic (approximately 80 percent) and American Indian  
30 (8 percent). Census tracts where the percentage of minority persons within the population  
31 exceeds 20 percent are located to the southwest and northeast of the Hanford Site and within  
32 the City of Pasco, Washington.  
33

34 The low-income population within the 80 km (50 mi) area of impact represents  
35 approximately 42 percent of households within the area. Census tracts where the percentage  
36 of the population consisting of low-income households exceeds 25 percent are principally  
37 located to the southwest and north of the Hanford Site and within the City of Pasco,  
38 Washington. Considerable overlap between low-income populations and minority populations  
39 exists in the vicinity of the Hanford Site.  
40

41 Increased human health risk would be associated with Agricultural, Industrial, and  
42 Research and Development processes and High-Intensity Recreation uses. Of these, the  
43 Agricultural land-use designation is the most likely to have disproportionately high human health  
44 effects in minority or low-income populations because agricultural crop-production jobs  
45 generally have higher health risks (31 fatalities annually per 100,000 workers), and are often  
46 filled by minority or low-income individuals. Alternative Three and the No-Action Alternatives  
47 are the only alternatives that involve agriculture. The other alternatives would have lesser  
48 human health risk, mainly associated with Industrial processes (3.5 fatalities annually per  
49 100,000 workers), and High-Intensity Recreation uses (2.6 to 153 fatalities annually per  
50 100,000 workers) (see Table ES-4).  
51

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

53  
54

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

8  
9 A person who relied solely on subsistence hunting or fishing would have a much higher  
10 probability of fatality due to the inherent dangers of the activities. The occupational fatality rate  
11 for fishing, hunting, and trapping is 137.7 fatalities annually per 100,000 workers (see  
12 Table ES-4).

13  
14 The *Screening Assessment and Requirements for a Comprehensive Assessment,*  
15 *Columbia River Comprehensive Impact Assessment (CRCIA)* evaluated both chemical and  
16 radiological health risk potential for a variety of site use scenarios including Native American  
17 subsistence scenarios. These Native American scenarios were developed by a Native  
18 American representative on the CRCIA team specifically for the CRCIA effort. Environmental  
19 measurements used for the CRCIA analysis were based on data collected from 1990 through  
20 1996 and, as a consequence, would not necessarily reflect the future condition of the site as  
21 these scenarios do not assume cleanup.

22  
23 In these Native American scenarios, people who live along the Columbia River were  
24 assumed to eat substantial quantities of food grown in the riparian zone, fish and wildlife from  
25 the river, and to drink seep water would have a much larger potential exposure and, thus,  
26 estimated health risk. Significant health risks (e.g., for carcinogens lifetime health risk greater  
27 than 10 in 100,000) were found in many sections of the river as a result of potential exposure to  
28 chromium, copper, strontium-90, uranium-238, lead, and tritium. The contaminants assessed  
29 fell into one of three categories: carcinogenic chemicals, toxic chemicals, and radionuclides.  
30 Because the three categories of contaminants resulted in different types of risk, the estimates  
31 for each category were reported differently. The estimates for carcinogenic chemicals were  
32 reported as the probability of the incidence of cancer. The estimates for toxic chemicals were  
33 reported as a ratio (a hazard index) between the reference dose determined by EPA to be safe  
34 and the dose that had been estimated. The estimates for radionuclides were reported as the  
35 risk of cancer fatality.

36  
37 Although many cultural differences exist between the general population and American  
38 Indians, the common pathways of food and water consumption could affect both groups.

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

40  
41 Low-income and minority populations in the vicinity of the Hanford Site could be affected  
42 by potential socioeconomic impacts and impacts to biological and cultural resources valued by  
43 American Indians.

#### 44 **ES5.4.3 Environmental Justice Impacts to American Indians**

45  
46 Under separate treaties signed in 1855, lands occupied by the present Hanford Site  
47 were ceded to the United States by the Confederated Tribes and Bands of the Yakama Indian  
48 Nation and by the CTUIR. Under these treaties, Tribal governments retained the right to fish in  
49 their usual and accustomed places in common with the citizens of the Territories. The treaties  
50 also retained to the Tribal governments the privilege of hunting, gathering roots and berries,  
51 and pasturing horses and cattle on open unclaimed lands. The 1855 Treaty with the Nez Perce  
52 also retained the right to fish at usual and accustomed places. The Wanapum People did not  
53  
54

1 sign a treaty with the United States and are not a Federally recognized Tribal government;  
2 however, the Wanapum People were historical residents of what would become the Hanford  
3 Site and their interests in the area have been acknowledged by the State of Washington.  
4

5 The Tribal government fishing rights reserved under the treaties have been recognized  
6 as effective within the Hanford Reach. Tribal governments also have an interest in renewing  
7 traditional uses, such as gathering of foods and medicines, hunting, and pasturing horses and  
8 cattle on Hanford Site lands.  
9

10 Future opportunities of Tribal governments to exercise reserved treaty rights are  
11 dependent upon the health of the ecosystems. The Tribal governments assert that a treaty-  
12 given right to hunt, fish, or gather plants is diminished (if not voided) if the fish, wildlife, or plants  
13 have vanished or are contaminated to the extent that they threaten human health. These  
14 resources, particularly the resources with cultural and religious connotations, do not have  
15 equivalent value for the general population. Consequently, impacts to these resources  
16 represent an environmental justice impact to American Indian populations.  
17

18 Cultural and biological resources valued by American Indians have, in effect, been  
19 preserved by the presence of the Hanford Site. The Conservation and Preservation land-use  
20 designations would continue to protect these resources and may allow Tribal governments to  
21 resume traditional uses of these resources. However, the Agricultural, Industrial-Exclusive,  
22 Industrial, and High-Intensity Recreation land-use designations are likely to result in damage or  
23 destruction of cultural and biological resources important to American Indians. The Research  
24 and Development and Low-Intensity Recreation designations would be less likely to result in  
25 resource destruction. However, these uses may not be compatible with traditional subsistence  
26 uses by American Indians.  
27

28 High promontories that provide a commanding and panoramic view of the surrounding  
29 terrain are culturally significant to American Indian Tribes, which historically used the land that  
30 would become the Hanford Site. Alteration of the viewshed from these sites could  
31 disproportionately impact American Indian populations. This alteration could occur under the  
32 Agricultural, Industrial, Research and Development, and High-Intensity Recreation land-use  
33 designations. Mining activities under the Conservation designation could also have adverse  
34 effects, either directly by mining of basalt outcrops or indirectly by altering the viewshed. Mining  
35 of the basalt outcrops would be considered an environmental justice impact, because these  
36 sites are sacred to American Indians but are of less significance to the general population.  
37

1  
2 **ES5.4.4 Occupational Human Health Impacts**  
3

4 The Hanford Site has an annual average accident fatality rate that has ranged from 4.9  
5 (1994) to 2.8 (1997) per 100,000 workers. The national annual average accident fatality rate  
6 for private industry in 1996 was 5.1 per 100,000 workers and Hanford was 4.3 per 100,000  
7 workers. The transfer jobs from the government to the private sector statistically doubles the  
8 accident fatality risk for the average worker in 1997. Some comparisons can be made  
9 regarding occupational health risks among the land-use designations using statistics from the  
10 U.S. Bureau of Labor Statistics.  
11

12 The data indicate that the riskiest occupation is law enforcement with an annual fatality  
13 rate of 1,057 per 100,000 workers (equivalent to a  $10^{-2}$  risk per year). Industrial activities  
14 associated with Industrial, Industrial Exclusive and Research and Development have annual  
15 fatal accident rates that vary from administrative support operations at 0.5 fatalities per 100,000  
16 workers to, 4.1 fatalities per 100,000 workers for food manufacturing workers, to 20.8 fatalities  
17 per 100,000 workers for trucking and warehousing workers. The land-use designations of  
18 Preservation, Conservation (Mining), Conservation (Mining and Grazing), Low-Intensity  
19 Recreation, High-Intensity Recreation have a different set of occupational hazards associated  
20 with recreational activities. Fishing, hunting and trapping are very risky occupations with an  
21 annual fatality rate of 137.7 fatalities per 100,000 workers. For sand and gravel mining  
22 operations, excavating and loading machine operators have an annual 28.3 fatalities per  
23 100,000 workers. The Agriculture land-use designation would expose workers to annual  
24 occupational fatality rates of 31.3 fatalities per 100,000 workers for crop production, 12.2  
25 fatalities per 100,000 workers for livestock production and 14.3 fatalities per 100,000 workers  
26 for agricultural services (see Table ES-4).  
27

28 Increased recreational opportunities associated with the Preferred Alternative and  
29 Alternatives One, Three, and Four could increase accident risks associated with outdoor  
30 recreation activities. These would include risks from boating and swimming accidents, hunting  
31 and target shooting accidents, and bicycling accidents. Alternative Three would introduce the  
32 relatively risky occupation of agriculture onto the Hanford site. The DOE Preferred Alternative  
33 and Alternative Three would best support the selection of some of the occupationally safer uses  
34 of the Hanford Site such as manufacturing, managerial and administrative support functions.  
35

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

2	Resource	Preferred Alternative	Alternative One	Alternative Two	Alternative Three	Alternative Four	No-Action Alternative
3	<b>GEOLOGIC RESOURCES</b>						
4	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.
5	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.
6	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.
7	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.
8	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.
9							

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

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Resource	Preferred Alternative	Alternative One	Alternative Two	Alternative Three	Alternative Four	No-Action Alternative
<b>WATER RESOURCES</b>						
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
1	<b>BIOLOGICAL RESOURCES</b>						
2	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.
3	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.
4	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.
5	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.
6 7	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.
<b>CULTURAL RESOURCES</b>						
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.

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
1 2	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.
3	<b>AESTHETIC RESOURCES</b>						
4 5	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.
6 7	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.
8	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.

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
<b>SOCIO-ECONOMICS AND INDUSTRIAL DEVELOPMENT</b>	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
<b>RESEARCH AND DEVELOPMENT</b>	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
<b>GRAZING AND AGRICULTURE</b>	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.
<b>MINERAL RESOURCES (Privately held)</b>	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.

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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
1 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.
2 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.
3	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 viewscales would also be protected.	Areas of cultural value to American Indian tribes could be developed and development could occur within culturally significant viewscales.	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	Same as the Preferred Alternative.	Same as 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
1 <b>HUMAN HEALTH</b>	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.
	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.
2	<p>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.</p> <p>Actual remediation scenario will be picked through the CERCLA/RCRA process which could require more or less remediation based on the scenario chosen.</p>	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.	<p>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.</p> <p>Actual remediation scenario will be picked through the CERCLA/RCRA process which could require more or less remediation based on the scenario chosen.</p>

1 **ES5.5 Cumulative Impacts**  
2  
3

4 This section summarizes cumulative impacts associated with Hanford Site land-use  
5 designations for each alternative identified in Chapter ES3. Cumulative impacts result  
6

7 . . . from the incremental impact of the action when added to other past, present,  
8 and reasonably foreseeable future actions regardless of what agency (Federal or  
9 non-Federal) or person undertakes such actions. Cumulative impacts can result  
10 from individually minor but collectively significant actions taking place over a  
11 period of time (40 CFR 1508.7).  
12

13 Reasonably foreseeable actions are identified and the relationship between these actions and  
14 the proposed land-use designations is discussed. The description of potential cumulative  
15 impacts couples impacts of each alternative with impacts from past and existing operations at  
16 the Hanford Site and impacts that may be associated with anticipated future actions.  
17 Section ES5.5.1 discusses cumulative impacts to land use associated with present and  
18 reasonably foreseeable actions; Section ES5.5.2 discusses cumulative impacts to trustee  
19 resources; and Sections ES5.5.3 and ES5.5.4 discuss cumulative socioeconomic impacts and  
20 cumulative human health risk, respectively.  
21

22 **ES5.5.1 Cumulative Impacts to Land Use**  
23

24 The alternatives analyzed in this document would establish acceptable uses for Hanford  
25 Site lands for at least the next 50 years. The alternative identified and selected for  
26 implementation in the ROD will allocate lands for use under the defined land-use designations.  
27 Other present and reasonably foreseeable actions at the Hanford Site that involve siting new  
28 facilities or using Site resources also would, in effect, allocate lands for certain uses. Those  
29 present and reasonably foreseeable actions that involve land uses that are compatible with the  
30 proposed land-use designations under all the alternatives would not have cumulative impacts  
31 for land use; these actions are listed in Table ES-6. However, those present and reasonably  
32 foreseeable actions that do not conform with the proposed land-use designations would change  
33 the land-use allocations and, in this sense, could be considered to have cumulative impacts.  
34 Those present and reasonably foreseeable actions involving nonconforming uses are listed in  
35 Table ES-7.  
36

37 The five actions listed in Table ES-7 could involve land uses that conflict with land-use  
38 designations under some alternatives. The USFWS is initiating a Comprehensive Conservation  
39 Plan (CCP) for the ALE Reserve. Assuming that the USFWS management plan would call for  
40 maintaining the ALE Reserve in its present, Preservation and Conservation type of  
41 management, the management plan would not conflict with any of the proposed land-use  
42 designations. If the USFWS plan only addresses preservation, then the proposed mining  
43 alternative on ALE, in lieu of the McGee Ranch mining area, would be in conflict with  
44 alternatives, Preferred, Four and Three.  
45

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

1 wildlife is the reason agriculture appears as a conflict in Table ES-7. Of the 181 National  
2 Wildlife Refuges with farming programs in 1989, 612 km<sup>2</sup> (233 mi<sup>2</sup>) of the 129 refuges were  
3 farmed by permittees who retained a share of the crop in return for costs incurred to farm the  
4 land. On the remaining refuges, Service personnel conducted farming operations with  
5 government equipment.  
6

7 The remaining nonconforming uses listed in Table ES-7 involve present or upcoming  
8 actions that would conflict with land-use designations. The operation of LIGO would be  
9 considered a pre-existing, nonconforming use under Alternative One and Alternative Four,  
10 which could require that the LIGO site be restored to the designated use at the end of the  
11 facility's life. Operation of LIGO conflicts with Conservation mining designations because of the  
12 facility's sensitivity to vibrations. The Inert/Demolition Waste Landfill proposed for Pit 9 involves  
13 using an existing gravel pit located north of the 300 Area for disposal of inert and demolition  
14 wastes from the 300 Area. This would be classified as an Industrial land use, and would be  
15 considered a pre-existing, nonconforming use under Alternative One, Alternative Two, and  
16 Alternative Four. The proposed salvage and demolition of the 300 Area Steam Plant calls for  
17 obtaining fill from Pit 9 for filling voids and constructing the final cover. The use of Pit 9 for  
18 quarrying materials would be a pre-existing, nonconforming use under Alternative One,  
19 Alternative Two, and Alternative Four. The B-Reactor Museum would be in conflict with the  
20 Preservation designation of Alternative Four. Management and mitigation of these  
21 nonconforming land uses would be accomplished through the CLUP policies and implementing  
22 procedures as explained in Chapter 6.  
23

## 24 **ES5.5.2 Cumulative Impacts by Trustee Resource**

25  
26 **ES5.5.2.1 Geologic Resources.** Geologic resources on the Hanford Site include unique  
27 features that have been preserved while similar features in the region have been damaged or  
28 destroyed by development. Mining of geologic materials would be allowed under all alternatives  
29 being considered, except Alternative Two, and could damage or destroy unique geologic  
30 features, such as Missoula Floods features and sand dunes. Mining under the No-Action  
31 Alternative and Alternative Three, if permitted by DOE, could also impact basalt outcrops, such  
32 as Umtanum Ridge, Gable Mountain, and Gable Butte. Because these features are rare and  
33 susceptible to development elsewhere in the region, damage or destruction of these features  
34 on the Hanford Site would increase their aesthetic and ecological value offsite, and decrease  
35 their availability for scientific study.  
36

37 Alternative Three would allow development of cultivated agriculture on the Wahluke  
38 Slope. Increasing irrigated lands in the vicinity of the White Bluffs would cumulatively increase  
39 groundwater recharge in the area and also could result in additional slumping of the White  
40 Bluffs. Additional slumping of the White Bluffs would further reduce their aesthetic, historic, and  
41 ecological value; would cumulatively increase sedimentation of the Columbia River; and could  
42 accelerate riverbank and island erosion. The No-Action Alternative would also allow the  
43 WDFW's current management practice of growing crops for wildlife management purposes on  
44 the Wahluke Slope.  
45

46 **ES5.5.2.2 Water Resources.** Water resources on the Hanford Site, including groundwater  
47 and surface water, have been impacted by past waste disposal practices at Hanford.  
48 Remediation strategies for cleaning up past contamination are designed for current and  
49 predicted future hydrologic conditions. Additional development on the Hanford Site could alter  
50 hydrologic conditions, disrupt CERCLA ROD conditions, and increase impacts to water quality  
51 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

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

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5

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

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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.

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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.

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**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.

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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,

1 but expansion of the Environmental Restoration and Disposal Facility (ERDF) and other future  
2 actions in the 200 Areas could involve larger losses, with cumulative impacts to shrub-steppe  
3 habitat. Alternatives One and Two would limit cumulative impacts in the 200 Areas by reducing  
4 the size of the Industrial-Exclusive land-use designation.  
5

6 The Conservation land-use designations could result in cumulative impacts by allowing  
7 commercial livestock grazing and mining. Cumulative impacts from grazing are most likely  
8 under the No-Action and Preferred Alternatives, which would allow grazing over the largest area  
9 and could result in further losses of regional biodiversity.  
10

11 Although basalt and sand and gravel quarries are unlikely to have cumulative impacts  
12 because they would disturb relatively small areas, large-scale soil mining to support remediation  
13 could result in large habitat losses. If permitted by DOE, the potential for cumulative effects  
14 from mining are greatest under the No-Action Alternative and Alternative Three, which would  
15 allow development of quarry sites at the McGee Ranch. Losses of shrub-steppe habitat in this  
16 area could eliminate the remaining segments of the wildlife movement corridor between the  
17 Hanford Site and the Yakima Training Center; which are among the last remaining large tracts  
18 of shrub-steppe habitat in the region. Mining in the McGee Ranch area would add to habitat  
19 fragmentation that has previously taken place in the region as a result of agricultural,  
20 residential, and industrial development; and could further reduce regional biodiversity.  
21

22 Increased recreational use associated with the Wild and Scenic River designation and  
23 High- or Low-Intensity Recreation land-use designations under the Preferred Alternative and  
24 Alternatives One, Three, and Four could result in cumulative impacts to wildlife and habitats  
25 that are not currently accessible by the public under the No-Action Alternative. Recreation  
26 designations would increase impacts from boating as well as foot traffic on sensitive plant  
27 communities and habitats.  
28

29 The potential for cumulative impacts to biological resources may best be evaluated by  
30 determining the amount of BRMaP Level III and IV resources that could be affected. The  
31 BRMaP III and IV designations identify the resources that could be most adversely affected by  
32 further habitat losses. Alternative Three has the greatest potential to impact Level III and IV  
33 resources, primarily because it would allow conversion of native plant communities on the  
34 Wahluke Slope to cultivated agriculture. The Preferred Alternative and the No-Action  
35 Alternative would have less potential for impacts to BRMaP Level III and IV resources, but are  
36 more likely to impact those resources than Alternatives One, Two, or Four. Alternative Two is  
37 least likely to have cumulative effects on biological resources, based on the amounts of BRMaP  
38 Level III and IV resources that could be impacted by development.  
39

40 **ES5.5.2.4 Cultural Resources.** Regionally, agricultural, industrial, and residential  
41 development have damaged or destroyed cultural resources. In addition, construction of dams  
42 along the Columbia River has inundated cultural resources and sites of significance to  
43 American Indian tribes. Cultural resources on the Hanford Site have been preserved by access  
44 restrictions for the past 55 years. Preservation of the Hanford Reach as the last free-flowing  
45 stretch of Columbia River would also preserve cultural resources associated with the river.  
46 Loss of these sites through development of Hanford Site lands could lead to potentially  
47 significant impacts on the remaining cultural resources in the region.  
48

49 Many of the biological resources on the Hanford Site are also important to American  
50 Indian tribes for traditional subsistence uses. In addition, the Hanford Site includes religious  
51 sites important to American Indians. American Indian tribes with ties to the Hanford Site have  
52 long advocated the protection of these resources in their efforts to maintain their cultures and  
53 traditional life ways. Further losses of these resources could impact American Indian cultures  
54 associated with the Hanford Site.  
55

1 Potential cumulative impacts to cultural resources are most likely to occur along the  
2 Columbia River, where cultural resources and traditional American Indian uses are  
3 concentrated. The No-Action Alternative has the greatest potential to affect these resources by  
4 allowing mining, grazing, or industrial development in the Columbia River Corridor. The  
5 Preferred Alternative and Alternatives One, Three, and Four would increase recreational access  
6 to the corridor, which could result in impacts to cultural resources from unauthorized artifact  
7 collection, vandalism, and losses to riverbank and island erosion from boat wakes.  
8

9 Industrial development under any of the alternatives has the potential to disturb  
10 archaeological and historic sites. Alternatives One and Two are least likely to result in  
11 cumulative impacts because these alternatives would minimize the amount of land designated  
12 for Industrial, Research and Development, and Industrial-Exclusive land uses. Ongoing  
13 remediation activities and some of the proposed projects listed in Table ES-7 could also have  
14 cumulative effects on cultural resources.  
15

16 Other cumulative impacts to American Indian cultures could occur under the No-Action  
17 Alternative and Alternative Three which, if permitted by DOE, would allow quarrying on basalt  
18 outcrops that are important religious and cultural sites. Alternative Two would designate most  
19 of the Hanford Site for Preservation to protect cultural resources and would be least likely to  
20 have cumulative impacts.  
21

22 **ES5.5.2.5 Aesthetic Resources.** The large, undeveloped portions of the Hanford Site and  
23 features such as the basalt outcrops, Rattlesnake Mountain, the White Bluffs, and the Columbia  
24 River Corridor have aesthetic values that are unique to the region. Industrial development  
25 associated with past Hanford operations has altered some viewsheds. Future development of  
26 Hanford Site lands could further alter viewsheds and reduce the aesthetic value by increasing  
27 airborne particulate, odors, or other pollutants.  
28

29 The potential for cumulative impacts to viewsheds would be greatest under the No-  
30 Action Alternative, which would allow development of Hanford Site lands on a project-by-project  
31 basis. This alternative is more likely to result in the siting and construction of industrial  
32 developments in previously undisturbed viewsheds. Alternative Three could also have  
33 cumulative impacts to viewsheds by allowing, if permitted by DOE, quarrying on basalt  
34 outcrops, the conversion of native plant communities on the Wahluke Slope to crop land and  
35 orchards, and development of High-Intensity Recreational facilities adjacent to the Columbia  
36 River Corridor. Future industrial development under the Industrial-Exclusive land-use  
37 designation, along with proposed and planned actions listed in Table ES-6, would have  
38 cumulative effects on viewsheds that would be similar under the alternatives being considered.  
39

40 Alternative Three also has the greatest potential for cumulative impacts on visibility  
41 associated with air quality. The conversion of much of the Wahluke Slope to agriculture would  
42 create a significant new source of fugitive dust from cultivated fields. Industrial development  
43 under this alternative as well as all other alternatives being considered could also result in new  
44 sources of industrial pollutants, which could further diminish visibility.  
45

46 Future development could also increase ambient noise levels, which would detract from  
47 the recreational experience associated with the Columbia River Corridor and other natural  
48 areas on the Hanford Site. Cumulative increases in noise are most likely occur under the No-  
49 Action Alternative, which could allow industrial development along the Columbia River. Mining  
50 along the river corridor, which could occur under the No-Action Alternative, could also increase  
51 noise impacts. Increases in High-Intensity Recreational land-use activities such as Alternative  
52 Three's proposed destination resort and RV camps or the Preferred Alternative's and  
53 Alternative Four's proposed Tribal fishing camps, could also increase the noise along the river  
54 and distract from the aesthetic experience.  
55

1 **ES5.5.3 Cumulative Socioeconomic Impacts**

2  
3 The economy of the area has in the past been strongly influenced by Hanford Site  
4 activities. Changes in the Site mission and reductions in Site activities have had negative  
5 impacts in the past. Recently, the area economy has become more diversified and less  
6 dependent on the Hanford Site. Future development of Hanford Site lands under multiple uses  
7 could accelerate the transition to a diversified economy. On the other hand, economic growth  
8 associated with future uses of the Hanford Site could cumulatively increase demand for  
9 infrastructure and services.

10  
11 Alternative Three has the greatest potential to have cumulative impacts, both positive  
12 and negative, on socioeconomic conditions. On the positive side, Alternative Three would  
13 provide the most opportunities to develop alternate uses of Hanford Site lands, maximizing the  
14 economic return. Alternative Three could have negative impacts on socioeconomic conditions  
15 by increasing the demand for services, including schools, law enforcement, and health and  
16 human services. Alternative Two has the least potential to have cumulative socioeconomic  
17 impacts because it would minimize future site development.

18  
19 Industrial development on Hanford Site lands could place increased demand on  
20 infrastructure beyond the City of Richland's capacity. This potentially cumulative impact could  
21 occur under the Preferred Alternative and Alternatives Three and Four because they have  
22 Industrial land-use designations larger than the City of Richland UGA. However, the impact  
23 would be the most under the No-Action Alternative, because no land-use plan would be  
24 available to assist government entities in anticipating and addressing increased demand.

25  
26 **ES5.5.4 Cumulative Human Health Risk**

27  
28 Risks due to exposure to residual contamination remaining after completion of CERCLA  
29 activities would be dependent on the level of access to any particular area where residual  
30 contamination remained. Consequently, the cumulative health risk to humans would be  
31 expected to be greatest under Alternative Three because it would provide greater access to  
32 more areas and would provide more opportunities for development of Hanford Site lands than  
33 would the other alternatives. Conversely, Alternative Two would have the least potential for  
34 cumulative human health risks, because it would provide the least access to Hanford Site lands.

35  
36 Significant occupational risk to workers could occur under some industrial uses, under  
37 both the Industrial-Exclusive and Industrial land-use designations. Agriculture is also  
38 traditionally a high risk occupation (Table ES-4). Cumulative occupational risk would likely be  
39 the greatest under Alternative Three because of the large area designated for Agriculture and  
40 the higher level of use associated with the entire Hanford Site. Conversely, occupational risk  
41 would be lowest for Alternative Two because industrial risk would be limited to workers in the  
42 200 Areas (similar under all alternatives) and Alternative Two designates the smallest area for  
43 Industrial development.

44  
45  
46 **ES5.6 Present and Reasonably Foreseeable Actions Adjacent to the**  
47 **Hanford Site**

- 48  
49 • **Offsite thermal treatment of low-level mixed waste** – The Allied Technology  
50 Group (ATG) proposes to construct a facility that would be located adjacent to the  
51 Hanford Site boundary in the northeast corner of the City of Richland. DOE has  
52 proposed that approximately 5,120 m<sup>3</sup> (6,696 yd<sup>3</sup>) of contact-handled low-level  
53 mixed waste be shipped from the Hanford Site to the ATG facility for treatment.  
54

1 Land-use planning efforts for areas outside of and surrounding the Hanford Site are  
2 currently being undertaken by Benton, Franklin, and Grant counties; and by the City of  
3 Richland. These planning efforts will establish land uses that would be permitted by local  
4 governments in areas surrounding the Hanford Site.  
5  
6

## 7 **ES5.7 Other NEPA Considerations**

### 8 **ES5.7.1 Unavoidable Adverse Impacts**

9  
10 Unavoidable adverse impacts are impacts that would occur after implementation of all  
11 feasible mitigation measures. The greatest potential for unavoidable adverse impacts is  
12 associated with more intensive land uses and the area extent of those uses in each alternative.  
13 These impacts would principally be associated with the degree of disturbance of sensitive  
14 habitats and loss of cultural resources.  
15  
16

### 17 **ES5.7.2 Irreversible and Irrecoverable Commitments of Resources**

18  
19 Irreversible and irretrievable (I&I) commitments of resources are related to use of  
20 nonrenewable resources and the effects that consumption of those resources could have on  
21 future generations. Irreversible effects occur as a result of use or destruction of a resource  
22 (e.g., energy and minerals) that cannot be replaced within a reasonable time. Irrecoverable  
23 resources commitments involve the loss in value of an affected resource that cannot be  
24 restored (e.g., extinction of a species or disturbance of a cultural site). This land-use plan  
25 would establish programmatic land-use policies and implementing procedures that will influence  
26 how natural resources are consumed by specific projects in the future, but each future project  
27 will carry its own level of NEPA or CERCLA/RCRA NEPA integrated analyses that would make  
28 the required I&I commitments for the proposed project.  
29  
30

## 31 **ES6.0 Implementation of the Comprehensive Land-Use 32 Plan**

33  
34 This section provides an overview of the procedures and guidance which will be used by  
35 DOE and the cooperating agencies and consulting Tribal governments for implementing the  
36 CLUP. The CLUP would provide the framework within which future use of the Hanford Site's  
37 lands and resources would occur. This framework consists of four basic elements:  
38

- 39 1. A final **Hanford CLUP Land-Use Map**, depicting land uses for the Site. The ROD  
40 for this EIS will select one of the alternative land-use maps presented in Chapter  
41 ES3 or will select a land-use map that combines features of several alternatives.  
42
- 43 2. **Hanford CLUP Land-Use Definitions**, describing the purpose, intent, and principal  
44 use(s) of each of the land-use designations on the adopted CLUP map (see Table  
45 ES-1).  
46
- 47 3. **Hanford CLUP Policies**, directing land-use actions. These policies ensure that  
48 individual actions of successive administrations shall collectively advance the  
49 adopted CLUP map, goals, and objectives.  
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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

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

3  
4 • **Amendments** – Amendments are required for the following:

- 5  
6 1. Any change to the map land-use designation of an area  
7  
8 2. Any change to CLUP policy  
9  
10 3. Any change in the use of land or an existing facility to a use that is inconsistent  
11 with the land-use designation.  
12

13 Additionally, definitions are used to define the terms of the land-use policies. These  
14 definitions include the following:  
15

- 16 • **Area Management Plans (AMPs)** – AMPs are management plans for specific  
17 geographic areas, which may include specific resource management plans,  
18 mitigation strategies, and various uses and facilities. An AMP shall be consistent  
19 with the CLUP's land-use designations and policies.  
20  
21 • **Use Request** – A Use Request is a proposal to use land or a facility for an activity  
22 different from what is currently occurring. This Use Request can be brought to DOE  
23 during the scoping of either NEPA, RCRA, CERCLA, or SEPA proposed actions.  
24 Use Requests can include site preparations, leasing, granting right-of-ways, or any  
25 other land-use related activities.  
26  
27 • **Policy** – Policies are statements of intent which direct decisions toward the  
28 accomplishment of adopted goals and objectives. Policies are applied on a  
29 continuous basis and applied consistently over time.  
30  
31 • **Pre-existing, Nonconforming Use** – Any existing lawfully established use that is  
32 neither allowed nor conditionally permitted within a land-use designation, but exists  
33 therein, having been established prior to the CLUP land-use designation.  
34  
35 • **Resource Management Plan (RMP)** – An RMP contains adopted management  
36 standards and strategies for a specific resource. Generally, resources subject to  
37 RMPs are not confined to geographically discrete areas and they are not static  
38 (i.e., their characteristics and conditions often vary in time and/or location across the  
39 Site). Examples of resources which have RMPs are biological resources (BRMaP),  
40 cultural resources (CRMP), and the *Bald Eagle Management Plan*. The provisions  
41 of each RMP apply wherever its subject resource occurs on the Site, except for  
42 areas specifically exempted within the RMP itself.  
43

44 Several RMPs may apply within an AMP. A single RMP may extend across several  
45 AMPs. Where an RMP exists within an AMP, the provisions of both must be  
46 integrated toward achieving their common objectives, consistent with land-use  
47 designations within which they occur.  
48

- 49 • **RL Manager** – The RL Manager is the Manager of DOE's Richland Operations  
50 Office (RL).  
51  
52 • **RL Site Management Board (SMB)** – The SMB is chaired by the Site Deputy  
53 Manager and comprises selected members of RL senior management staff.  
54

- 1 • **Real Estate Officer (REO)** – The REO, from the RL Site Infrastructure Division  
2 (SID), is the single point of contact for reviewing, processing, and coordinating land-  
3 use activities on the Hanford Site.
- 4
- 5 • **Shall** – For the purpose of Chapter 6 of this EIS, “shall” refers to activities that would  
6 be mandatory if adopted by the ROD.
- 7
- 8 • **Should** – For the purpose of Chapter 6 of this EIS, “should” refers to activities that  
9 would be discretionary if adopted by the ROD.
- 10
- 11 • **Site Planning Advisory Board (SPAB)** – The SPAB is an advisory board to land-  
12 use matters on the Hanford Site. The SPAB consists of representatives from  
13 HRA-EIS cooperating agencies and affected Tribal governments. The SPAB  
14 reviews Use Requests that are other than “allowable uses” and makes  
15 recommendations to DOE.
- 16
- 17

### 18 **ES6.3 Hanford CLUP Policies**

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

- 21 • Establish land-use mitigation procedures
- 22
- 23 • Establish hierarchies, priorities, and standards relating to land use, resource use,  
24 and values
- 25
- 26 • Integrate competing land and resource goals and objectives
- 27
- 28 • Provide reference points for addressing unanticipated circumstances and making  
29 actual Amendments to the CLUP when necessary
- 30
- 31 • Identify which RMPs or AMPs shall be considered for development or revision as  
32 part of the CLUP implementation.
- 33
- 34
- 35

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

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

#### 45 **ES6.3.1 Overall Policy**

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

- 47 1. Protect the Columbia River and associated natural and cultural resources and water  
48 quality.
- 49
- 50
- 51
- 52
- 53

- 1 2. Wherever possible, locate new development, including cleanup and remediation-  
2 related projects, in previously disturbed areas.
- 3
- 4 3. Protect and preserve the natural and cultural resources of the Hanford Site for the  
5 enjoyment, education, study, and use of future generations.
- 6
- 7 4. Honor treaties with American Indian Tribes as they relate to land uses and resource  
8 uses.
- 9
- 10 5. Reduce EUZ areas to maximize the amount of land available for alternate uses while  
11 still protecting the public from inherently hazardous operations.
- 12
- 13 6. Allow access for other uses (e.g., recreation) outside of active waste management  
14 areas, consistent with the land-use designation.
- 15
- 16 7. Ensure that a public-involvement process is used for amending the CLUP and land-  
17 use designations to respond to changing conditions.
- 18
- 19 8. As feasible and practical, remove pre-existing, nonconforming uses.
- 20
- 21 9. Facilitate cleanup and waste management.
- 22

### 23 **ES6.3.2 Protection of Environmental Resources**

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

- 25 1. Implement DOE's Land- and Facility-Use Policy (DOE P 430.1) which is to protect  
26 and sustain native species and their habitats on the Site. The Conservation and  
27 Preservation land-use designations are the primary land-use controls to accomplish  
28 this policy. Within the Conservation and Preservation designations, land uses shall  
29 be consistent with the purpose of the designation and significant impacts shall be  
30 mitigated. Implementation mechanisms such as the Draft *Biological Resources*  
31 *Mitigation Strategy* (BRMiS), and habitat management plans augment these  
32 designations for development review and approval sitewide. Developments for  
33 public access and recreation should be according to adopted AMPs depicting  
34 management of use, and siting of support facilities.
- 35 2. Within land-use designations other than Conservation and Preservation, mitigate  
36 significant unavoidable (residual) impacts at locations by enhancing habitats within  
37 the Conservation or Preservation designations. To accomplish this, undertake the  
38 following actions:
  - 39 a. Modify the BRMaP and BRMiS to be consistent with this policy and with  
40 implementing procedures.
  - 41 b. Review habitat management plans to redirect their actions and strategies, where  
42 necessary and possible, to the Conservation and Preservation designations.
  - 43 c. Consider provisions for the protection of "vulnerable aggregations," as defined by  
44 the WDFW, for nongame species wherever they occur on the Site.
- 45 3. Require that projects have reasonable setbacks from the Preservation and  
46 Conservation features of importance.
- 47
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- 1 4. Within all land-use designations, require that land not be cleared until a specific  
2 project has been approved.  
3

4 **ES6.3.3 Protection of Cultural Resources**  
5

6 The CLUP policy would accomplish the following for the Site:  
7

- 8 1. Implement DOE's Land- and Facility-Use Policy (DOE P 430.1) which is to protect  
9 and sustain cultural resources on the Site. The Conservation and Preservation land-  
10 use designations are the primary land-use controls to accomplish this policy. The  
11 CRMP addresses those actions where land-use controls are not the appropriate  
12 mitigation (i.e., if a cultural resource is found in an industrial designation, provisions  
13 of the CRMP would be applied to mitigate impacts to the resource). Within the  
14 Conservation and Preservation designations, land uses shall be consistent with the  
15 purpose of the designation and significant impacts mitigated. Implementation  
16 mechanisms such as the CRMP, and habitat management plans augment these  
17 designations for development review and approval sitewide. Developments for  
18 public access and recreation should be according to adopted AMPs depicting  
19 management of use, and siting of support facilities.  
20
- 21 2. Proposed developments within all areas should be reviewed consistent with the  
22 BRMaP and the CRMP, and reflected in the applicable AMP.  
23

24 **ES6.3.4 Siting New Development**  
25

26 The CLUP policy would accomplish the following for the Site:  
27

- 28 1. Locate and approve new developments in areas consistent with the adopted Hanford  
29 CLUP.  
30
- 31 2. Locate proposed projects, as feasible and practical, in those areas of the Hanford  
32 Site where the adopted CLUP and the local cities' and counties' land-use maps are  
33 consistent.  
34
- 35 3. Within all land-use designations, previously disturbed areas (as defined by the  
36 BRMaP) should be developed first, followed by the acreages with the least sensitive  
37 biological and cultural resources. Within the site plan of any proposed new  
38 development, the acreages with the most sensitive biological and cultural resources  
39 should be worked into natural open space for landscaping, buffers, natural drainage  
40 areas, etc.  
41
- 42 4. Focus on using existing infrastructure and developed areas for new projects within a  
43 land-use designation.  
44
- 45 a. Locate new development in close proximity to existing infrastructure unless a  
46 project requires an isolated site away from incompatible uses.  
47
- 48 b. Concentrate development on or adjacent to existing infrastructure. Where  
49 extensions of infrastructure are necessary, minimize the extension of  
50 infrastructure into undeveloped areas.  
51
- 52 c. Site, plan, and design development to avoid significant impacts on resources.  
53 Mitigate unavoidable impacts through design to minimize impacts and mitigation  
54 costs associated with biological and cultural resources.  
55

1 **ES6.3.5 Utility and Transportation Corridors**

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

- 3
- 4
- 5 1. With to-be-identified exception(s), existing utility and transportation corridor rights-of-
- 6 way are the preferred routes for expanded capacity and new infrastructure.
- 7
- 8 2. Existing utility corridors that are in actual service, clearly delineated, and of defined
- 9 width, are not considered "nonconforming" uses in any land-use designation.
- 10
- 11 3. Utility corridors and systems without the characteristics of number 2 (above) are
- 12 considered to be nonconforming uses and shall be identified in the applicable RMP
- 13 or AMP.
- 14
- 15 4. Avoid the establishment of new utility corridors within the Conservation and
- 16 Preservation designations unless the use of an existing corridor(s) is infeasible or
- 17 impractical.
- 18
- 19 5. Avoid the location of new above-ground utility corridors and systems in the
- 20 immediate viewshed of an American Indian sacred site. Prioritize for removal, as
- 21 funding is available, existing nonconforming utility corridors and systems in such
- 22 areas.

23

24 **ES6.3.6 Economic Development and Diversification**

25 The CLUP policy would promote the following for the Site:

- 26
- 27
- 28 1. Multiple land uses for both the private and public sector.
- 29
- 30 2. Protection and maintenance of existing functional infrastructure and utilities for use
- 31 in economic development and Site transition.
- 32
- 33 3. Future Federal missions and programs, consistent with the provisions of the CLUP.
- 34
- 35 4. Protection of natural, historic, and cultural resources to assure continued biodiversity
- 36 and cultural values as essential elements of a recreation and tourism economy.
- 37
- 38 5. Reduction or elimination of existing conditions which are impediments to the
- 39 realization of the land-use designations (e.g., scattered withdrawn Public Domain
- 40 land, contamination, and nonconforming and abandoned developments).
- 41
- 42

43 **ES6.4 Organizational Structure and Procedure for Review and Approval**

44 **of Use Requests**

45

46 It is intended that the existing organizational structure within DOE be used to implement

47 the Hanford CLUP, augmented with the SPAB consisting of representatives from cooperating

48 agencies and affected Tribal governments (Figure ES-31).

49

50 It is recommended that the CLUP land-use map, land-use policies and implementing

51 procedures be integrated with and addressed at the threshold decision points of all

52 authorizations, operational plans (e.g., the *Hanford Strategic Plan*), and actions. This includes

53 contracts and budget proposals that directly or indirectly affect land use on the Site so they will

1 not create conflicts with the CLUP, or fail to forward its map and policy objectives where the  
2 opportunity and ability to do so exists.  
3

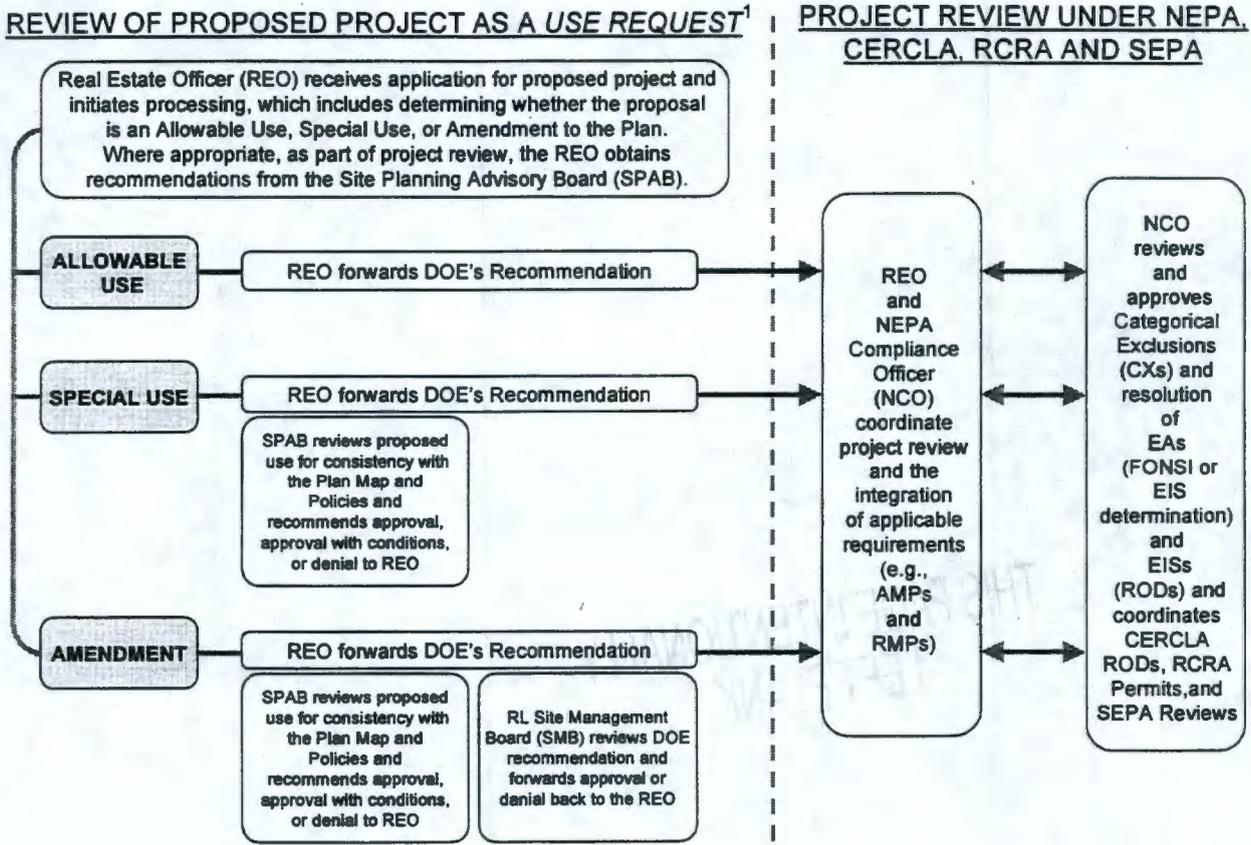
4 After the HRA-EIS ROD is approved, the actions presented in this section would be  
5 undertaken to ensure that the plan is implemented. The objectives of these actions are as  
6 follows:  
7

- 8 • To streamline and integrate procedures for project review, including ensuring project  
9 consistency with the plan, pre-planning for large areas, siting new developments,  
10 providing and using infrastructure and utilities, managing resources, notifying the  
11 public, and conducting environmental review.  
12
- 13 • To make decisions on the use of lands and resources on the Site within the frame-  
14 work of existing DOE legal and administrative procedures, with an implementation  
15 process that parallels, and efficiently coordinates with local land-use regulatory  
16 processes, and provides similar accountability and tracking.  
17
- 18 • To make adjustments in existing DOE administrative structures as necessary to  
19 efficiently implement the CLUP.  
20

21 Achieving these objectives is essential to accomplishing DOE missions and working with  
22 Federal agencies, Tribes, and local cities and counties to jointly accomplish planning goals,  
23 economic transition, and multiple uses of the Site.  
24  
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4

# Figure ES-31. Organizational Structure for CLUP Implementation.



<sup>1</sup>The proposed land or facility use, and location are reviewed for consistency with the Plan Map and Policies.

- 5 AMP = Area Management Plan
- 6 CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
- 7 CX = Categorical Exclusion
- 8 EA = Environmental Assessment
- 9 FONSI = Finding of No Significant Impact
- 10 EIS = Environmental Impact Statement
- 11 NEPA = National Environmental Policy Act
- 12 RCRA = Resource Conservation Recovery Act
- 13 ROD = Record of Decision
- 14 SEPA = State Environmental Policy Act
- 15
- 16

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