

Cover Sheet

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

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

10 **Consulting Tribal Governments:** Nez Perce Tribe Department of Environmental Restoration
11 and Waste Management and the Confederated Tribes of the Umatilla Indian Reservation
12 |

13 **Title:** *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement*
14 (HCP EIS), Hanford Site, Richland, Washington |

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29 |

30 **Abstract.** The DOE prepared this *Final Hanford Comprehensive Land-Use Plan Environmental*
31 *Impact Statement* (HCP EIS) to evaluate the potential environmental impacts associated with
32 implementing a comprehensive land-use plan for the Hanford Site for at least the next 50 years.
33 With the exception of the required No-Action Alternative, each of the six alternatives presented
34 represents a Tribal, Federal, state, or local agency's Preferred Alternative. Each alternative is
35 presented separately. The DOE's Preferred Alternative anticipates multiple uses of the Hanford
36 Site, including: consolidating Waste Management operations in the Central Plateau, allowing
37 industrial development in the eastern and southern portions of the site, increasing recreational
38 access to the Columbia River, and expanding the Saddle Mountain National Wildlife Refuge to
39 include all of the Wahluke Slope and ALE (managed by the U.S. Fish and Wildlife Service).
40 |

41 The Hanford Site occupies 1,517 square kilometers (km^2) (586 square miles [mi^2]) in
42 southeastern Washington. Today, the Hanford Site has diverse missions associated with
43 environmental restoration, Waste Management, and science and technology. These missions
44 have resulted in the growing need for a comprehensive, long-term approach to planning and
45 development for the Site.
46 |

47 **Public Comments:** The Final EIS is a revision of the *Revised Draft Hanford Remedial Action*
48 *Environmental Impact Statement and Comprehensive Land-Use Plan* (HRA-EIS) published in
49 April 1999 and responds to comments received in writing and at public hearings. The Final EIS
50 is being transmitted to commenting agencies and individuals, made available to the public, and
51 filed with the Environmental Protection Agency (EPA). A DOE decision on proposed actions will
52 not be made earlier than 30 days after EPA issues a public notice of availability for the Final EIS.
53 The DOE will issue a Record of Decision (ROD) published in the *Federal Register*. |

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Foreword

Objective of the EIS

This Final HCP EIS is being 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. The DOE will use the Final HCP EIS as a basis for a Record of Decision (ROD) on a CLUP for the Hanford Site. While development of the CLUP will be complete with release of the HCP EIS ROD, full implementation of the CLUP is expected to take at least 50 years.

Implementation of the CLUP would begin a more detailed planning process for land-use and facility-use decisions at the Hanford Site. The DOE would use the CLUP to screen proposals. Eventually, management of Hanford Site areas would 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 would consist of the following:

A final Land-Use Map, depicting the desired future patterns of land use on the Hanford Site. This map would 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 will help to ensure that individual actions of successive managers collectively advance the adopted CLUP map, goals, and objectives over time.

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 DOE, the cooperating agencies with land-use authority, and the affected Tribes, to evaluate and make recommendations on development proposals and land-use requests. It is anticipated that some requested activities would be permitted under the plan, but that others would 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.

¹Vertical lines in the margins like these to the right indicate where changes have been made since the publication of the Revised Draft HRA-EIS in April, 1999.

1 ***Integration of the CLUP***

2
3 The process described above would be integrated with existing DOE land-use review
4 procedures (e.g., the draft *Biological Resources Management Plan* and the draft *Cultural*
5 *Resources Management Plan*). The final CLUP map, policies and implementing procedures
6 would be integrated with and addressed at the threshold decision points of all authorizations,
7 operational plans, and actions, including contracts and budget proposals that directly or indirectly
8 affect land use so that they would not create unintentional conflicts with the CLUP, or fail to
9 advance CLUP objectives where the opportunity and ability to do so exists.

10
11 The DOE would have the final approval of all land-use decisions taking place on the
12 Hanford Site while under DOE responsibility. The DOE Richland Operations Office would
13 coordinate review of Hanford land development and land-use requests, and determine, with input
14 from the SPAB, whether a request represents an *allowable use*, or *special use*, or whether the
15 request would require an *amendment* to the CLUP.

16
17 ***Cooperating Agencies and Consulting Tribal Governments***

18
19 The nine cooperating agencies and consulting Tribal governments that participated in the
20 preparation of this Final HCP EIS are: the U.S. Department of the Interior (Bureau of Land
21 Management [BLM], Bureau of Reclamation [BoR], and the U.S. Fish and Wildlife Service
22 [USFWS]); the City of Richland, WA; Benton, Franklin, and Grant counties; the Nez Perce Tribe,
23 Department of Environmental Restoration and Waste Management; and the Confederated
24 Tribes of the Umatilla Indian Reservation (CTUIR).

25
26 ***Public Comment***

27
28 The DOE received more than 400 comment letters, 30 E-mails, and 86 transcript
29 comments from four public hearings on the Revised Draft HRA-EIS. The DOE also accepted a
30 binder with 922 endorsements for the Wild and Scenic River (with the inclusion of a Wahluke
31 Wildlife Refuge) that were collected for the Department of the Interior's Hanford Reach EIS in
32 1994. More than 200 request forms for farmland on the Wahluke Slope (also generated for the
33 Hanford Reach EIS in 1994) were accepted in the same spirit. Each of these signature-
34 gathering efforts were assigned only one comment number. Based on the public comment
35 received, the following changes have been made to the DOE's Preferred Alternative:

- 36
37 • All Conservation (Mining and Grazing) has been changed to Conservation (Mining).
38 • The National Wildlife Refuge designation (from Alternative One) has been extended to
39 include the ALE Reserve, the Riverlands, and McGee Ranch; and all river islands not in
40 Benton County. The Preferred Alternative clarifies that the refuge would be an overlay
41 wildlife refuge (without a transfer of title from DOE), and that DOE retains the right to
42 mine the ALE insert for cover materials.
43 • A railroad right-of-way through the Riverlands portion of the proposed Refuge would be
44 given status as a preexisting condition and included in the proposed USFWS permit to
45 manage the Refuge.
46 • The White Bluffs town-site (from Alternatives One and Three) has been added to the
47 Preferred Alternative map as Low-Intensity Recreation to serve as the White Bluffs
48 Memorial.
49 • The Low-Intensity Recreation dots (comfort stations) along the river which could
50 eventually serve as anchor points for a river trail from Richland to Vernita Bridge have
51 been moved to ensure that they have both river and road access.

- 1 • A High-Intensity Recreation triangle (from Alternative Three) has been added to the
2 Preferred Alternative map near Horn Rapids Park on the Yakima River

3
4 In addition to changes made to the Preferred Alternative, and the identifying of Alternative
5 One as the environmentally preferable alternative, many other changes were made to the
6 document updating items, refining analyses, and correcting errors. Each change in the Final
7 EIS from the Revised Draft EIS is identified by vertical line on the outside margin of the page
8 such as the one that accompanies this paragraph.

Preamble

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

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

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Acronyms and Initialisms

4	ac	acres
5	AEA	Atomic Energy Act
6	AEC	Atomic Energy Commission
7	AMP	area management plan
8	ATG	Allied Technology Group
9	BLM	Bureau of Land Management
10	BoR	Bureau of Reclamation
11	BPA	Bonneville Power Administration
12	BRMaP	Biological Resources Management Plan
13	BRMiS	Biological Resources Mitigation Strategy Plan
14	CAA	<i>Clean Air Act of 1970</i>
15	CAAA	<i>Clean Air Act Amendments of 1990</i>
16	CBC	Columbia Basin College
17	CBRP	Columbia Basin Reclamation Project
18	CCP	Comprehensive Conservation Plan
19	CEQ	Council on Environmental Quality
20	CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
21	CLUP	comprehensive land-use plan
22	CRADA	Cooperative Research & Development Agreement
23	CRMP	Cultural Resources Management Plan
24	CTUIR	Confederated Tribes of the Umatilla Indian Reservation
25	D&D	Decontamination and Decommissioning
26	DOE	U.S. Department of Energy
27	DOH	Department of Health (State of Washington)
28	DOI	U.S. Department of the Interior
29	DSTs	double-shell tanks
30	EA	environmental assessment
31	Ecology	Washington State Department of Ecology
32	EIS	environmental impact statement
33	EM	Environmental Management
34	EMSL	Environmental Molecular Sciences Laboratory
35	Energy Northwest	formerly known as the Washington Public Power Supply System (WPPSS)
36	EPA	U.S. Environmental Protection Agency
37	EPZ	emergency planning zone
38	ERDF	Environmental Restoration Disposal Facility
39	ERWM	(Nez Perce Tribe) Environmental Restoration and Waste Management (Program)
40	ESU	Evolutionary Significant Units
41	EUZ	exclusive use zone
42	FFCA	<i>Federal Facilities Compliance Act of 1992</i>
43	FFT	Fast Flux Test Facility
44	FLEFA	<i>Federal Land Exchange Facilitation Act of 1988</i>
45	FLPMA	<i>Federal Land Policy and Management Act of 1976</i>
46	RI/FS	Remedial Investigation/Feasibility Study
47	FONSI	Finding of No Significant Impact

1	Working Group	Future Site Uses Working Group
2	GIS	Geographic Information System
3	GMA	<i>Growth Management Act</i>
4	GSA	General Services Administration
5	ha	hectares
6	HAB	Hanford Advisory Board
7	HCP EIS	<i>Hanford Comprehensive Land-Use Plan Environmental Impact Statement</i> (formerly named the <i>Hanford Remedial Action Environmental Impact Statement and Comprehensive Land-Use Plan</i> [HRA-EIS])
8	HAMMER	Hazardous Materials Management and Emergency Response
9	HAP	hazardous air pollutants
10	HCRL	Hanford Cultural Resources Laboratory
11	HEHF	Hanford Environmental Health Foundation
12	HGIS	Hanford Geographic Information System (database)
13	HMS	Hanford Meteorological Station
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 ²	square kilometers
19	LIGO	Laser Interferometer Gravitational-Wave Observatory
20	MEI	maximally exposed individual
21	mi ²	square miles
22	MMI	Modified Mercalli Intensity
23	MOA	Memorandum of Agreement
24	MOX	mixed oxide
25	MTCA	<i>Model Toxics Control Act of 1989</i>
26	NAAQS	National Ambient Air Quality Standards
27	NARM	naturally occurring and accelerator-produced radioactive materials
28	NCO	NEPA Compliance Officer
29	NCP	National Contingency Plan
30	NEPA	<i>National Environmental Policy Act of 1969</i>
31	NERP	National Environmental Research Park
32	NOA	Notice of Availability
33	NOI	Notice of Intent
34	NPA	<i>Northwest Power Act</i>
35	NPDES	National Pollutant Discharge Elimination System
36	NPL	National Priorities List
37	NPPC	Northwest Power Planning Council
38	NPS	U.S. National Park Service
39	NWR	National Wildlife Refuge
40	ORP	Office of River Protection (formerly known as the Tank Waste Remediation System [TWRS])
41	OSHA	Occupational Safety and Health Administration
42	PCB	polychlorinated biphenyl
43	PFP	Plutonium Finishing Plant
44	PSD	Prevention of Significant Deterioration
45	PUD	Public Utility District

1	PUREX	Plutonium-Uranium Extraction
2	R&D	research and development
3	RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
4	RCW	Revised Code of Washington
5	REO	Real Estate Officer
6	RL	(Department of Energy) Richland Operations Office
7	RMP	Resource Management Plan
8	ROD	Record of Decision
9	SALDS	state-approved land disposal structure
10	SARA	<i>Superfund Amendments and Reauthorization Act of 1986</i>
11	SDWA	<i>Safe Drinking Water Act of 1974</i>
12	SEPA	<i>State Environmental Policy Act of 1971</i>
13	SHPO	State Historic Preservation Office
14	SMB	Site Management Board
15	SPAB	Site Planning Advisory Board
16	SRS	Savannah River Site
17	SSTs	single-shell tanks
18	TAP	toxic air pollutants
19	THPO	Tribal Historic Preservation Officer
20	TPA	Tri-Party Agreement
21	TRIDEC	Tri-City Industrial Development Council
22	TSCA	<i>Toxic Substances Control Act of 1976</i>
23	TSD	Treatment, Storage and Disposal
24	TSP	total suspended particulates
25	TWRS	Tank Waste Remediation System (now known as the Office of River Protection [ORP])
26	UBC	Uniform Building Code
27	USACE	U.S. Army Corps of Engineers
28	USFWS	U.S. Fish and Wildlife Service
29	VOC	volatile organic compound
30	WAC	Washington Administrative Code
31	WCAA	<i>Washington Clean Air Act of 1991</i>
32	WDFW	Washington Department of Fish and Wildlife
33	WIDS	Waste Information Data System (database)
34	WNP-2	Washington Nuclear Plant Number 2
35	WSU-TC	Washington State University - Tri-Cities
36		

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S1.0 *Introduction*²

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 Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement (HCP 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, Compensation, and Liability Act of 1980* (CERCLA) and decisions made through the *Resource Conservation and Recovery Act of 1976* (RCRA) permitting process 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. It is DOE's responsibility to include in its annual budget request sufficient funds for compliance with applicable environmental requirements. The Tri-Party Agreement, which defines the schedule for clean-up activities at the Hanford Site is one source of such requirements, and 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 boundary encloses 1,517 square kilometers (km^2) (586 square miles [mi^2]) in southeastern Washington (Figure S-1). This new number is based on Geographic Information System (GIS) interpolation of the legal site boundary and not on any addition to DOE holdings. Historically the Hanford site area of 1450 km^2 (560 mi^2) was calculated by the addition of sections; (however; not all sections are exactly 640 acres) and their subunits based on surveys from the 1800's. Included within the Site is 36.42 km^2 (14.1 mi^2) of Columbia River surface water and one square mile of Washington State land.

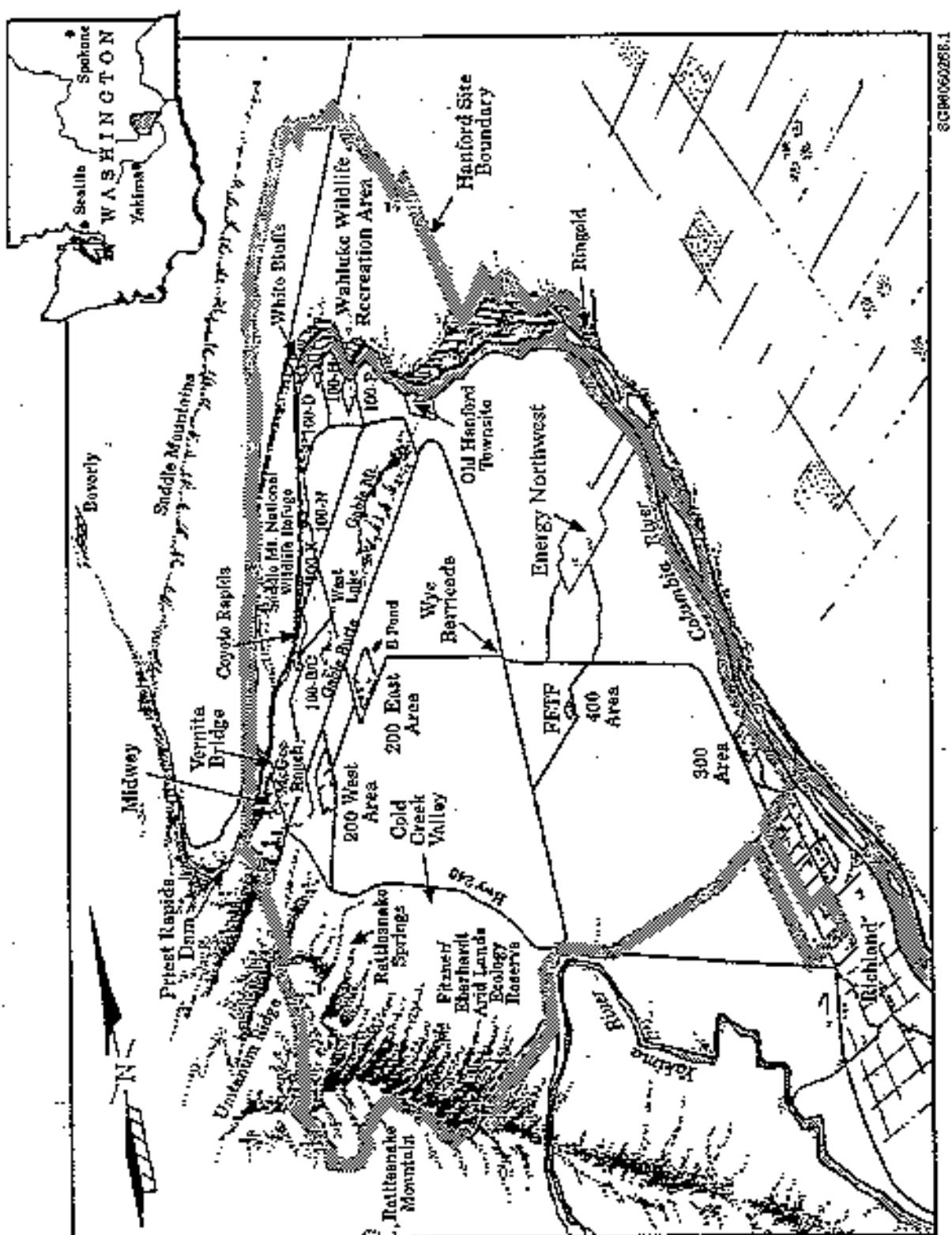
For more than 40 years, the primary mission at Hanford was the production of nuclear materials for national defense. The DOE developed infrastructure and facility complexes to accomplish this work, but large tracts of land used as protective buffer zones for safety and security purposes remained undisturbed. 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 HCP 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,

² Vertical lines in the margins like these to the right indicate where changes have been made since the publication of the Revised Draft HRA-EIS in April, 1999.

Figure ES-1. Hanford Site Location and Landmarks.



1 DOE developed several land-use alternatives. The cooperating agencies are the U.S.
2 Department of the Interior (DOI), consisting of the Bureau of Land Management (BLM), Bureau
3 of Reclamation (BoR), and U.S. Fish and Wildlife Service (USFWS); Benton, Franklin, and Grant
4 counties; and the City of Richland. The consulting Tribal governments are the Nez Perce Tribe
5 Department of Environmental Restoration and Waste Management, and the Confederated
6 Tribes of the Umatilla Indian Reservation. With the exception of the required No-Action
7 Alternative, each alternative presented represents a Tribal, Federal, state, or local
8 agency's Preferred Alternative. Each alternative is presented separately. Effort was taken to
9 present each alternative with equal measure to encourage public comment.

10

11 **S1.1 The National Environmental Policy Act Process**

12

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

16

17 **S1.1.1 Public Review of the Draft and Revised Draft HRA-EIS**

18

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

25

26 On April 23, 1999, DOE published the Revised Draft HRA-EIS. A public comment period
27 was held from April 23, 1999 to June 7, 1999. Public hearings on the Revised Draft HRA-EIS
28 were held on May 18, 1999, in Portland, OR; on May 20, 1999, in Richland, WA; on June 2, 1999
29 in Mattawa, WA; and on June 3, 1999 in Spokane, WA. More than 400 comment documents
30 were received by DOE, including letters, postcards, questionnaires, and surveys as well as
31 electronic mail. In addition, more than 200 pages of transcripts were generated during the four
32 public hearings.

33

34 Public comments on the Revised Draft HRA-EIS have been incorporated into this Final
35 EIS as appropriate. For example, DOE solicited public comment on a proposed name change
36 for the EIS which the public supported. Accordingly, the name of this EIS has been changed
37 from the *Hanford Remedial Action Environmental Impact Statement and Comprehensive Land-*
38 *Use Plan* to the *Final Comprehensive Land-Use Plan EIS* (HCP EIS). The DOE's responses to
39 public comments are presented in the Comment Response Document of this Final EIS.

40

41 The Final HCP EIS evaluates the potential environmental impacts associated with
42 establishing land uses at the Hanford Site for at least the next 50 years, defers the evaluation of
43 impacts associated with remedial actions to Tri-Party Agreement documents, and includes the
44 entire Hanford Site within the scope of the document.

45

46 The major differences between the Final HCP EIS and the August 1996 Draft HRA-EIS
47 are as follows:

- 48
- 49 C The Final HCP EIS focuses on land-use impacts and decisions rather than potential
50 remediation impacts.

- 1 C Each alternative in the Final HCP EIS features a site-wide map designating land |
2 uses, whereas alternatives in the August 1996 Draft HRA-EIS focused on individual |
3 geographic areas.
4
5 C In response to public comment, the Final HCP EIS includes a new DOE Preferred |
6 Alternative as well as land-use alternatives developed by the cooperating agencies |
7 and consulting Tribal governments.
8
9 C The Final HCP EIS contains proposed land-use policies and implementing |
10 procedures for integration into the Hanford CLUP (see Chapter S-6). |

12 Preparation of the Final HCP EIS is consistent with 42 USC 7274k (Public Law 104-201, |
13 Section 3153), which requires the development of a future-use plan for the Hanford Site; and is |
14 responsive to public comments received during scoping and during the public comment periods |
15 on the original draft and the Revised Draft. The Final HCP EIS also provides a basis for |
16 considering potential future proposals regarding transferring ownership and control of some or |
17 all of the Hanford Site.

18 Since March 1997, DOE has worked with the cooperating agencies and consulting Tribal |
19 governments to establish the framework for the environmental analyses that is presented in the |
20 Final HCP EIS. Substantial agreement was reached among the cooperating agencies and |
21 consulting Tribal governments on the development of land-use designations and on the format |
22 for determining the potential environmental impacts associated with the land uses carried |
23 forward in this Final HCP EIS. The cooperating agencies and consulting Tribal governments |
24 also worked together to develop the CLUP policies and implementing procedures.
25

27 *S1.1.2 Summary of Major Issues Raised by Agencies and the Public*

28

29 The DOE considered all comments received on the Revised Draft HRA-EIS. Many of the |
30 comments supported particular alternatives, or a combination of alternatives. A significant |
31 number of the comments addressed environmental issues, such as the plight of wildlife habitat |
32 and the continued preservation of habitat for plants and animals, including the diminishing |
33 population of salmon, and the Hanford Reach designation as a Wild and Scenic River. The |
34 comments and comment responses are given in the Final HCP-EIS Comment Response |
35 Document, and summarized comments and responses are found in Appendix F.
36

37 Twenty-eight major topics were identified and given general responses from the |
38 hundreds of comments received. More than 200 detailed comments were given individual |
39 responses in the Comment Response Document. The major topics are summarized below.
40

41 **No-Action Alternative.** A few commenters gave input regarding this alternative, with two |
42 supporting it and two opposing the lack of planning in this alternative.
43

44 **DOE's Preferred Alternative.** Most commenters citing this alternative offered support, albeit |
45 with many favoring some modification to further protect the environment. Those opposed cited |
46 the lack of economic development for Grant County and keeping the Wahluke Slope under |
47 Federal control as the basis for their opposition.
48

49 **Alternative One.** Almost all letters received regarding this alternative were in favor of this |
50 alternative, citing the emphasis on preservation and the additional protection that it provides for |
51 high value or sensitive ecological areas on the Hanford Site, and the prohibition against |
52 agriculture, mining, grazing, and intensive recreational uses that would compromise the |

1 ecological and wildlife values presented. The opposing letter expressed the need for economic
2 development.

3
4 **Alternative Two.** Almost all commenters citing this alternative were in favor of it. The primary
5 issue expressed in the supporting comments was the additional protection given to the
6 environment, particularly that afforded to the high value ecological areas and natural and
7 sensitive lands on the Hanford Site. Some commenters expressed the desire for even more
8 protection of the environment, citing this alternative as the one closest to total preservation. The
9 two opposing commenters cited lack of economic development.

10
11 **Alternative Three.** A significant majority of the commenters citing this alternative supported it,
12 particularly the economic development provided to Grant County. These commenters wanted
13 the land returned to farming. Opposing commenters cited the lack of adequate protection of the
14 shrub-steppe habitat, and the concern that irrigation would undermine the White Bluffs.

15
16 **Alternative Four.** Commenters expressing an opinion on this alternative generally supported it,
17 citing the large amount of preservation. Those opposed expressed concern that there was no
18 economic development.

19
20 **National Wildlife Refuge/DOE's Preferred Alternative.** More than 300 commenters wrote
21 concerning the DOE's Preferred Alternative, with the modification that a National Wildlife Refuge
22 be created/expanded for additional protection of the environment. Six commenters were
23 opposed to this combination, citing as their reasons the USFWS's lack of adequate resources to
24 properly manage the land, and the lack of consideration of the previous use in farming and future
25 economic development.

26
27 **Other Combinations.** More than 100 comments expressed concern or support for parts of
28 alternatives or an additional alternative. A few submitted their own alternative maps. Some
29 commenters addressed the issue of Federal versus local control. A few supported an extension
30 to the public comment period. The comment was made that additional mapping be done to
31 better represent the wildlife population picture. Others suggested that cleanup, not planning, be
32 the focus of the mission at the Hanford Site.

33
34 **Preservation.** Several commenters expressed their support for preservation of the Hanford
35 Site, varying from preservation of the entire Hanford Site, to the addition of the 200 West Area
36 sagebrush to preservation. Many cited the Hanford Reach, the creation of a National Wildlife
37 Refuge, McGee Ranch, May Junction, the islands, the LIGO land, Gable Mountain, Gable Butte,
38 and the sand dunes. Reasons cited were historical, ecological, cultural, biological, and
39 economic.

40
41 **Conservation (Mining).** A large majority of the commenters expressing a view on this topic
42 said mining could be allowed but only for the necessary materials to support cleanup of the
43 Hanford Site. Some letters described specific areas that should not be mined (primarily the ALE
44 Reserve), while one commenter cited the need for McGee Ranch silt specifically for the cleanup
45 program.

46
47 **Conservation (Mining and Grazing).** More than 200 commenters were against allowing any
48 commercial grazing on the Hanford Site. Many commenters cited grazing as being incompatible
49 with wildlife protection. The spreading of noxious weeds was attributed to livestock grazing,
50 because hooves tear up the delicate ground cover habitat. There was a concern raised
51 regarding possible plutonium contamination of the livestock.

1 **Low-Intensity Recreation.** Commenters gave a variety of views regarding recreation. Boat
2 launches were generally supported, although a boat launch at White Bluffs drew comments for
3 and against. Two commenters opposed any recreation at the Hanford Site. Several expressed
4 the view that only non-motorized vehicles or recreation be allowed on constructed trails, while
5 others supported access for limited recreation such as campsites for paddlers and access for
6 kayakers and rafters.
7

8 **High-Intensity Recreation.** Most of the commenters who expressed views on High-Intensity
9 Recreation were in support of the B Reactor Museum. Some commenters were opposed to any
10 High-Intensity Recreation on the Hanford Site.
11

12 **Research and Development.** Letters received on this land-use designation cited the need for
13 restricting or prohibiting research and development, using only the 300 Area, LIGO, and FFTF,
14 for example.
15

16 **Industrial.** Some commenters addressing this topic recommended limiting industrial
17 development to the 300 Area and 1100 Area, or areas near the Tri-Cities, which would support
18 the industry with infrastructure. A few commenters were against any industrial development at
19 Hanford, while some expressed that timing was important, with cleanup of the site first, then
20 development.
21

22 **Industrial-Exclusive.** Several commenters stated that the area designated for Industrial-
23 Exclusive land use should be reconfigured to represent what was shown in Alternatives One and
24 Two.
25

26 **Agriculture.** Ninety percent of the more than 200 commenters addressing Agriculture were
27 opposed to any agriculture on the Hanford Site, citing the possible endangering of the health of
28 the Columbia River from irrigation runoff, the potential damage to the White Bluffs from irrigation,
29 the need for preservation of the shrub-steppe habitat for wildlife, and the possibility that
30 agriculture on the Hanford Site would be bad, perceptually, for all Washington State agriculture.
31 The commenters in support cited the need to support world food production, schools, and the
32 rural area in Grant County.
33

34 **Policy.** Several letters were received addressing payment in lieu of taxes (PILT), expressing
35 support for DOE to give Grant County PILT; others would like the PILT based on lost opportunity
36 instead of current land use. Commenters also reiterated the need for continuation of the
37 cleanup mission, the need to consider human health and safety, and the need to better address
38 environmental justice by expanding farming opportunities on the Wahluke Slope.
39

40 **Procedure.** Several letters addressed the membership of the Site Planning Advisory Board,
41 wanting to add regulators and Tribes as sovereign nations, and to limit counties' involvement.
42 Several commenters expressed the opinion that the Secretary's announcement in April 1999 of
43 the DOE's Preferred Alternative prejudiced the outcome. Commenters also wanted a document
44 name change, a change in timing, and cultural reviews and natural resources for land-use
45 planning.
46

47 **Plan.** Some commenters addressed the comprehensive land-use plan, citing a variety of items.
48 These included the concern that "management by committee" is too risky, thanking the DOE for
49 keeping an open process, lack of impacts from industrial development, the recommendation that
50 planning should be seven generations out, and concerns regarding the sensitivity of LIGO to
51 noise and vibration.
52

1 **Public Involvement.** Several letters cited the commenter's appreciation for the opportunity to
2 comment, positive feedback on multiple public hearings, and complimented DOE and the
3 Cooperating Agencies on the quality of the document and the work that went into preparing the
4 document.

5 **Salmon and Steelhead.** All letters addressing salmon were in support of protection of salmon
6 and salmon habitat and salmon recovery efforts, and this extended to other anadromous fish,
7 such as steelhead, as well.

8 **Hanford Reach.** More than 100 letters were received supporting protection of the Hanford
9 Reach, citing the importance of the salmon spawning habitat and the welfare of the eagles and
10 other wildlife that eat the salmon. Concern was expressed for the erosion of the White Bluffs,
11 and the effects of regional agricultural growth on spawning habitat.

12 **Tribal Rights.** Several commenters expressed their concern that Tribal rights be honored by
13 the DOE. Many expressed an opinion that no grazing of any type should be allowed on the
14 Hanford Site. Also supported was the protection of cultural and religious sites, working with the
15 Yakama Indian Nation, and consideration of an option to deed stewardship back to the Tribes.

16 **Wild and Scenic River.** Several commenters supported a Wild and Scenic River designation
17 for the Columbia River flowing through the Hanford Reach, citing protection of the river and the
18 riverbanks. A few of those opposed the designation were concerned for future local needs, such
19 as water rights.

20 **Habitat.** Many commenters were in favor of setting aside land for conservation and preservation
21 of habitat, noting that the wildlife needs protection. Many of the commenters mentioned the
22 valuable shrub-steppe habitat, which is home to many species, including the sage sparrow,
23 desert butterflies, and species of snakes, other reptiles, and amphibians. A few commenters did
24 not support wildlife habitat, noting that shrub-steppe is only weeds, or that wildlife can coexist
25 with farming.

26 **Wahluke Slope.** Many commenters addressed the Wahluke Slope, with more than half
27 opposing any farming there. Other commenters supported farming, or an impartial study of all
28 the potential uses of the land.

29 **Split Record of Decision.** Over 180 commenters supported a split ROD in the interest of
30 moving the designation of a wildlife refuge forward, without waiting for cleanup of the site to be
31 completed.

32 **S1.1.3 Summary of Changes Made in Response to Public Comment**

33 Based on the public comment received, the following changes have been made, all of
34 which affect DOE's Preferred Alternative:

- 35
 - 36 • All areas designated as Conservation (Mining and Grazing) have been changed to
37 Conservation (Mining).
 - 38 • The National Wildlife Refuge designation (from Alternative One) has been extended to
39 include the ALE Reserve, the Riverlands, and McGee Ranch; and all river islands not in
40 Benton County. The Preferred Alternative clarifies that the refuge would be an overlay
41 wildlife refuge (without a transfer of title from DOE), and that DOE retains the right to
42 mine the ALE insert for cover materials.

- A railroad right-of-way through the Riverlands portion of the proposed Refuge would be given status as a preexisting condition and included in the proposed USFWS permit to manage the Refuge.
- The White Bluffs town-site (from Alternatives One and Three) has been added to the Preferred Alternative map as Low-Intensity Recreation to serve as the White Bluffs Memorial.
- The Low-Intensity Recreation dots (comfort stations) along the river which could eventually serve as anchor points for a river trail from Richland to Vernita Bridge have been moved to ensure that they have both river and road access.
- A High-Intensity Recreation triangle (from Alternative Three) has been added to the Preferred Alternative map near Horn Rapids Park on the Yakima River.

In addition to changes made to the Preferred Alternative, and the identifying of Alternative One as the environmentally preferable alternative, many other changes were made to the document updating items, refining analyses, and correcting errors. Each change in the Final EIS from the Draft EIS is identified by vertical line on the outside margin of the page. Where there is no vertical line, no changes have been made.

S1.2 National Environmental Policy Act and Other Environmental Reviews

Past land-use commitments based on other NEPA documents, as well as CERCLA RODs addressing remediation, had a direct impact on the development of the land-use alternatives presented in this Final HCP EIS. Appropriate ongoing NEPA reviews were also considered in preparing this EIS. These documents are listed in the following sections.

S1.2.1 NEPA Reviews Affecting the Hanford Site

- c *Waste Management Operations, Hanford Reservation, Richland, Washington* (ERDA-1538, December 1975)
- c *Double-Shell Tanks for Defense High-Level Radioactive Waste Storage, Hanford Site, Richland, Washington* (DOE/EIS-0062, April 1980)
- c *Decommissioning of the Shippingport Atomic Power Station, Hanford Site, Richland, Washington* (DOE/EIS-0080, May 1982)
- c *Operation of PUREX and Uranium Oxide Plant Facilities, Hanford Site, Richland, Washington* (DOE/EIS-0089, February 1983)
- c *Disposal and Decommissioning, Defueled Naval Submarine Reactor Plants* (Lead Agency - Department of the Navy; DOE was a Cooperating Agency) (No document no., May 1984)
- c *Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes, Hanford Site, Richland, Washington* (DOE/EIS-0113, December 1987)
- c *Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington* (DOE/EIS-0119, December 1991)
- c *Tank Waste Remediation System, Hanford Site, Richland, Washington* (DOE/EIS-0189, August 1996)

- 1 C *Waste Management Programmatic Environmental Impact Statement (DOE/EIS-0200, May 1997)*
- 2
- 3 C *Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs* (DOE/EIS-0203, April 1995)
- 4
- 5 C *Safe Retrieval, Transfer and Interim Storage of Hanford Tank Wastes, Hanford Site, Richland, Washington* (DOE/EIS-0212, October 1995)
- 6
- 7 C *Plutonium Finishing Plant Stabilization Environmental Impact Statement* (DOE/EIS-0244, May 1996)
- 8
- 9 C *Management of Spent Nuclear Fuel from the K Basins Hanford Site, Richland, Washington* (DOE/EIS-0245, January 1996)
- 10
- 11 C *Disposal of Decommissioned, Defueled Cruiser, Ohio Class, and Los Angeles Class Naval Reactor Plants Environmental Impact Statement* (Adopted by DOE as DOE/EIS-0259, April 1996)
- 12
- 13 C *Hanford Reach of the Columbia River, Comprehensive River Conservation Study and Final Environmental Impact Statement* (Hanford Reach EIS) (National Park Service, June 1994)
- 14
- 15 C *Storage and Disposition of Weapons-Usable Fissile Materials Programmatic Environmental Impact Statement* (DOE/EIS-0229, November 1996)
- 16
- 17 C *Surplus Plutonium Disposition Environmental Impact Statement* (DOE/EIS-0283)- The Draft EIS was released in July 1998, and a supplement to the Draft EIS was released in May, 1999.
- 18
- 19
- 20 C *Columbia River System Operation Review Environmental Impact Statement* (DOE/EIS-0170, November 1995)
- 21
- 22
- 23 C *Transfer of the 1100 Area and the Southern rail connection to the Port of Benton* DOE prepared an environmental assessment as an interim action to this EIS that resulted in a finding of no significant impact (FONS) on (DOE/RL EA-1260) August 27, 1998.
- 24
- 25
- 26 C *Environmental Impact Statement for the Geologic Repository for the Disposal of Spent Nuclear Fuel and High Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0250)- Draft EIS published July, 1999.
- 27
- 28
- 29 C *Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement* (DOE/EIS-0286) – in preparation.
- 30
- 31
- 32 C *Programmatic Environmental Impact Statement for Accomplishing Expanded Civilian Nuclear Energy Research and Development and Isotope Production Missions in the United States, Including the Role of the Fast Flux Test Facility* (DOE/EIS-0310)– in preparation.
- 33
- 34
- 35 C *Idaho High Level Waste and Facility Disposition Environmental Impact Statement* (DOE/EIS-0287) – in preparation.
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2 **S1.2.2 State Environmental Policy Act (SEPA) Reviews Affecting the Hanford Site**
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4

- 5 C Commercial Low-Level Radioactive Waste Disposal Site (U.S. Ecology) on the
6 Hanford Site Environmental Impact Statement – in preparation.
7
8 C City of Richland Comprehensive Plan/Environmental Impact Statement (August 1997).
9
10 • SEPA EIS on Treatment of Low-Level Mixed Wastes (Allied Technology Group) City of
11 Richland EIS (EA6-97, March 1998).
12
13 C Draft Benton County Comprehensive Plan (SEPA EIS Addendum) (September 1997)
14

15 **S1.2.3 CERCLA Reviews Affecting the Hanford Site**
16

- 17 C 1100 Area Remediation – 1100-EM-1, 1100-EM-2, 1100-EM-3, and 1100-IU-1. Final
18 Record of Decision (ROD) issued September 24, 1993; certified remedial action - July
19 1996; delisted from National Priorities List (NPL) but Horn Rapids Asbestos Landfill
20 deed restriction is still in effect.
21
22 C 300 Area Remediation – 300-FF-1, 300-FF-5. Final ROD issued July 17, 1996.
23 Remedial Investigation/Feasibility Study (RI/FS) for NPL Site - to be completed after all
24 operable units are addressed.
25
26 C 100 Area Remediation – 100-BC-1, 100-HR-1, and 100-DR-1. Interim ROD for
27 37 high-priority waste sites issued September 1995. The ROD was amended May 14,
28 1997, to include additional waste sites.
29
30 • 100-HR-3/100-KR-4 (groundwater operable units). Interim ROD issued April 1, 1996.
31
32 • 100-IU-1, 100-IU-3, 100-IU-4, 100-IU-5. Interim ROD issued February 12, 1996.
33
34 RI/FS for 100 Area NPL Site – to be completed after all operable units are addressed.
35
36 C 200 Area Remediation – Environmental Restoration Disposal Facility - Final ROD
37 issued January 1995.
38
39 200-ZP-1 (groundwater operable unit). Interim ROD issued June 5, 1995.
40
41 200-UP-1 (groundwater operable unit). Interim ROD issued February 24, 1997.
42
43 RI/FS for 200 Area NPL site – to be completed after all operable units are addressed.
44

45 Just as the restrictions posed by approved CERCLA RODs were taken into consideration
46 in the development of the land-use alternatives in the Final HCP EIS, in the future, the U.S.
47 Environmental Protection Agency (EPA), Washington State Department of Ecology (Ecology),
48 and DOE are expected to consider the land-use plan for a given area when determining cleanup
49 levels. Remediation is conducted under CERCLA/RCRA authority. If the remediation process
50 cannot support the proposed land use within the National Contingency Plan's (NCP) 10^{-4} to 10^{-6}
51 risk range, then the HCP EIS contains a proposed process for changing the use of the land while
52 maintaining the effectiveness of institutional controls (see Chapter S-6).
53

1 **S1.3 Hanford Site Planning Efforts**

2

3 Several Hanford Site planning documents have been developed to address the various
4 information needs of DOE managers. These planning documents are periodically updated to
5 reflect new information and DOE decision making, such as the decision(s) that DOE would make |
6 based on the Final HCP EIS. Summarized below, these planning documents are:
7

- 8 C **Draft Hanford Cultural Resources Management Plan** – The CRMP establishes
9 guidance for the identification, evaluation, recordation, curation, and management of
10 archaeological, historic, and traditional cultural resources. The plan specifies
11 methods of consultation with affected Tribes, government agencies, and interested
12 parties; and includes strategies for the preservation and/or curation of representative
13 properties, archives, and objects.
14
- 15 C **Draft Hanford Biological Resources Management Plan (BRMaP)** – The BRMaP
16 provides DOE and DOE contractors with a consistent approach for protecting
17 biological resources and for monitoring, assessing, and mitigating impacts to
18 biological resources from site development and environmental restoration activities.
19 The BRMaP provides a comprehensive direction that specifies DOE biological
20 resource policies, goals, and objectives.
21
- 22 C **Hanford Strategic Plan** – This plan articulates the DOE vision and commitments to a
23 long-range strategic direction for Hanford Site missions as they were when the plan |
24 was adopted in 1996. The strategic plan provides a basis for decisions and actions to |
25 achieve DOE goals and it is updated periodically.
26
- 27 • **Accelerating Cleanup: Paths to Closure at the Hanford Site** – A revision of DOE's
28 2006 Plan, this document builds on an already accelerated pace of activities and
29 numerous efficiencies implemented at the Hanford Site during the last few years. It
30 commits to significant cleanup progress on the Site by 2006, while recognizing that
31 much of the cleanup effort will remain beyond 2006.
32
- 33 • **Hanford Site Ground-Water Protection Management Plan and Management and
34 Integration of Hanford Site Groundwater and Vadose Zone Activities** – These
35 documents provide management and protection guidelines to protect Hanford
36 groundwater from radioactive and nonradioactive hazardous substances.
37

38 This Final HCP EIS builds on past efforts to address land-use planning at the Hanford |
39 Site, and presents a range of alternative land uses that represent several different visions.
40

41 **S1.4 Integrating Planning Efforts by Other Governments and Agencies**

42 This section includes information supplied to DOE by representatives of other local
43 governments and agencies about their respective planning efforts. The concept of "agreeing to
44 disagree" on issues such as Tribal members' treaty rights allowed the agencies to set aside
45 differences and to work together on the land-use planning process.
46

47 **S1.4.1 Tribal Rights**

48 Tribal governments and DOE agree that the Tribal governments' treaty-reserved right of
49 taking fish at all "usual and accustomed" places applies to the Hanford Reach of the Columbia
50 River where it passes through Hanford.
51

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

S1.4.2 Other Federal Agencies

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

The BLM and BoR continue to retain an interest in their original property holdings prior to the establishment of the Hanford Site. The DOE must use the land consistent with the purposes for which they were originally acquired from BLM and BoR. Any other use of these lands by DOE requires BLM and BoR involvement. The BLM is responsible for administering Public Domain land. The BoR is responsible for the ultimate development of the irrigable lands within the Wahluke Slope, as part of the Columbia Basin Reclamation Project. Both the BLM and BoR have an interest in the Hanford resources and in management of those resources over the long term. When DOE relinquishes its withdrawals on these lands, the BLM and/or BoR would have the right of first refusal to the land. The BLM would examine the lands for current uses and suitability for return to the Public Domain. Depending upon condition, and after public involvement, suitable lands could be retained and designated for a special protective classification, recreational use, multiple-use management, exchange, etc. If unsuitable, then DOE or the Federal General Services Administration (GSA) would have the responsibility to dispose of the land.

In addition to BoR's irrigation system maintenance activities, DOE lands on the Wahluke Slope have been managed, in part, by the Washington Department of Fish and Wildlife (WDFW) as the Wahluke State Wildlife Recreation Area and, in part, by the USFWS as the Saddle Mountain National Wildlife Refuge. In April 1999, the WDFW and the USFWS notified the DOE of their intent to modify their management responsibilities on the Wahluke Slope under the 1971 agreement leaving only a small portion (about 324 ha (800 ac)) northwest of the Vernita bridge under WDFW permit. The USFWS informed the DOE that it intends to allow essentially the same uses permitted by the State of Washington under the WDFW's management of the Wahluke Slope. Therefore, transfer of management of the Wahluke Slope from the WDFW to the USFWS involves only a change in the agency managing the property and does not involve any change in the management activities for the Wahluke Slope. Management of the entire Wahluke Slope by the USFWS as an overlay wildlife refuge is consistent with the 1996 DOI Hanford Reach EIS ROD. The ROD recommended the Wahluke Slope be designated a wildlife refuge and the Hanford Reach a Wild and Scenic River, and that the wildlife refuge be managed by the USFWS.

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

1 Aside from BoR, BLM, and the USFWS current management responsibilities, the
2 U.S. National Park Service (NPS), DOI with DOE as a co-preparer, completed an EIS in 1994 for |
3 the Hanford Reach of the Columbia River. The *Hanford Reach of the Columbia River,*
4 *Comprehensive River Conservation Study and Final Environmental Impact Statement* (Hanford
5 Reach EIS) examined alternatives for preservation of the resources and features of the Hanford
6 Reach (including addition of the Hanford Reach to the National Wild and Scenic Rivers System),
7 and evaluated impacts that could result from various uses of the river. The DOI's ROD
8 recommended that the Congress designate Federally owned and privately owned lands within
9 0.4 km (0.25 mi) of the Columbia River, on both banks from river mile 396 to 346.5 as
10 a Recreational River under the Wild and Scenic Rivers System; and the portion of the
11 Hanford Site that lies north of the river, as a National Wildlife Refuge that is to be managed by the
12 USFWS. Congress is still contemplating actions that are necessary to implement the
13 DOI's ROD.

14 In addition to the proposed wild and scenic discussions, other discussions have occurred
15 to swap certain parcels of land in the State of Washington from the DOE to the DOI, affecting |
16 ownership of about 197 km² (75 mi²) of the Hanford Site. This swap would consolidate the
17 scattered Benton County portion of Hanford's BLM Public Domain lands into an area beginning
18 near 100-D, running south and east along the Columbia River shore, to just north of Energy
19 Northwest (formerly the Washington Public Power Supply System [WPPSS]) and then west to
20 Gable Mountain.

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

27 **S1.4.3 Local Governments**

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

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

39 **S1.4.3.1. Benton County.** Benton County is preparing a comprehensive land-use plan
40 that covers the entire county, including a portion of the Hanford Site. As a cooperating agency,
41 Benton County's government does not agree with the Tribal view that Hanford lands are "open
42 and unclaimed." As part of its planning effort, Benton County has developed a proposed critical
43 areas map (see Figure S-15). Critical areas include wetlands, areas with a critical recharging
44 effect on aquifers used for potable water, fish and wildlife habitat conservation areas, frequently
45 flooded areas, and geologically hazardous areas.

1 The Port of Benton, which must comply with county land-use plans, has already received
2 the 1100 and 3000 areas and has expressed interest in the industrial development of portions of
3 the 300 Area, and the area south of Energy Northwest (formerly WPPSS) Plant Number 2.
4

5 **S1.4.3.2. City of Richland.** The City of Richland plans in coordination with Benton
6 County under the GMA. Future land use at the Hanford Site has the potential to affect the
7 economic development of Richland. The City of Richland has identified portions of the southern
8 Hanford Site suitable for urban development and possible annexation (see Figure S-16).
9

10 **S1.4.3.3. Grant, Franklin, and Adams Counties.** Grant, Franklin, and Adams counties
11 coordinate local land-use planning for the Wahluke Slope. The three counties, along with the Port
12 of Mattawa, have expressed a desire to implement a land-use plan that would accommodate
13 increased agricultural activities, including irrigated cropping systems, along with wildlife and
14 cultural resource protections (see Figure S-17).
15
16

17 **S2.0 Purpose and Need**

18

19 The DOE has several missions to fulfill at the Hanford Site that have competing natural
20 resource consumption needs and management values. Governments and stakeholders within
21 the region have an interest in Hanford resources and in management of those resources over the
22 long-term. The DOE needs to assess the relative qualities of Hanford's resources, compare the
23 priorities and needs of Hanford's missions, and reach decisions such as the identification and
24 disposal of any excess lands. DOE Order 430.1 and 42 USC 7274k require a land-use plan for
25 the Hanford Site. The *Hanford Comprehensive Land-Use Plan Environmental Impact Statement*
26 (HCP EIS) (DOE/EIS-0222) provides the analysis to adopt a land-use plan.
27

28 The role of the HCP EIS is to document, in a public forum, the process of determining the |
29 best combination of land uses required to meet DOE mission needs for at least the next |
30 50 years.
31
32

33 **S3.0 Proposed Action and Alternatives**

34

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

43 Six land-use alternatives (including the No-Action) were developed by the nine
44 Cooperating Agencies and Consulting Tribal Governments using common land-use designations
45 and definitions. With the exception of the No-Action Alternative, each of the six alternatives
46 presented represents a Tribal, Federal, state, or local agency's Preferred Alternative.
47

48 **No-Action Alternative.** This alternative, developed by DOE in compliance with the *National*
49 *Environmental Policy Act of 1969* (NEPA), presents the current status of land use at the Hanford
50 Site and represents no change from current land-management processes or intergovernmental
51 relationships with the cooperating agencies. Lands within the Central Plateau geographic area
52 would continue to be used for the management of radioactive and hazardous waste materials.
|

1 These management activities would include collection and disposal of radioactive and/or
2 hazardous waste materials that remain onsite, contaminated groundwater management, current
3 offsite commitments, and other related and compatible uses. Specific land-use decisions for
4 Hanford would continue to be made under the NEPA process and the Tri-Party Agreement, based
5 on the current *Hanford Strategic Plan* (Mission Plan) and on a project-by-project basis.
6

7 **DOE's Preferred Alternative.** The DOE's Preferred Alternative has been changed in response
8 to public comment to increase the size of the proposed overlay wildlife refuge and eliminate
9 commercial grazing on the site. The DOE still anticipates multiple uses of Hanford, including
10 anticipated future DOE missions, non-DOE Federal missions, and other public and private-sector
11 land uses. The DOE Preferred Alternative would do the following:
12

- 13 C *for the clean-up mission* – consolidate waste management operations on 50.1 km²
14 (20 mi²) in the Central Plateau of the site
- 15 C *for the economic development mission* – allow industrial development in the eastern and
16 southern portions of Hanford and increase recreational access to the Columbia River
- 17 C *for the Natural Resource Trustee mission* – expand the existing Saddle Mountain National
18 Wildlife Refuge to include all of the Wahluke Slope (North Slope) of the Site, consistent
19 with the 1994 Hanford Reach EIS and 1996 Hanford Reach ROD; include the Riverlands
20 and McGee Ranch with the Arid Lands Ecology Reserve (ALE Reserve) under USFWS
21 management by permit to facilitate USFWS's overlay wildlife refuge expansion; eliminate
22 commercial grazing as an option; and ensure that, where practicable, withdrawn BLM
23 lands are clean enough to support BLM's multiple-use mandate.
24
- 25
- 26

27 **Alternative One (Natural Resource Trustee).** The USFWS's alternative emphasizes a Federal
28 stewardship role for managing the natural resources at Hanford. This alternative considers these
29 resources in a regional context, and would expand the existing Saddle Mountain National Wildlife
30 Refuge to include all of the Wahluke Slope (North Slope), the Riverlands, McGee Ranch, and the
31 ALE Reserve (i.e., all of the Hanford lands north and east of the Columbia River and west of State
32 Highways 24 and 240). The vision of Alternative One is to conserve the Hanford Site shrub-
33 steppe ecosystem and protect the Hanford Reach.
34

35 **Alternative Two (Nez Perce Tribe, Department of Environmental Restoration and Waste
36 Management).** This Nez Perce alternative calls for preservation of natural and cultural
37 resources and traditional Tribal use at the site. Future DOE missions would be constrained to
38 the Central Plateau, 300 Area, and 400 Area. Both this alternative and Alternative Four
39 (developed by the Confederated Tribes of the Umatilla Indian Reservation) reflect Tribal visions
40 and views of Tribal members' treaty rights and traditional Tribal uses of Hanford lands. The
41 Tribes and DOE have "agreed to disagree" on the interpretation of treaty rights on Hanford lands
42 in the interest of moving the EIS process forward. Each party reserves the right to assert its
43 respective interpretation of treaty rights at Hanford.
44

45 **Alternative Three (Cities and Counties).** This local governments' alternative is based on the
46 individual planning efforts of local agencies and organizations including Benton County, Franklin
47 County, Grant County, and the City of Richland. Alternative Three recognizes the potential that
48 land use at the Hanford Site has in relation to economic development. Alternative Three would
49 allow dryland (non-irrigated) agricultural and grazing activities, and irrigated agriculture on the
50 Hanford Site. The land-use designations contained in Alternative Three were developed
51 consistent with local availability of infrastructure, nearness of urban areas, soils capabilities, and
52 current use patterns.
53

1 **Alternative Four (Confederated Tribes of the Umatilla Indian Reservation, [CTUIR]).** This
2 CTUIR alternative calls for preservation of natural resources and areas of religious importance to
3 the CTUIR as well as traditional Tribal use at the Site. Both this alternative and Alternative Two
4 (developed by the Nez Perce Tribe, Department of Environmental Restoration and Waste
5 Management) reflect Tribal visions and views of Tribal members' treaty rights and traditional
6 Tribal uses of Hanford lands. The Tribes and DOE have "agreed to disagree" on the
7 interpretation of treaty rights on Hanford lands in the interest of moving the EIS process forward.
8 Each party reserves the right to assert its respective interpretation of treaty rights at Hanford.
9

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

13 Based on goals, objectives, and values (vision) of the cooperating agencies and
14 consulting Tribal governments, the land-use designations were applied to specific geographic
15 areas of the Hanford Site (Figure S-2). This process resulted in the development of the five
16 alternatives (six, including the No-Action Alternative) that are presented and analyzed in this Final
17 HCP EIS.

18 Following development of the alternatives, an analysis of potential environmental impacts
19 resulting from the proposed land uses associated with each alternative was conducted. With the
20 exception of DOE's Preferred Alternative and the No-Action Alternative (both of which were
21 written by DOE), the narratives of each alternative do not contain precisely parallel information
22 because each alternative was written by a separate cooperating agency or consulting Tribal
23 government with differing management goals. A summary of the results of the impact analyses
24 from the EIS is presented in Section S5.0 (Table S-6).

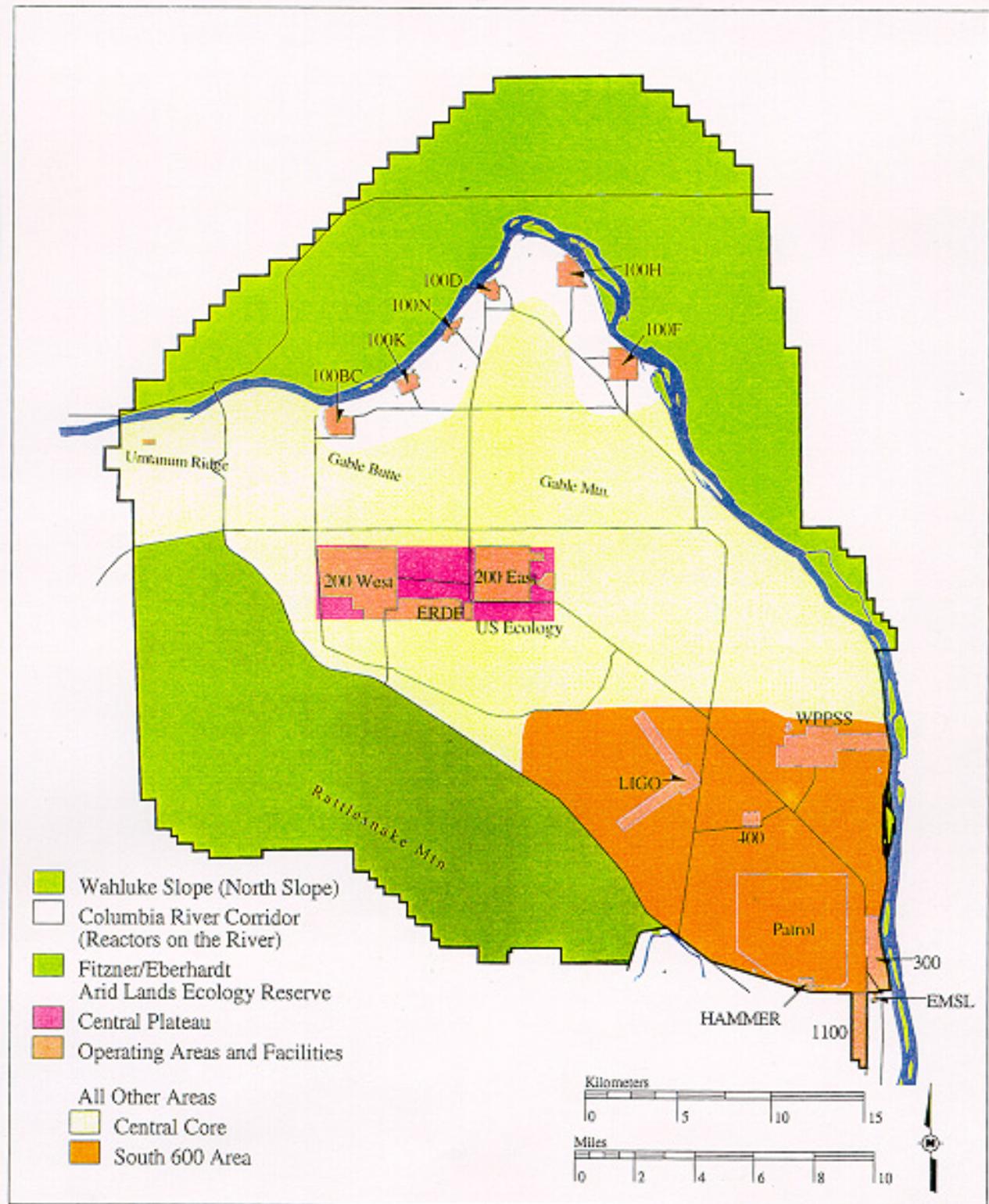
27 **S3.1 No-Action Alternative**

28 The No-Action Alternative is presented as "no change" from current management
29 direction or level of management intensity. Specifically, "no change" means that DOE would not
30 employ the land uses shown in Table S-1, any of the alternative maps (or combination of
31 alternative maps), and the CLUP policies and implementing procedures for managing Hanford
32 Site lands into the future.

Table S-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 or smaller scale time-limited research conducted in the field or within facilities that consume limited resources. 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 (e.g., quarrying for sand, gravel, basalt, and topsoil for governmental purposes) and grazing could occur as a special use (i.e., 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 (e.g., quarrying for sand, gravel, basalt, and topsoil for governmental purposes) could occur as a special use (i.e., 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 (i.e., mining or extraction of non-renewable resources) would be allowed within this area. Limited public access controls would be consistent with resource preservation. Includes activities related to Preservation uses.

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



BHLapp 04/23/96 clsp/geogareas.lnd Database: 03-DEC-1998

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

7
8 To analyze the impacts associated with implementing the no change in land-use
9 management policy/No-Action Alternative, assumptions regarding land-management options
10 were applied. In the No-Action Alternative, specific land-use decisions and designations would be
11 made through the NEPA process on a project-by-project basis as needed. Still, there would not
12 be a true land-use designation or land-use policies. There would only be areas of the Hanford
13 Site that are currently used or managed for specific purposes guided by administrative
14 agreements (e.g., the ALE Reserve and the Wahluke Slope), and areas of the Hanford Site that
15 are committed to a general land-use because of historical uses and existing NEPA or
16 CERCLA/RCRA ROD commitments, but are subject to change by future projects or missions
17 that are unknown at this time. Consequently, potential uses for the Hanford Site lands under the
18 No-Action Alternative are mapped using the policies presented in the 1996 *Hanford Strategic Plan*|
19 (Figure S-3).

20
21 **S3.1.1 Wahluke Slope**

22
23 The area of the Wahluke Slope currently managed by the USFWS would continue to be
24 managed as Preservation. The area managed by the WDFW would continue to be managed as
25 Conservation (Mining and Grazing). Limited public access would be allowed for hunting, fishing,
26 or recreation; permitted mining and grazing would be allowed; and agricultural leases would
27 continue.

28
29 **S3.1.2 Columbia River Corridor**

30
31 The Columbia River would continue to be managed to allow limited public access and use
32 as a Low-Intensity Recreation area. Access to the Columbia River's islands would remain
33 restricted to protect cultural and biological resources. Public access to the Reactors on the River
34 area (i.e., the 100 Areas) would remain restricted.

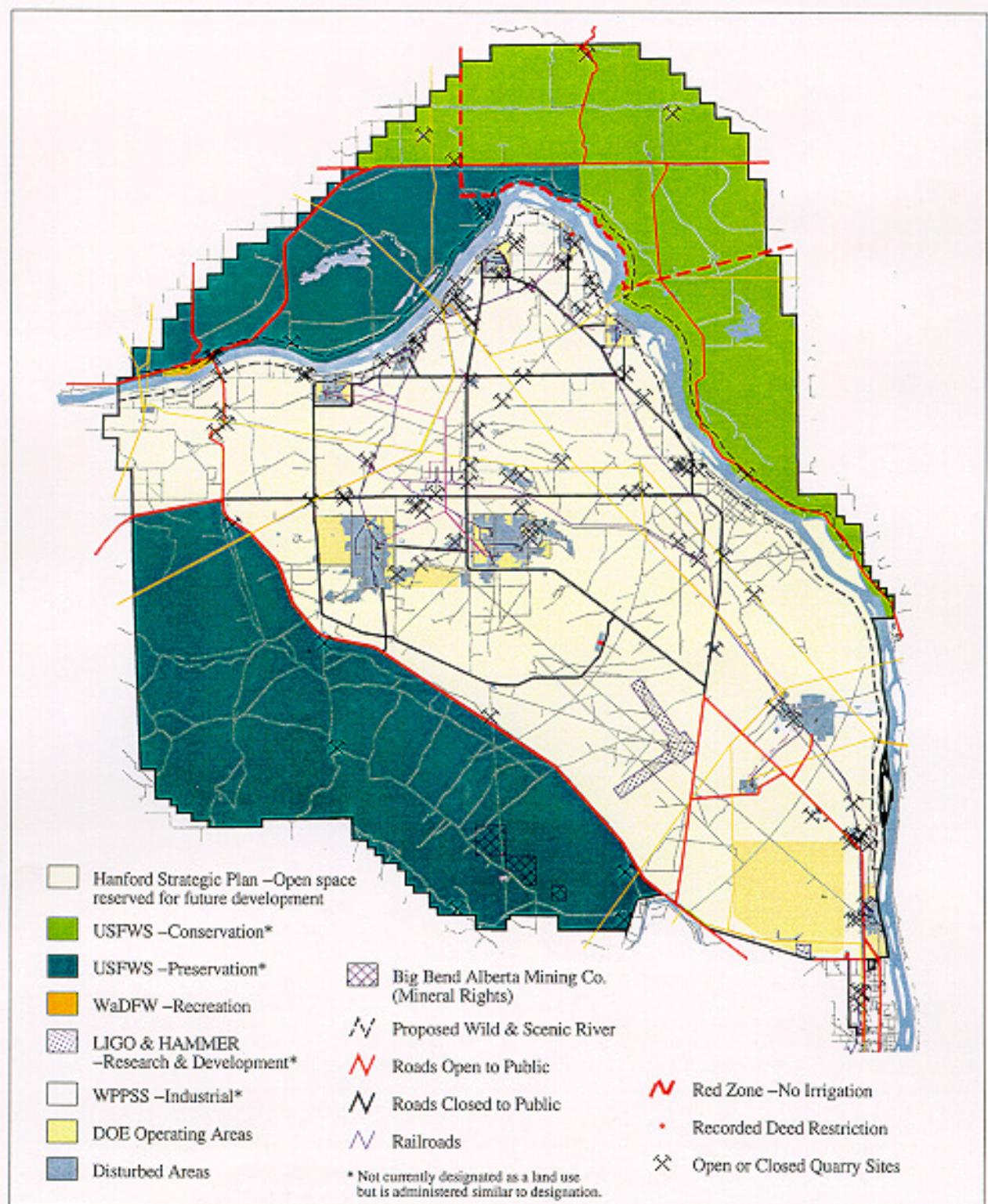
35
36 **S3.1.3 Central Plateau**

37
38 Lands within the Central Plateau area would continue to be used for the management of
39 radioactive and hazardous waste materials.

40
41 **S3.1.4 All Other Areas**

42
43 These areas would be available for other Federal and non-Federal uses, which are
44 consistent with safety, cultural, and biological resources protection requirements. The area north
45 of the City of Richland would be used for industrial purposes. The lands in and adjacent to the
46 300 and 400 Areas would remain under Federal ownership but could be leased for private and
47 public uses to support industrial and economic development. Other Federal uses would be
48 allowed by permit (e.g., the Laser Interferometer Gravitational-Wave Observatory [LIGO]).

Figure S-3. No-Action Alternative.



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1 **S3.1.5 Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE Reserve)**

2

3 The ALE Reserve geographic area would continue to be managed by the USFWS as
4 Preservation. The Big Bend Alberta Mining Company holds mineral rights on about 5.2 km²
5 (2 mi²) under the southern portion of the ALE Reserve.

6

7

8 **S3.2 The Agency's (DOE's) Preferred Alternative**

9

10 Much like the No-Action Alternative, DOE's Preferred Alternative was developed based on
11 policies that are consistent with the 1996 *Hanford Strategic Plan*. However, unlike the No-Action |
12 Alternative, DOE's Preferred Alternative would establish land-use policies and implementing
13 procedures that would place Hanford's land-use planning decisions in a regional context.

14

15 In the development of the Preferred Alternative, DOE took into account its role as the long-
16 term caretaker for the Site for at least the next 50 years and a synthesis of stated values and
17 objectives from the Future Site Uses Working Group, Hanford Advisory Board, August 1996 Draft
18 HRA-EIS, April 1999 Revised Draft HRA-EIS, written comments, public hearings and public
19 meetings, cooperating agencies, consulting Tribal governments, and those associated with
20 municipal and county land-use planning. The DOE also used information from the Hanford
21 Geographic Information System (HGIS) and Waste Information Data System (WIDS) database.
22 Information considered by DOE includes:

23

- 24 C All surface waste sites, including those remediated (Figure S-4)
- 25
- 26 C Groundwater contaminants and flow direction (Figures S-5, S-6, and S-7)
- 27
- 28 C Cultural and biological resources (Figure S-8)
- 29
- 30 C Exclusive Use Zones (EUZs) and Emergency Planning Zones (EPZs) associated with
31 DOE and other Hanford activities (e.g., Energy Northwest's nuclear power reactor,
32 U.S. Ecology's low-level waste disposal site, LIGO, etc.) (Figure S-9).
- 33

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

37

38 **S3.2.1 Wahluke Slope**

39

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

47

48 **S3.2.2 Columbia River Corridor**

49

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

53

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

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

The remainder of the land within the Columbia River Corridor outside the quarter mile buffer zone would be designated for Conservation (Mining).

S3.2.3 Central Plateau

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

S3.2.4 All Other Areas

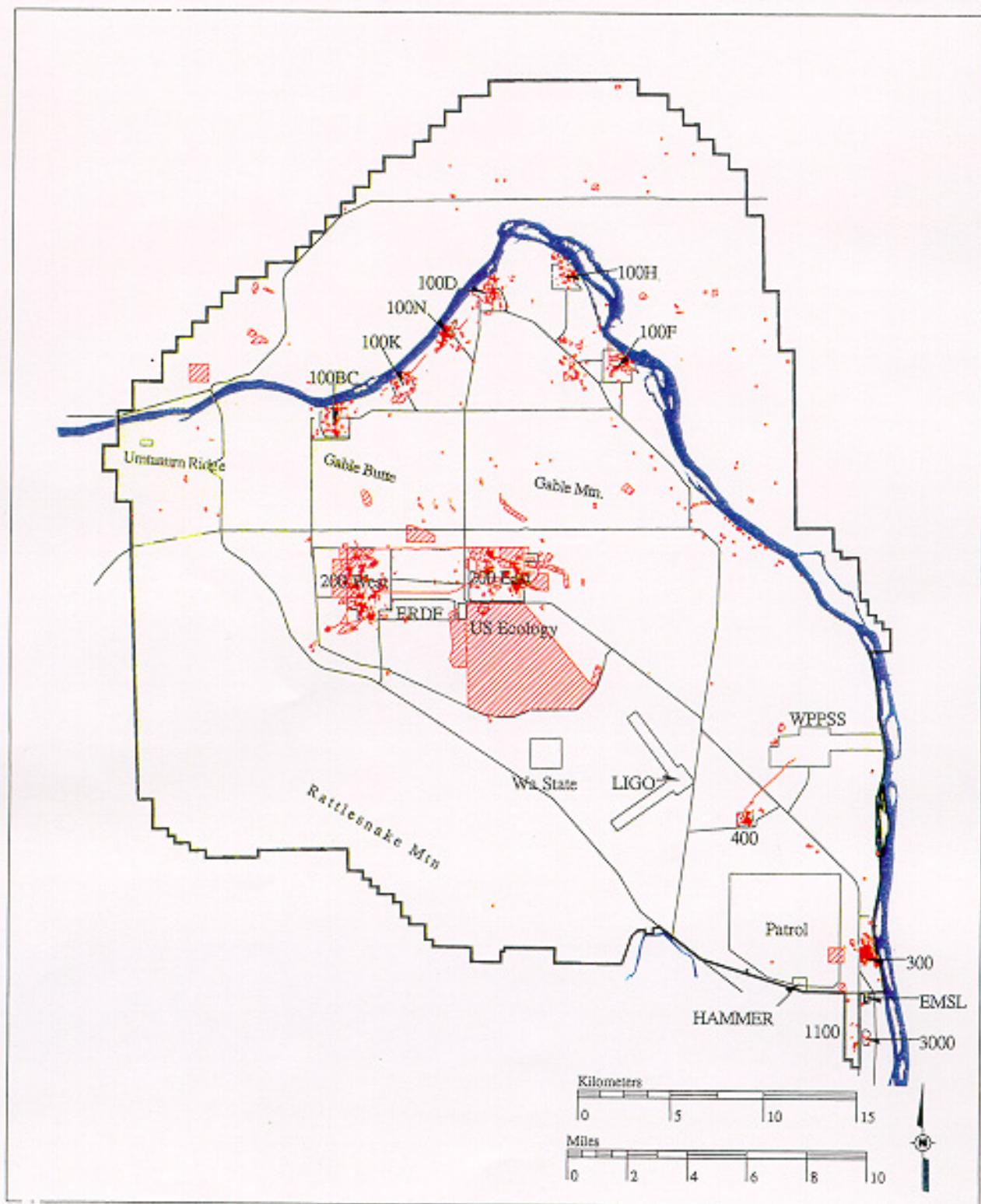
Within the All Other Areas geographic area, the Preferred Alternative would include Industrial, Research and Development, High-Intensity Recreation, Low-Intensity Recreation, Conservation (Mining), and Preservation land-use designations.

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

S3.2.5 Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE Reserve)

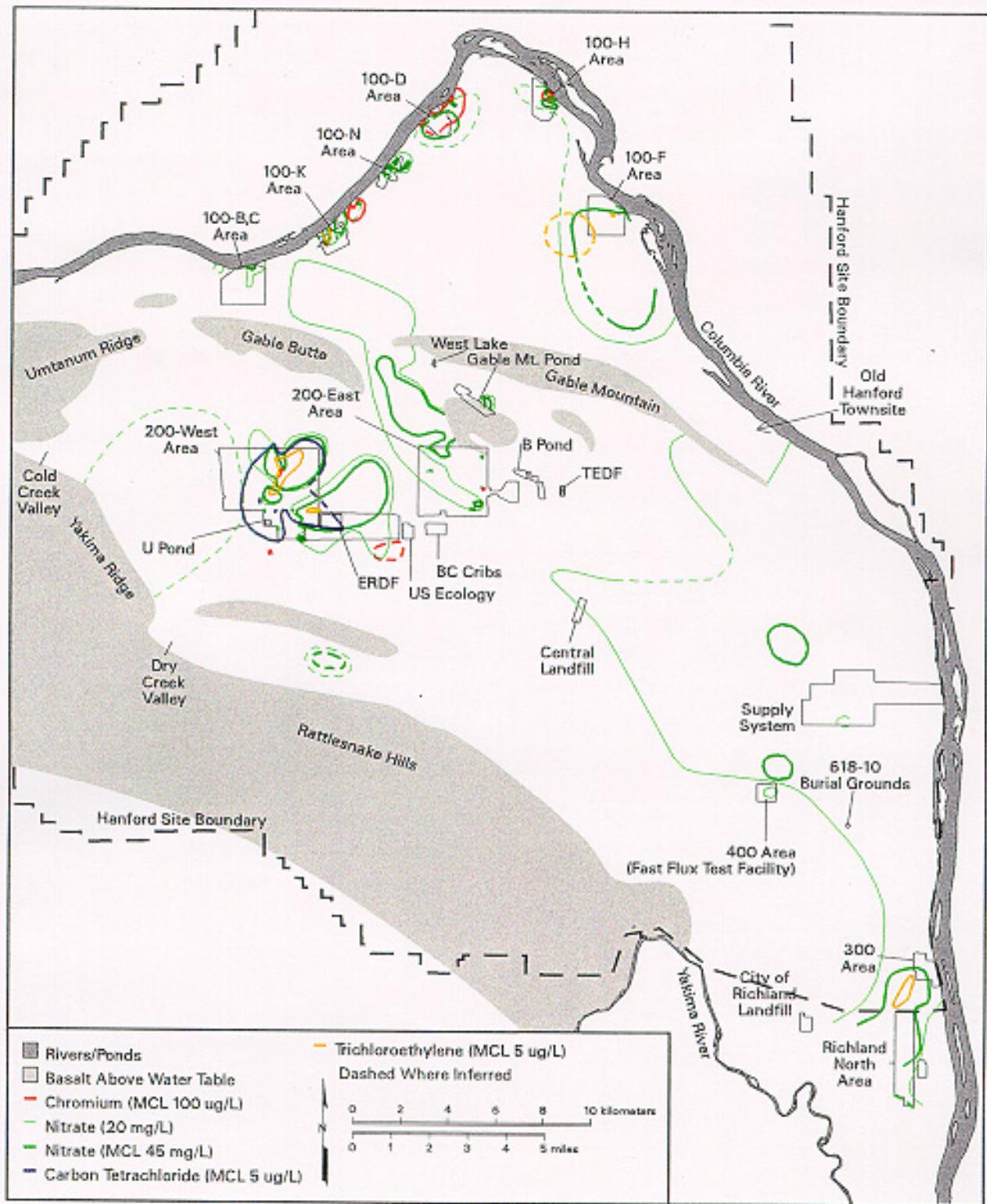
Nearly all of the ALE Reserve geographic area would be designated as Preservation. A portion of the ALE Reserve would be managed as Conservation (Mining) for a basalt and fine soils landfill cover source to support governmental purposes.

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



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1
3
Figure S-5. Distribution of Hazardous Chemicals in
Groundwater within the Hanford Site.



1
3
Figure S-6. Distribution of Radionuclides of Concern in
Groundwater within the Hanford Site.

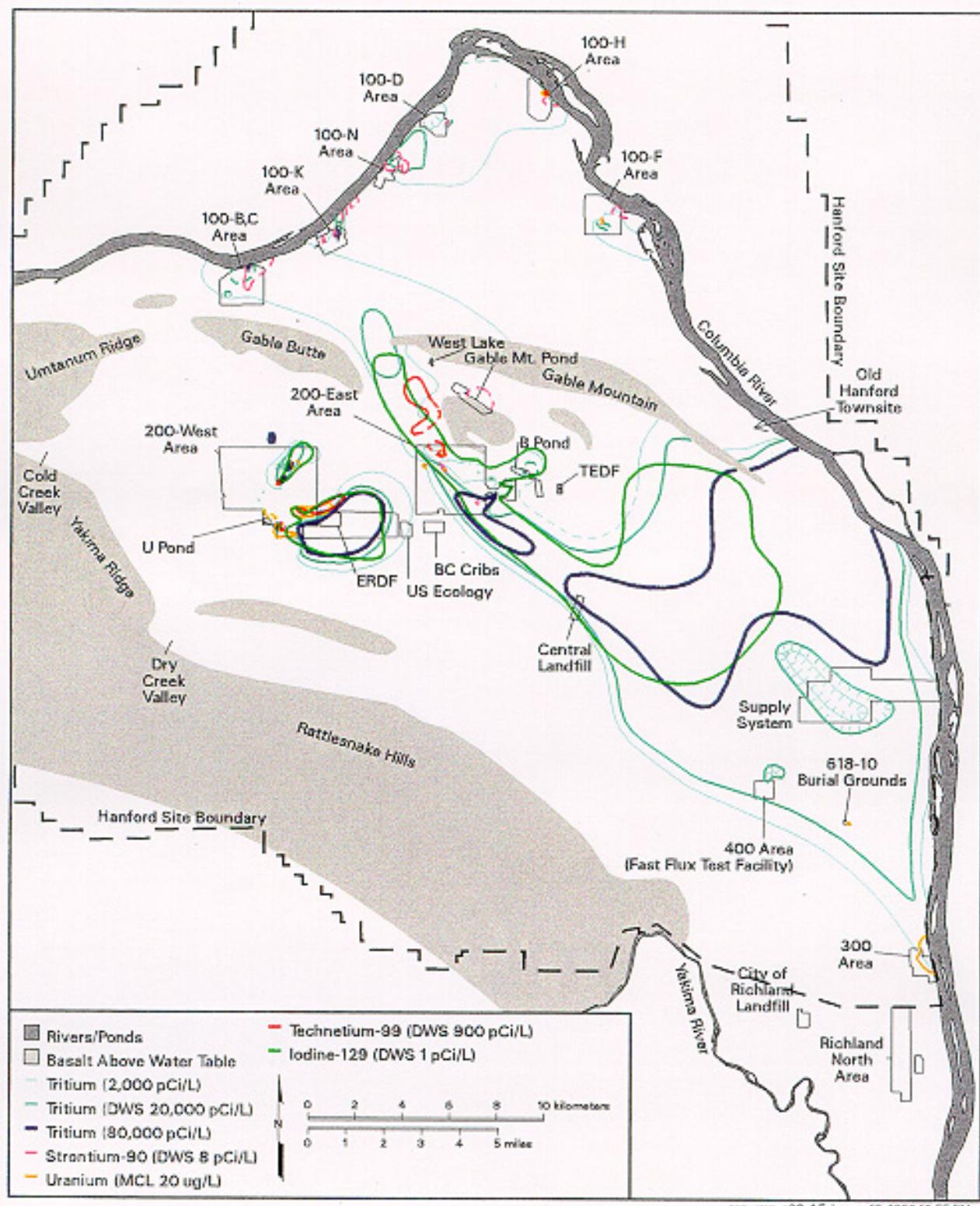
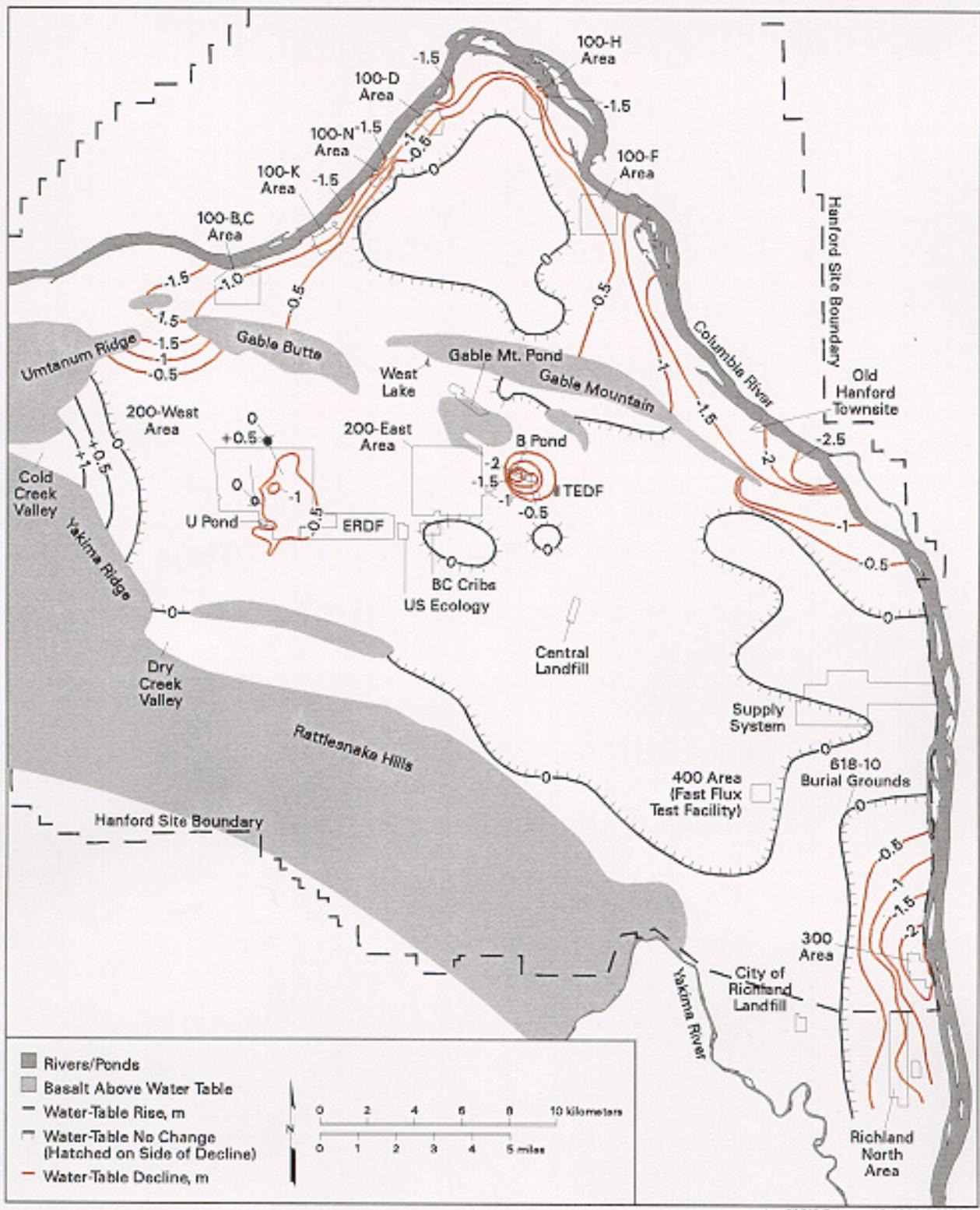
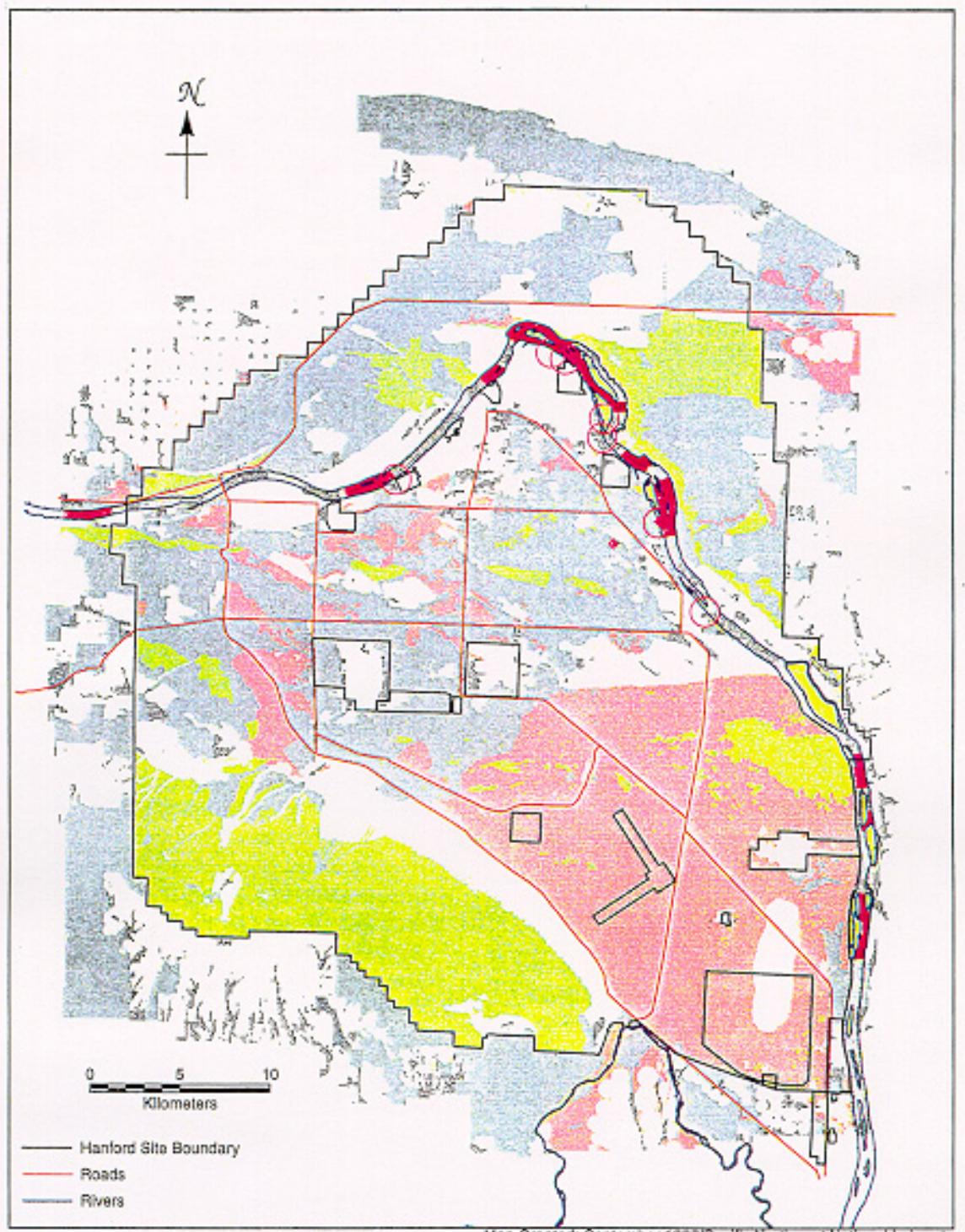


Figure S-7. Watertable Change Map for 1997 - 1998.



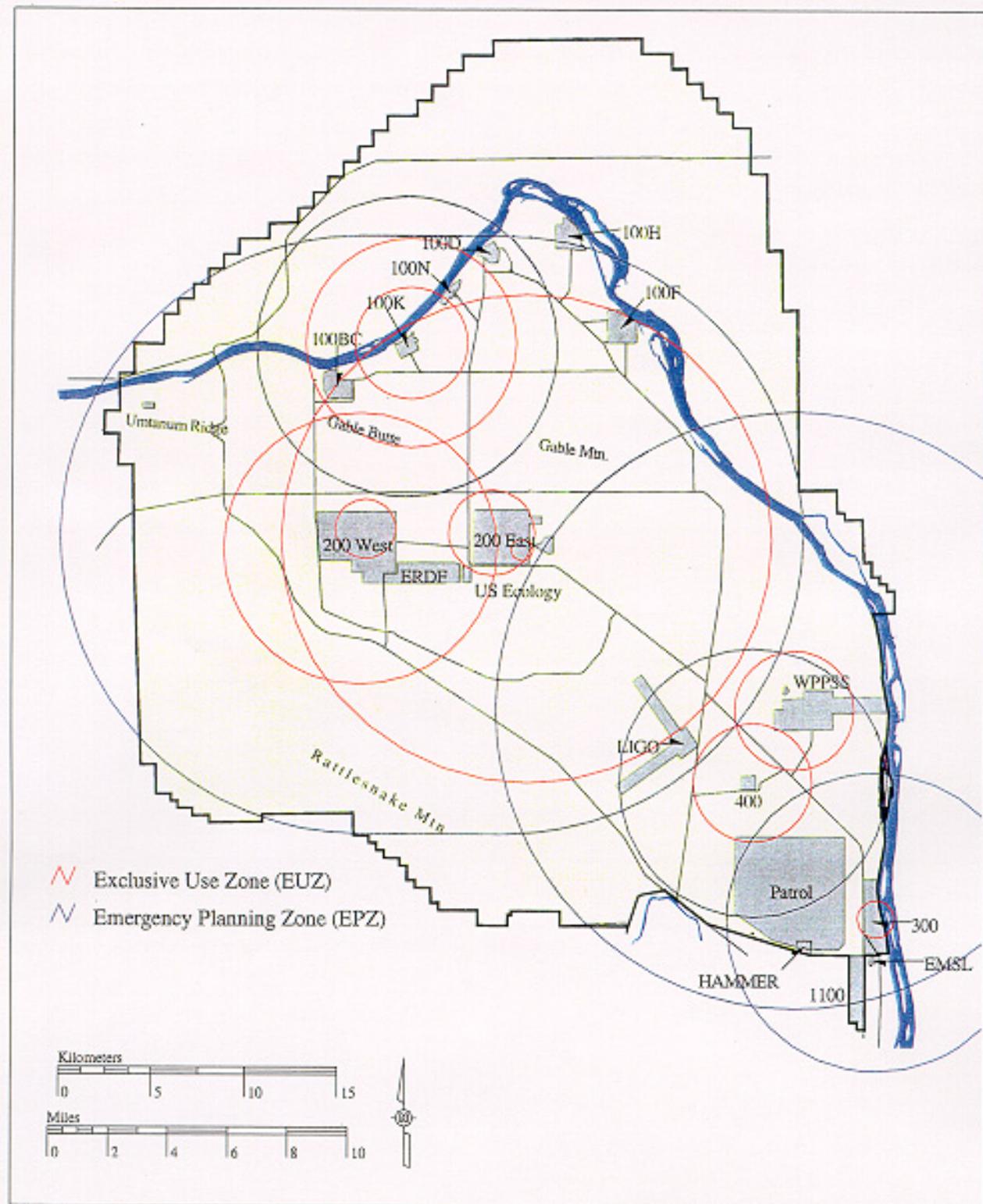
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Figure S-8. Composite Map of Level II, Level III, and
Level IV Biological Resources.



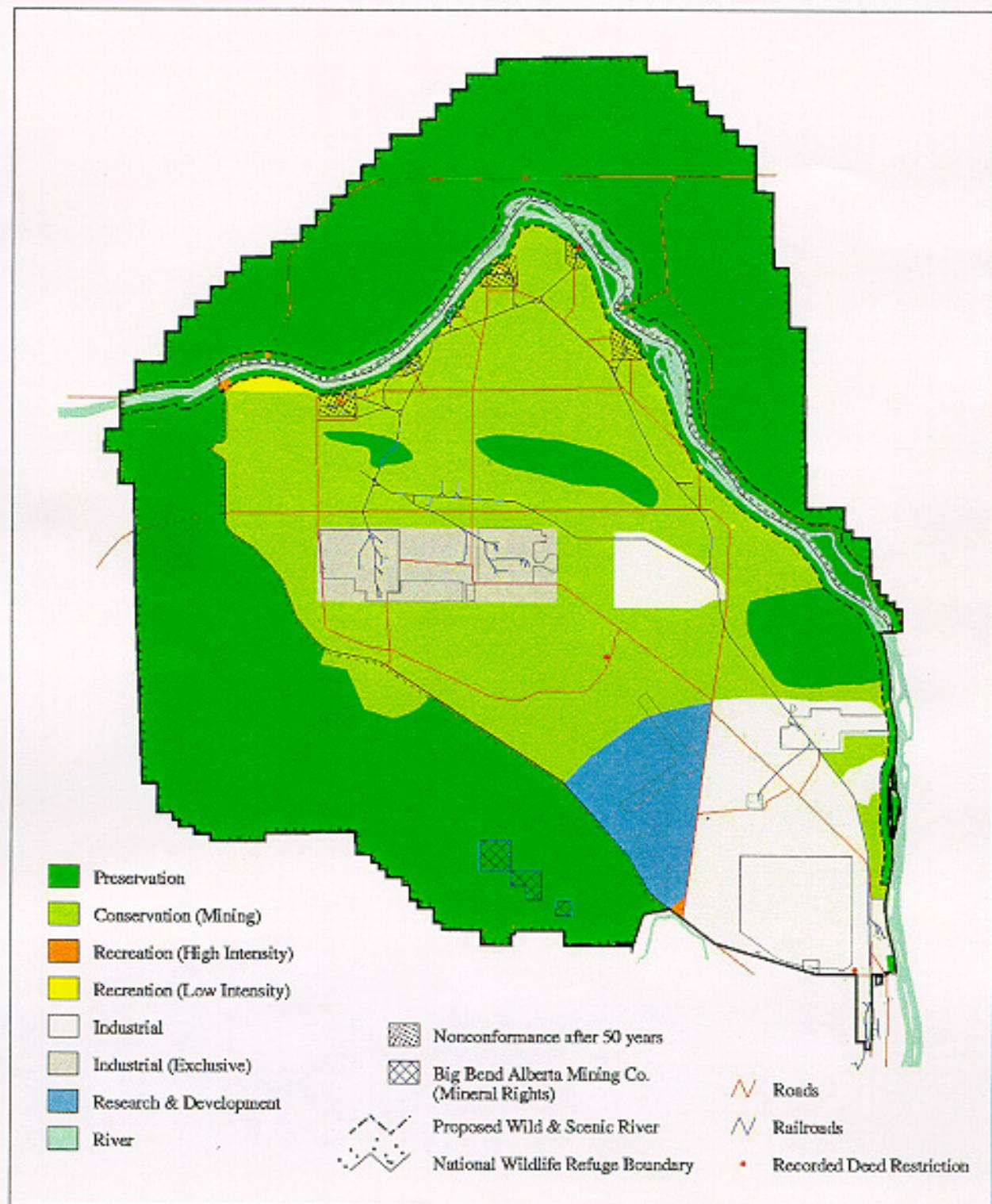
- Level II Resources
- Level III Resources (Species-Based Resources Not Separately Shown)
- Level IV Habitat-Based Resources
- Level IV Species-Based Resources

Figure S-9. Protective Safety Buffer Zones.



BHLpp 04/2296 clups\ari.aml Database: 12-NOV-1998

Figure S-10. DOE's Preferred Alternative.



BHmap 04/23/98 chap/peefak.html Database: 25-AUG-1999

1 **S3.3 Alternative One**

2 Alternative One represents a Federal stewardship role for managing valuable national
3 resources on the Hanford Site. This alternative addresses these national resources
4 (i.e., ecological, historic, cultural, and economic resources) in a regional context, and would be
5 used to enlarge an existing Federal Wildlife Refuge. Alternative One does not provide for as
6 much research and development, or industrial economic development, flexibility as the Preferred
7 Alternative and Alternative Three. Figures S-11 and S-12 show how the Hanford Site has
8 become a regional preserve for shrub-steppe species by presenting the historic and current
9 distributions. Figure S-13 is a map of Alternative One.

10 **S3.3.1 Wahluke Slope**

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

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

27 **S3.3.2 Columbia River Corridor**

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

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

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

1 **S3.3.3 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 would prevent additional sprawl to the west and encourage siting |
8 of new projects between the 200 East and 200 West Areas.
9

10 **S3.3.4 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). This
15 would include transition of existing facilities in the 300 and 400 Areas, and the Energy Northwest
16 site to Industrial, and Research and Development designations. The majority of the non-Federal
17 uses would occur offsite or within a portion of the area identified by the City of Richland's Urban
18 Growth Area (UGA) boundary in the southeast portion of the Site. Wildlife corridors designated as
19 Preservation would be located around this industrial development to allow wildlife movements
20 between the ALE Reserve, the Columbia River, and the Saddle Mountain National Wildlife
21 Refuge. Between the western boundary and State Highway 240, a wildlife corridor would run
22 north from the ALE Reserve to the Columbia River. This northwestern wildlife corridor would
23 include the areas known as McGee Ranch and the Riverlands.
24

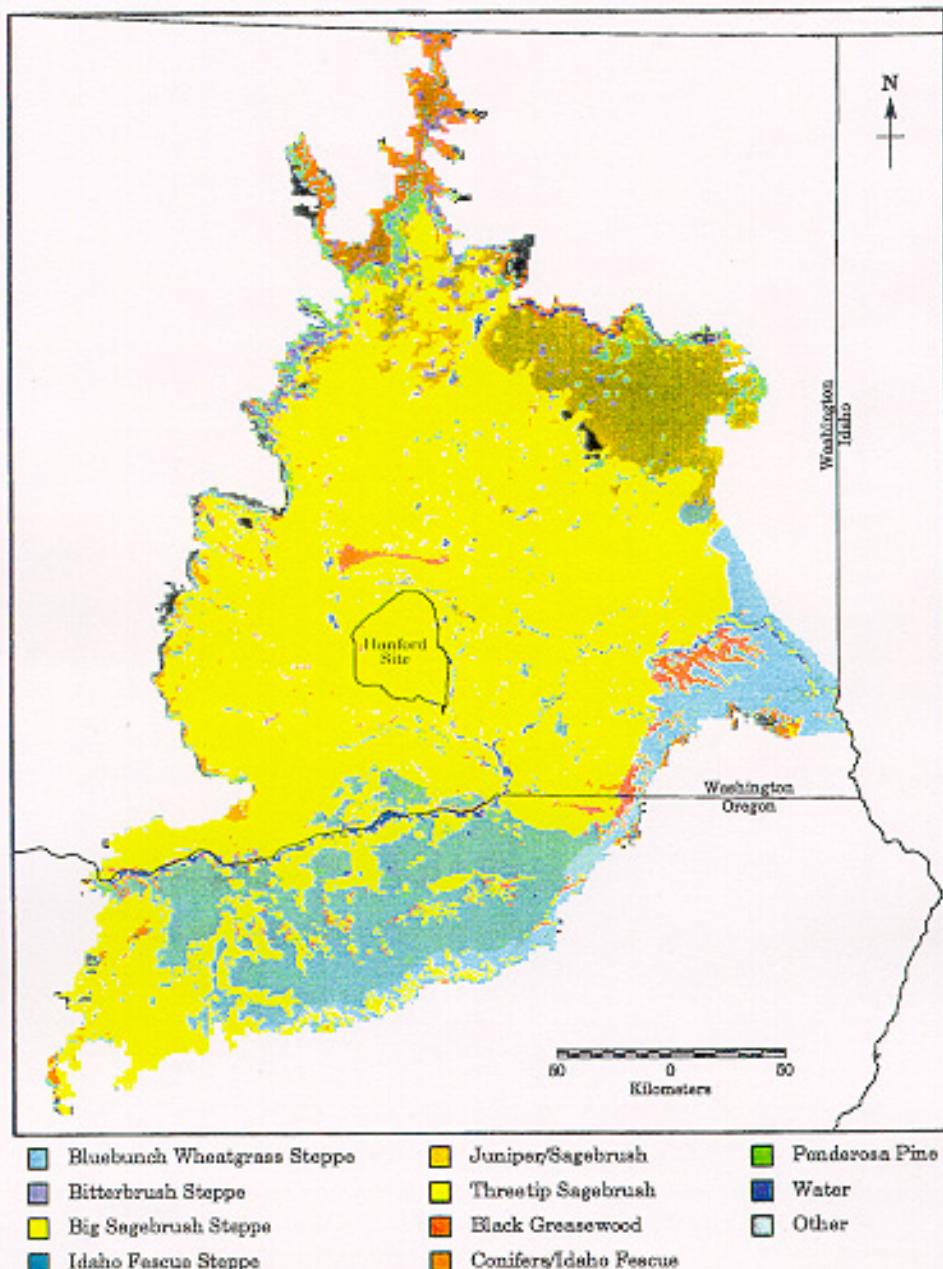
25 Within the southeastern wildlife corridor north of the Yakima River, a small area would be
26 designated Conservation (Mining) to allow potential extraction of geologic materials for use in the
27 200 Areas remedial efforts. Considering this as a quarry site for basalt and soil provides DOE
28 with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

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

41 **S3.3.5 Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE Reserve)**

42
43 The ALE Reserve geographic area would be designated Preservation consistent with the
44 management of the expanded Saddle Mountain National Wildlife Refuge. Preservation and
45 USFWS management of the ALE Reserve as an expansion of the Saddle Mountain National |
46 Wildlife Refuge would protect the rare and high quality shrub-steppe plant communities, and
47 unique and rare fauna that reside on this portion of the Site. Many of these plant communities
48 and fauna are found nowhere else in the state of Washington or in the Columbia Basin ecoregion.
49
50
51

1 ***Figure S-11. Historic Distribution and Extent of Land Cover***
2 ***Classes within a Portion of the Columbia Basin Ecoregion.***



1
3
**Figure S-12. Current Distribution and Extent of Land Cover
Classes within a Portion of the Columbia Basin Ecoregion.**

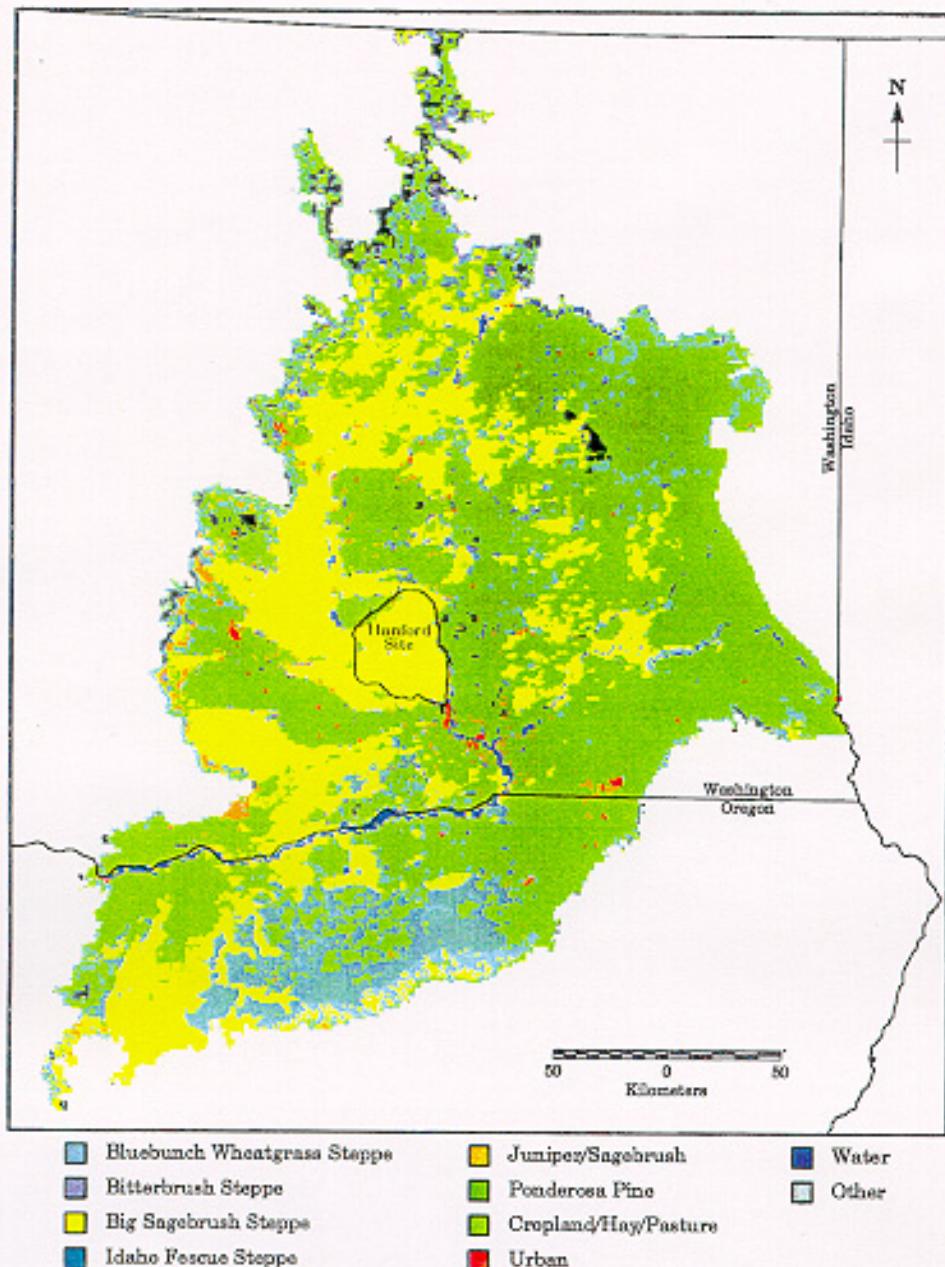
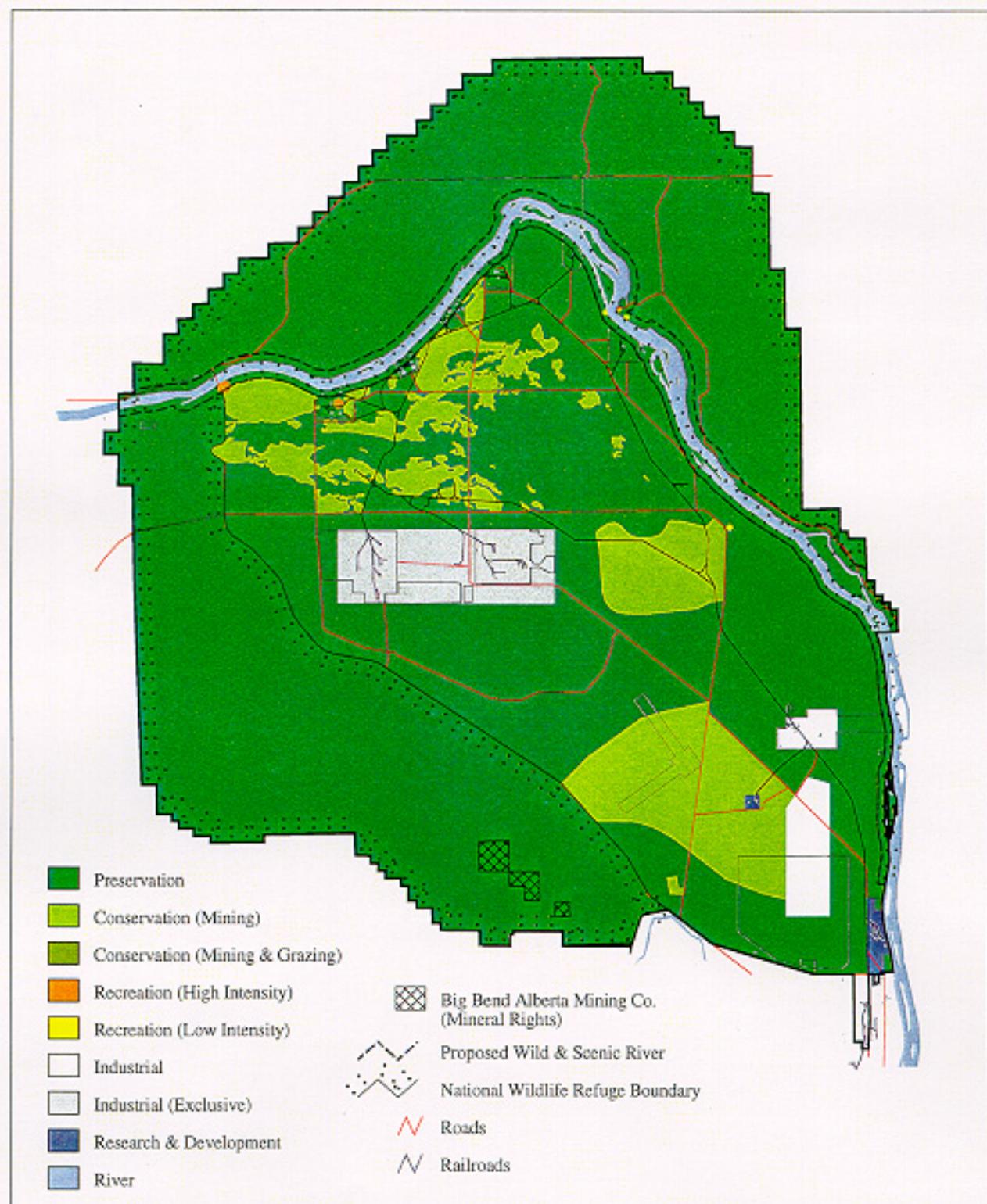


Figure S-13. Alternative One.



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1 **S3.4 Alternative Two**

2
3 Alternative Two presents the vision of the Nez Perce Tribe Department of Environmental
4 Restoration and Waste Management and incorporates the Federal trust responsibility to the
5 Indian Tribes. This vision calls for the preservation of the natural and cultural resources at
6 Hanford. Traditional tribal use is consistent with the Preservation land-use designation. Figure S-
7 14 is a map of Alternative Two.

8
9 **S3.4.1 Wahluke Slope**

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

11
12 **S3.4.2 Columbia River Corridor**

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

21
22 **S3.4.3 Central Plateau**

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

26
27 **S3.4.4 All Other Areas**

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

34
35 **S3.4.5 Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE Reserve)**

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

Figure S-14. Alternative Two.



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1 **S3.5 Alternative Three**

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

- 6
- 7 C Benton County is preparing a comprehensive land-use plan that covers the entire
8 county, which includes a portion of the Hanford Site. As part of its planning effort,
9 Benton County has developed a proposed critical areas map, which depicts lands
10 identified as critical areas under the GMA (Figure S-15). Critical areas include
11 wetlands areas with a critical recharging effect on aquifers used for potable water, fish
12 and wildlife habitat conservation areas, frequently flooded areas, and geologically
13 hazardous areas.
- 14
- 15 C The City of Richland plans in coordination with Benton County under the GMA.
16 Richland is greatly influenced by activities at the Hanford Site and has gone through
17 several boom-and-bust cycles in response to employment levels at Hanford. Land
18 use at Hanford has the potential to affect the economic development of Richland. The
19 city currently provides services such as water, electricity, and sanitary sewers to the
20 southern portion of the Hanford Site. The City of Richland has identified portions of the
21 southern Hanford Site (Figure S-16) suitable for industrial development and possible
22 annexation.
- 23
- 24 C The designations in Franklin County result from a land-use analysis conducted by the
25 Franklin County Planning Department.
- 26
- 27 C The designations in Grant County reflect the Wahluke 2000 Plan prepared by farming
28 interests in 1992 and supported by Grant County (Figure S-17).

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

36 **S3.5.1 Wahluke Slope**

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

43 **S3.5.2 Columbia River Corridor**

44 The Preservation land-use designation would extend 0.4 km (0.25 mi) from the average
45 high-water line of the river. In Franklin and Grant counties, the boundary would extend further
46 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 as
5 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 **S3.5.3 Central Plateau**
9

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

13 **S3.5.4 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-Intensity
22 Recreation, primarily for limited activities such as biking, hiking, fishing, hunting, boat launching
23 facilities, primitive camping, and nature viewing.
24

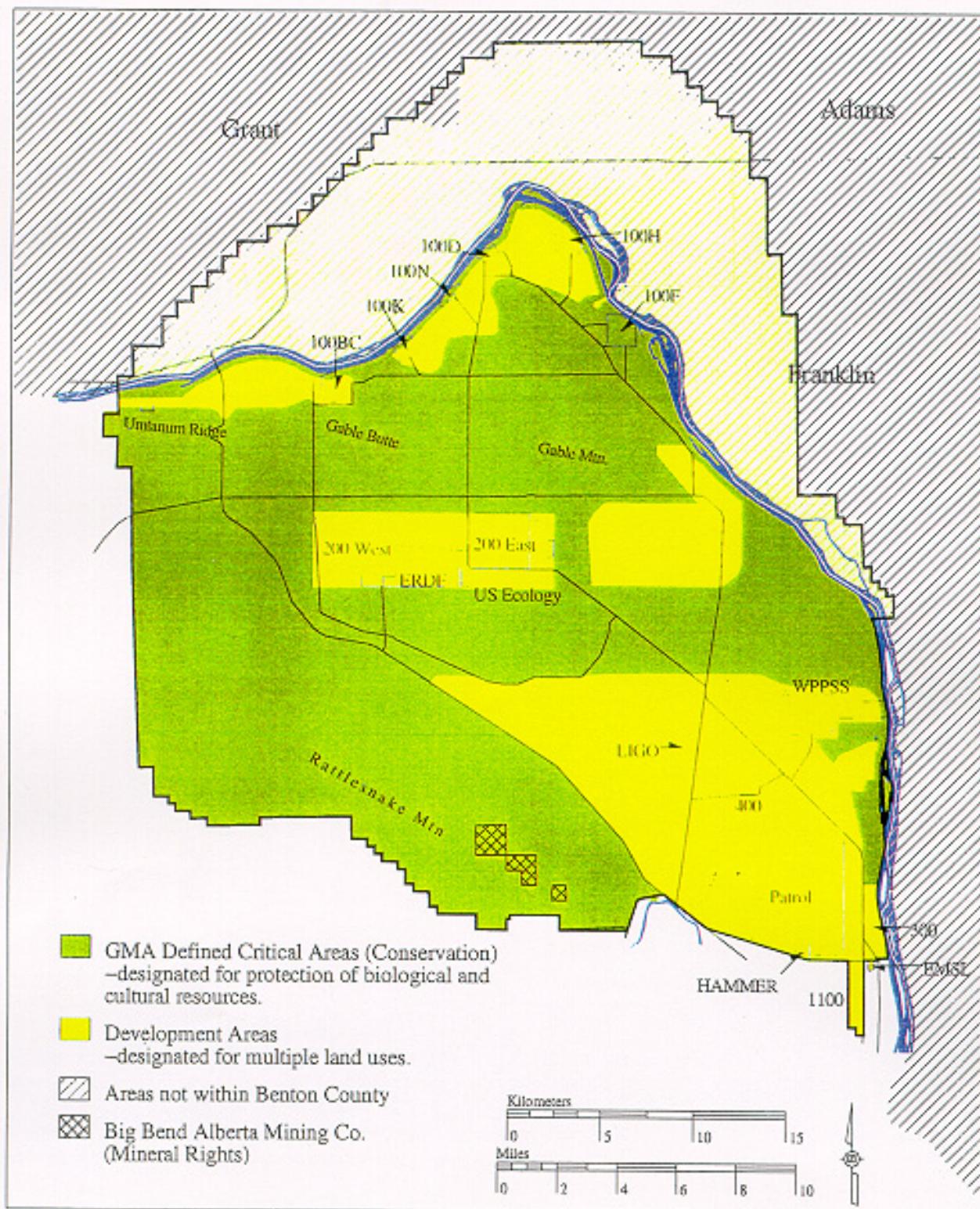
25 Areas north of the City of Richland would be designated as Industrial and Research and
26 Development.
27

28 **S3.5.5 Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE Reserve)**
29

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

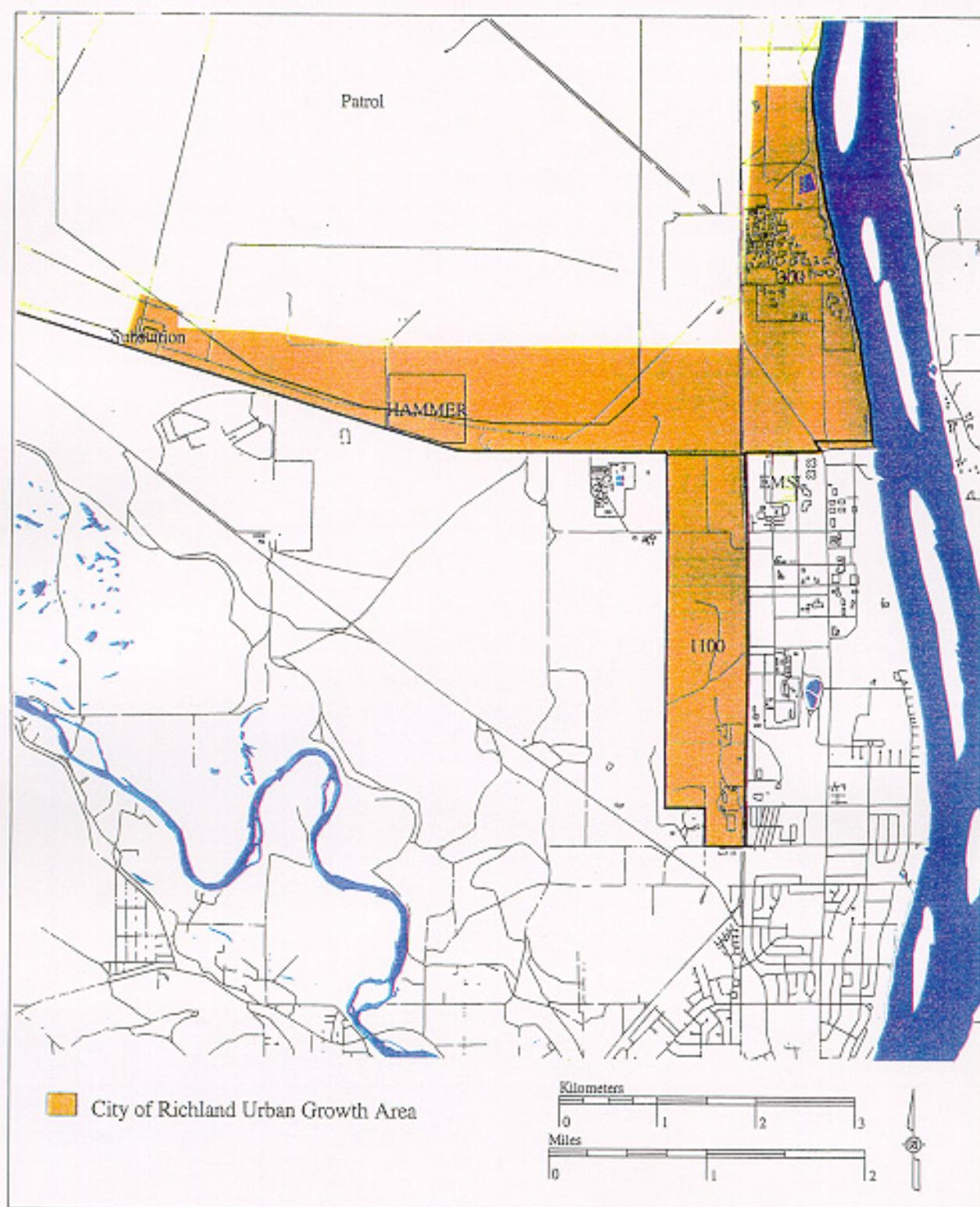
32

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



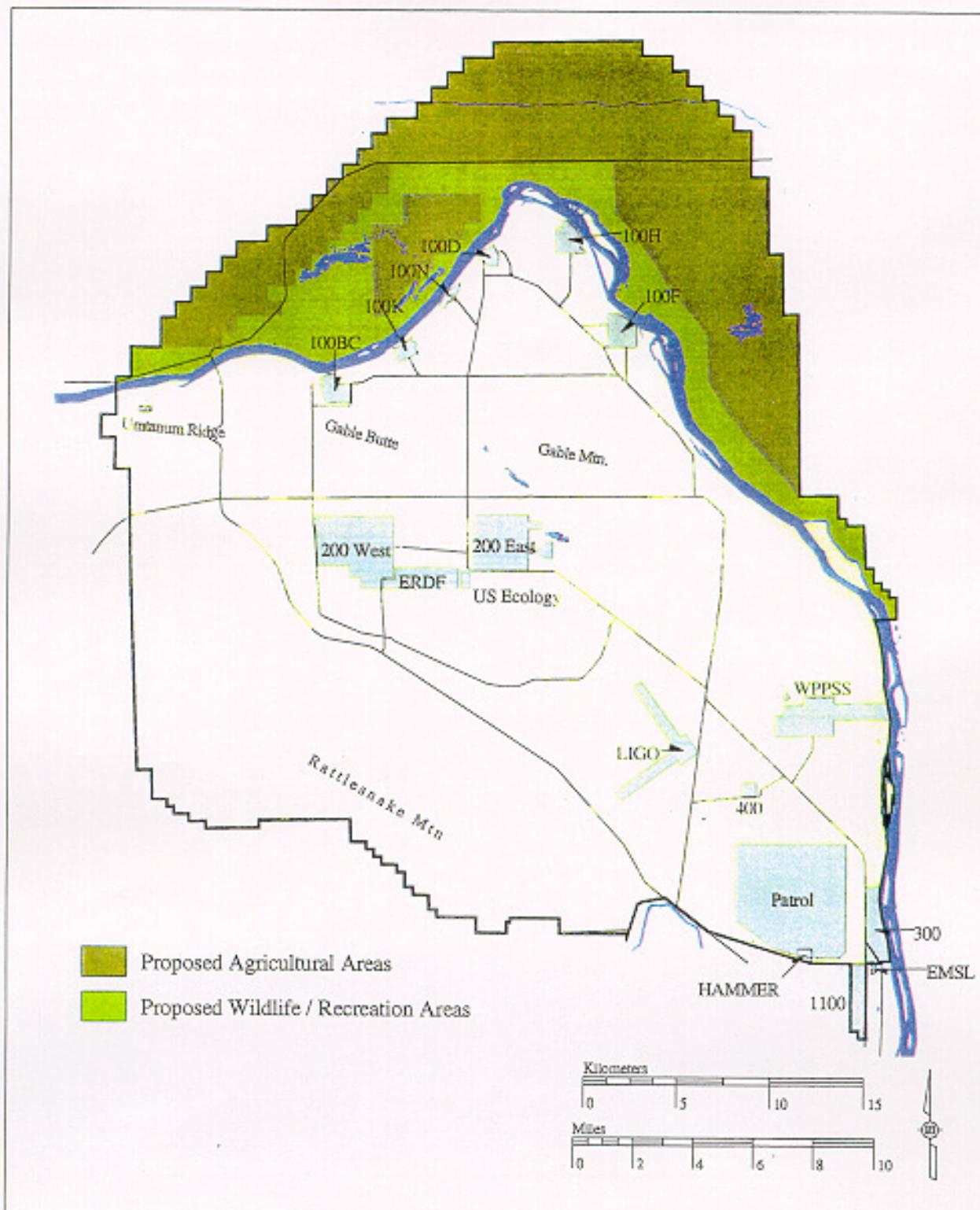
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Figure S-16. City of Richland Urban Growth Area.



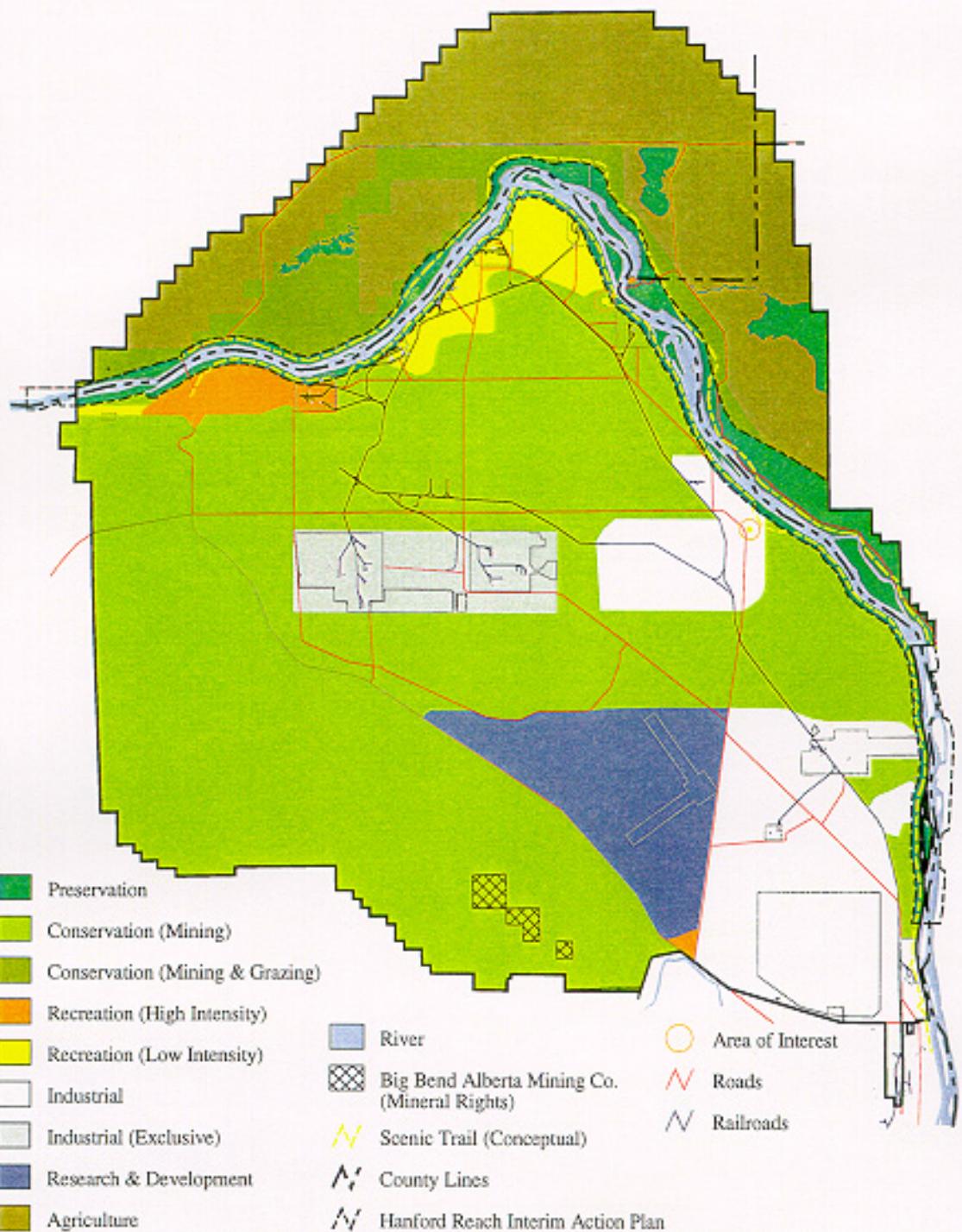
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Figure S-17. Wahluke 2000 Plan Map.



BHapp 01/13/98 draft_2/urban4.uml Database: 03-AUG-1998

Figure S-18. Alternative Three.



BHlpp 04/23/98 clsp/alternativethree3.aml Database: 26-MAR-1999

1 **S3.6 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 and
5 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 Tribal
10 governments) and will be an issue of great importance. Figure S-19 is a map of Alternative Four.

11 **S3.6.1 Wahluke Slope**

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

14 **S3.6.2 Columbia River Corridor**

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

22 **S3.6.3 Central Plateau**

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

26 **S3.6.4 All Other Areas**

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

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

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

40 Alternative Four designates a large area near the Central Plateau and between the
41 Plateau and the southeastern border of the Hanford Site as Conservation (Mining). This area
42 contains large areas of high quality mature sagebrush communities; therefore, DOE would need

1 to make prudent choices regarding the removal of needed material. If these geologic materials
2 are not needed, the land-use designation for this area should revert to Preservation.
3

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

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

12 **S3.6.5 Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE Reserve)**

13

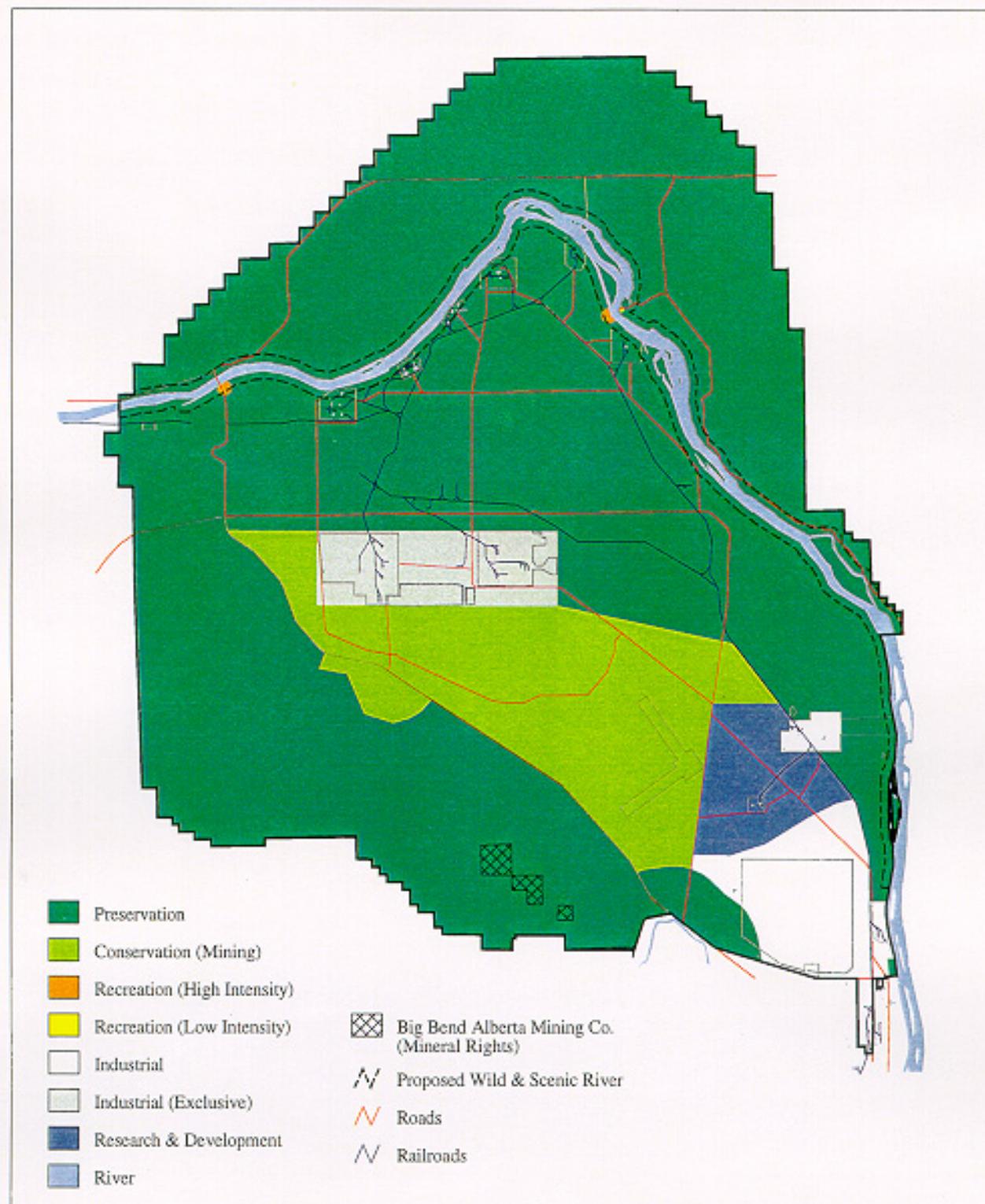
14 Alternative Four would continue to manage the ALE Reserve in a manner consistent with
15 the Preservation designation. The sole exception is an area of the ALE Reserve bordering State
16 Highway 240 near the 200 West Area that would be designated Conservation (Mining). If the site
17 is not used as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

21 **S3.7 Comparisons of Affected Areas by Alternatives**

22

23 Table S-2 shows comparisons of the affected areas by alternative, Table S-3 shows the
24 potential realm of impacts from each of the land-use designations. Table S-6 (immediately
25 following Section S.5.4.4) shows a summary of potential impacts to Hanford Site resources.
26 |

Figure S-19. Alternative Four.



BHapp 04/23/98 cluph/alternative4.aml Database: 23-FEB-1999

1 **Table S-2. Comparisons of Affected Areas by Alternative. (4 pages)**

	No-Action ^a	Preferred Alt.	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Areas in Hectares						
Agriculture	0	0 (0) ^b	0	0	23,951	0
Conservation (Mining and Grazing)	0	0 (43,857) ^b	0	0	6,476	0
Conservation (Mining)	0	44,183 (1,005) ^b	15,921	0	72,685	19,341
Industrial	22,534	15,335 (15,378) ^b	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	78,127 (77,449) ^b	124,517	140,767	9,002	112,321
High-Intensity Recreation	0	125 (82) ^b	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
^cTOTAL	148,080	148,080	148,080	148,080	148,080	148,080

19 ^a The No-Action Alternative does not have land-use designations. It has areas administered similar to land-use designations (see Figure S-3).
20 ^b Areas in Revised Draft EIS.
21 ^c In addition to the 148,080 ha (572 mi²) of land surface areas, this EIS affects 3642.3 ha (14.1 mi²) of surface water, almost all of which is the Columbia River.

Table S-2. Comparisons of Affected Areas by Alternative. (4 pages)

	No-Action ^a	Preferred Alt.	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Areas in Acres						
1	Agriculture	0	0 (0) ^b	0	0	59,184
2	Conservation (Mining and Grazing)	0	0 (108,371) ^b	0	0	16,003
3	Conservation (Mining)	0	109,179 (2,483) ^b	39,342	0	179,609
4	Industrial	55,684	37,894 (38,000) ^b	6,281	4,522	44,133
5	Industrial-Exclusive	12,513	12,323	11,350	11,350	12,513
6	Preservation	114,573	193,056 (191,381) ^b	307,688	347,843	22,244
7	High-Intensity Recreation	0	309 (203) ^b	158	472	4,369
8	Low-Intensity Recreation	2	825	72	0	7,653
9	Research & Development	0	12,138	1,023	1,727	20,206
10	Open Space Reserved	183,142	0	0	0	0
11	^cTOTAL		365,914	365,914	365,914	365,914
12						
13	^a The No-Action Alternative does not have land-use designations. It has areas administered similar to land-use designations (see Figure S-3).					
14	^b Areas in Revised Draft EIS.					
15	^c In addition to the 148,080 ha (572 mi ²) of land surface areas, this EIS affects 3642.3 ha (14.1 mi ²) of surface water, almost all of which is the Columbia River.					
16						

Table S-2. Comparisons of Affected Areas by Alternative. (4 pages)

	No-Action ^a	Preferred Alt.	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Areas in Square Miles						
Agriculture	0	0 (0) ^b	0	0	92	0
Conservation (Mining and Grazing)	0	0 (169) ^b	0	0	25	0
Conservation (Mining)	0	171 (4) ^b	61	0	281	75
Industrial	87	59 (59) ^b	10	7	69	27
Industrial-Exclusive	20	20	18	18	20	20
Preservation	179	302 (299) ^b	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
^cTOTAL	572	572	572	572	572	572

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

^b Areas from Revised Draft EIS.

^c In addition to the 148,080 ha (572 mi²) of land surface areas, this EIS affects 3642.3 ha (14.1 mi²) of surface water, almost all of which is the Columbia River.

Table S-2. Comparisons of Affected Areas by Alternative. (4 pages)

	No-Action ^a	Preferred Alt.	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Percentage of Area						
1	Agriculture	0.00%	0.00% (0.00%) ^b	0.00%	0.00%	16.17%
2	Conservation (Mining and Grazing)	0.00%	0.00% (29.62%) ^b	0.00%	0.00%	4.37%
3	Conservation (Mining)	0.00%	29.84% (0.68%) ^b	10.75%	0.00%	49.08%
4	Industrial	15.22%	10.36% (10.38%) ^b	1.72%	1.41%	12.06%
5	Industrial-Exclusive	3.42%	3.42%	3.10%	3.10%	3.42%
6	Preservation	31.31%	52.76% (52.30%) ^b	84.09%	94.89%	6.08%
7	High-Intensity Recreation	0.00%	0.08% (0.06%) ^b	0.04%	0.13%	1.19%
8	Low-Intensity Recreation	0.00%	0.23%	0.02%	0.00%	2.09%
9	Research & Development	0.00%	3.32%	0.28%	0.47%	5.52%
10	Open Space Reserved	50.05%	0.00%	0.00%	0.00%	0.00%
11	^cTOTAL					
12	100.00%	100.00	100.00	100.00	100.00	100.00
13	^a The No-Action Alternative does not have land-use designations. It has areas administered similar to land-use designations (see Figure S-3).					
14	^b Areas from Revised Draft EIS.					
15	^c In addition to the 148,080 ha (572 mi ²) of land surface areas, this EIS affects 3642.3 ha (14.1 mi ²) of surface water, almost all of which is the Columbia River.					

1
2 **Table S-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
3	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
4	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									
6	Alternative One	Agriculture									
		Development	x	x	x					x	x
		Recreation			x					x	x
		Mining	x								x
		Grazing							x	x	
8	Alternative Two	Agriculture									
		Development			x						
		Recreation			x						
		Mining									
		Grazing								x	x
10	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
12	Alternative Four	Agriculture									
		Development	x	x		x	x			x	x
		Recreation			x			x	x	x	x
		Mining					x				x
		Grazing									

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

16

1 **S4.0 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 1,517 km²
5 (586 mi²) north of the confluence of the Yakima River with the Columbia River. The Columbia
6 River flows through the northern part of the Hanford Site and, turning south, forms part of the
7 Hanford Site's eastern boundary. This section of the Columbia River is known as the Hanford
8 Reach and is the last unimpounded, nontidal segment of the Columbia River in the United States.
9 The Yakima River runs near the southern boundary and joins the Columbia River below the City
10 of Richland, which bounds the Hanford Site on the southeast.

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

22 **S4.1 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
30 atomic bomb.

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

41 **S4.1.1 Wahluke Slope**

42

43 The area north of the Columbia River consists of 357 km² (138 mi²) of relatively
44 undisturbed or recovering shrub-steppe habitat known as the Wahluke Slope. The northwest
45 portion of the area is managed by the USFWS as the Saddle Mountain National Wildlife Refuge
46 under a permit issued by DOE in 1971. The permit conditions require that the refuge remain
47 closed to the public as a protective perimeter surrounding Hanford operations. The closure has
48 benefitted migratory birds, such as curlews, and waterfowl.

49 The Wahluke State Wildlife Recreation Area was established in 1971 in the northeast
50 portion of the Wahluke Slope. This area had been managed by the WDFW. In April 1999, the
51 WDFW and the USFWS notified the DOE of their intent to modify their management
52 responsibilities on the Wahluke Slope under the 1971 agreement leaving only a small portion

(about 324 ha (800 ac)) northwest of the Vernita bridge under WDFW permit. The USFWS informed the DOE that it intends to allow essentially the same uses permitted by the State of Washington under the WDFW's management of the Wahluke Slope. Therefore, transfer of management of the Wahluke Slope from the WDFW to the USFWS involves only a change in the agency managing the property and does not involve any change in the management activities for the Wahluke Slope. Management of the entire Wahluke Slope by the USFWS as an overlay wildlife refuge is consistent with the 1996 DOI Hanford Reach EIS ROD. The ROD recommended the Wahluke Slope be designated a wildlife refuge and the Hanford Reach a Wild and Scenic River, and that the wildlife refuge be managed by the USFWS.

The WDFW had issued a grazing permit for approximately 3,756 ha (9,280 ac) of the Wahluke Wildlife Recreation Area, allowing up to 750 animal-unit-months to graze the parcel. This WDFW grazing lease was allowed to expire on December 31, 1998 but, under SEPA regulations for up to 10 years after the expiration of the lease, the WDFW can reinstate the grazing lease without public review. The WDFW has leased a total of approximately 43 ha (107 ac) on the Wahluke Wildlife Recreation Area for sharecropping. The purpose of the agricultural leases is to produce food and cover for wildlife and to manage the land for continued multi-purpose recreation. The Wahluke Wildlife Recreation Area is open to the public for recreational uses during daylight hours.

The Wahluke Slope once contained small, nonradioactively contaminated sites (landfills). These sites were subject to an Expedited Response Action, and were remediated by DOE in 1997. Although remediation took place, the landfills could still have hazardous materials that would cause injury to trust resources. The DOE is not planning to alter the current land uses of the Wahluke Slope and in order to avoid causing any adverse impacts on the values for which the area is under consideration for Wild and Scenic River or National Wildlife Refuge status (DOI 1996).

S4.1.2 Columbia River Corridor

The 111.6 km² (43.1 mi²) Columbia River Corridor, which is adjacent to and runs through the Hanford Site, is used by the public and Tribes for boating, water skiing, fishing, and hunting of upland game birds and migratory waterfowl. While public access is allowed on certain islands, access to other islands and adjacent areas is restricted because of unique habitats and the presence of cultural resources.

The 100 Areas occupy approximately 68 km² (26 mi²) along the southern shoreline of the Columbia River Corridor. The area contains all of the facilities in the 100 Areas, including nine retired plutonium production reactors, associated facilities, and structures. The primary land uses are reactor decommissioning and undeveloped areas. Future use restrictions have been placed in the vicinity of the 100-H Area, which is associated with the 183-H Solar Evaporation Basins. Additional deed restrictions or covenants for activities that potentially extend beyond 4.6 meters (m) (15 feet [ft]) below ground surface are expected for other CERCLA remediation areas.

The area known as the Hanford Reach includes an average of a 402 m (0.25 mi.) strip of public land on either side of the Columbia River. The Hanford Reach is the last unimpounded, nontidal segment of the Columbia River in the United States. In 1988, Congress passed Public Law 100-605, *Comprehensive River Conservation Study*, which required the Secretary of the Interior to prepare a Comprehensive River Conservation Study (in consultation with the Secretary of Energy) to evaluate the outstanding features of the Hanford Reach and its immediate environment.

1 Alternatives for preserving the outstanding features also were examined, including the
2 designation of the Hanford Reach as part of the National Wild and Scenic Rivers system with the
3 1994 Hanford Reach EIS. In 1996 the DOI made a decision for Congressional consideration in
4 their 1996 Hanford Reach ROD. The ROD recommended that the Hanford Reach be designated
5 a “recreational river” as defined by the *National Wild and Scenic Rivers Act of 1968*. The ROD
6 also recommended that the remainder of the Wahluke Slope be established as a National Fish
7 and Wildlife Refuge. Finally, the ROD recommended that the approximately 728 ha (1,800 ac) of
8 private land located in the Hanford Reach Study Area be included in the recreational river
9 boundary, but not the refuge boundary. The final designation will require Congressional
10 legislation.

11 There were two proposals under consideration in the 105th Congress. The primary
12 differences between the proposals include the extent of the geographic scope (whether the
13 Wahluke Slope is addressed in addition to the river corridor), and the designation of the land
14 manager (i.e., local vs. Federal control). |

15 In addition to the proposed Wild and Scenic legislation, discussions have been held to
16 swap certain parcels of land in the State of Washington from the Secretary of Energy to the
17 Secretary of the Interior, affecting about 197 km² (75 mi²) of the Hanford Site. This swap would
18 consolidate the scattered Benton County portion of Hanford’s BLM Public Domain lands, into an
19 area beginning near 100-D, running south and east along the Columbia River shore, to just north
20 of Energy Northwest (formerly WPPSS) and then west to Gable Mountain. As long as these
21 lands are needed (i.e., still withdrawn from BLM by DOE), this legislative action would not affect
22 DOE’s administration of the areas involved. The DOE use of withdrawn BLM Public Domain
23 lands is consistent with most land-use designations with the exceptions of Industrial Exclusive,
24 Research and Development, or Industrial designations where BLM’s multiple-use mandate would
25 be limited by an extensive infrastructure.

26 **S4.1.3 Central Plateau**

27 The 200 East and 200 West Areas occupy approximately 51 km² (19.5 mi²). Facilities
28 located in the Central Plateau were built to process irradiated fuel from the production reactors.
29 The operation of these facilities resulted in the storage, disposal, and unplanned release of
30 radioactive and nonradioactive waste. The primary land uses are waste operations and
31 operations support. Deed restrictions or covenants for activities that potentially may extend
32 beyond 4.6 m (15 ft) below ground surface are expected for CERCLA remediation areas in the
33 Central Plateau geographic area.

34 In 1964, a 410 ha (1,000 ac) tract was leased to the State of Washington to promote
35 nuclear-related development. A commercial low-level radioactive waste disposal facility, run by
36 U.S. Ecology, Inc., currently operates on 41 ha (100 ac) of the leasehold. The rest of the
37 leasehold was not used by the State, and this portion of the leasehold recently reverted to DOE.
38 The DOE constructed the Environmental Restoration Disposal Facility (ERDF) on this tract. The
39 ERDF is operated on the Central Plateau to provide disposal capacity for environmental
40 remediation waste (e.g., low-level, mixed low-level, and dangerous wastes) generated during
41 remediation of the 100, 200, and 300 Areas of the Hanford Site. The facility is currently about
42 65 ha (160 ac) and can be expanded up to 414 ha (1.6 mi²) if additional waste disposal capacity
43 is required.

44 **S4.1.4 All Other Areas**

45 The All Other Areas geographic area is 689 km² (266 mi²) and contains the 300, 400, and
46 1100 Areas; Energy Northwest (formerly WPPSS facilities); and a section of land currently owned
47 by the State of Washington. The DOE prepared an Environmental Assessment (EA) that

1 resulted in a finding of no significant impact on August 27, 1998 for the transfer of the 1100 Area
2 and the Southern rail connection to the Port of Benton (DOE/RL EA-1260). Although the 1100
3 Area is no longer under DOE control, it is included in this EIS to support the local governments
4 with their SEPA EIS analyses of the Hanford sub-area of Benton County under the State of
5 Washington's Growth Management Act.

7 The Port of Benton officially took ownership and control of the "1100 Area" (consisting of
8 786 acres, 26 buildings, and 16 miles of rail tract) on October 1, 1998. The Port is studying the
9 feasibility of reconnecting the Hanford main rail line to Ellensburg, WA (as it was in the 1970s), as
10 an alternative route for Yakima Valley rail traffic flowing between the Puget Sound and the Tri-
11 Cities. Specifically, the Port has expressed a desire to use the Hanford rail system and extend
12 the current system upriver where there is currently only an abandoned railroad grade.

14 Provisions for the reconnection would be made in DOE's permit to the USFWS for
15 management of the Riverlands. The DOE's Preferred Alternative would not hinder the rail option
16 because it would be considered a pre-existing, nonconforming use (see Chapter 6). At this time,
17 DOE has no plans to maintain the northern portions of the existing rail line.

19 The 300 Area, located just north of the City of Richland, covers 1.5 km² (0.6 mi²) and is
20 used for research and technology development facilities. The 400 Area, located southeast of the
21 200 East Area, is the site of the Fast Flux Test Facility (FFTF). The FFTF is a 400 megawatt
22 thermal, liquid metal (sodium-cooled) nuclear research test reactor that was constructed in the
23 late 1970s and operated from 1982 to 1992. The Secretary decided, on August 18, 1999, that the
24 DOE would conduct a programmatic *National Environmental Policy Act* (NEPA) review, including
25 an Environmental Impact Statement (EIS), evaluating the potential environmental impacts
26 associated with proposed expansion of infrastructure, including the possible role of the FFTF, for
27 civilian nuclear energy research and development activities; production of isotopes for medical,
28 research, and industrial uses; and production of plutonium-238 for use in advanced radioisotope
29 power systems for future National Aeronautic and Space Administration (NASA) space missions.
30

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

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

47 **S4.1.5 Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE Reserve)**

49 The Fitzner/Eberhardt Arid Lands Ecology Reserve (also designated the Rattlesnake Hills
50 Research Natural Area, or the ALE Reserve) encompasses 308.7 km² (119.2 mi²) in the
51 southwestern portion of the Hanford Site and is managed as a habitat and wildlife reserve and
52 environmental research center. A Research Natural Area is a classification used by Federal land
53 management agencies to designate lands on which various natural features are preserved in an

1 undisturbed state solely for research and educational purposes. The ALE Reserve remains the
2 largest Research Natural Area in the State of Washington.

3
4 The mineral rights to a 518 ha (1,280 ac) area on the ALE Reserve are owned by a private
5 company. The company has been free to enter this area and explore for oil or gas since 1977.
6

7 Because public access to the ALE Reserve has been restricted since 1943, the shrub-
8 steppe habitat is virtually undisturbed and is part of a much larger Hanford tract of shrub-steppe
9 vegetation. This geographic area contained a number of small contaminated sites that were
10 remediated in 1994 and 1995 and have been revegetated. There are two landfills on the ALE
11 Reserve, at least one of which was used for disposal of a nonradioactive hazardous waste.
12 Although remediated, one of the landfills may still have hazardous materials that could cause
13 injury to trust resources.
14

15 In 1997, DOE granted a permit and entered into an agreement with USFWS to manage
16 the ALE Reserve consistently with the existing ALE Facility Management Plan. Under this
17 framework, the USFWS is preparing a CCP pursuant to the *National Wildlife Refuge System*
18 *Improvement Act of 1997* to identify refuge management actions and to bring the ALE into the
19 National Wildlife Refuge System.
20
21

22 **S4.2 Hanford Site Land Ownership**

23

24 The Hanford Site land holdings consist of three different real property classifications:
25 (1) lands acquired in fee by DOE or its predecessor agencies, (2) BLM Public Domain lands
26 withdrawn from the Public Domain for use as part of the Hanford Site, and (3) lands the BoR has
27 withdrawn from the Public Domain or acquired in fee as part of the Columbia Basin Project
28 (Figure S-20). All lands in the Hanford area were ceded to the United States by the Treaties of
29 1855 (Appendix A), and these treaties contain reserved rights for perpetuity. All Federal agencies
30 and projects, including the BoR and BLM, have a Federal trust responsibility to protect the rights
31 of the Indian Tribes.
32

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

46 The BoR continues to retain an interest in the ultimate development of the irrigable lands
47 within the Wahluke Slope as part of the Columbia Basin Project. The interest of the BoR pertains
48 not only to irrigation development, but also to other project purposes (e.g., fish and wildlife
49 protection) and to resource management and environmental concerns. The BoR maintains that
50 the agreement with the AEC assures return of the lands when the lands are no longer necessary
51 to support DOE's mission for the Hanford Site. Furthermore, the BoR would not concur with any
52 change in the present use of the lands until technical and environmental studies were completed.
53

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

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

S4.3 Geological and Soil Resources

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

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

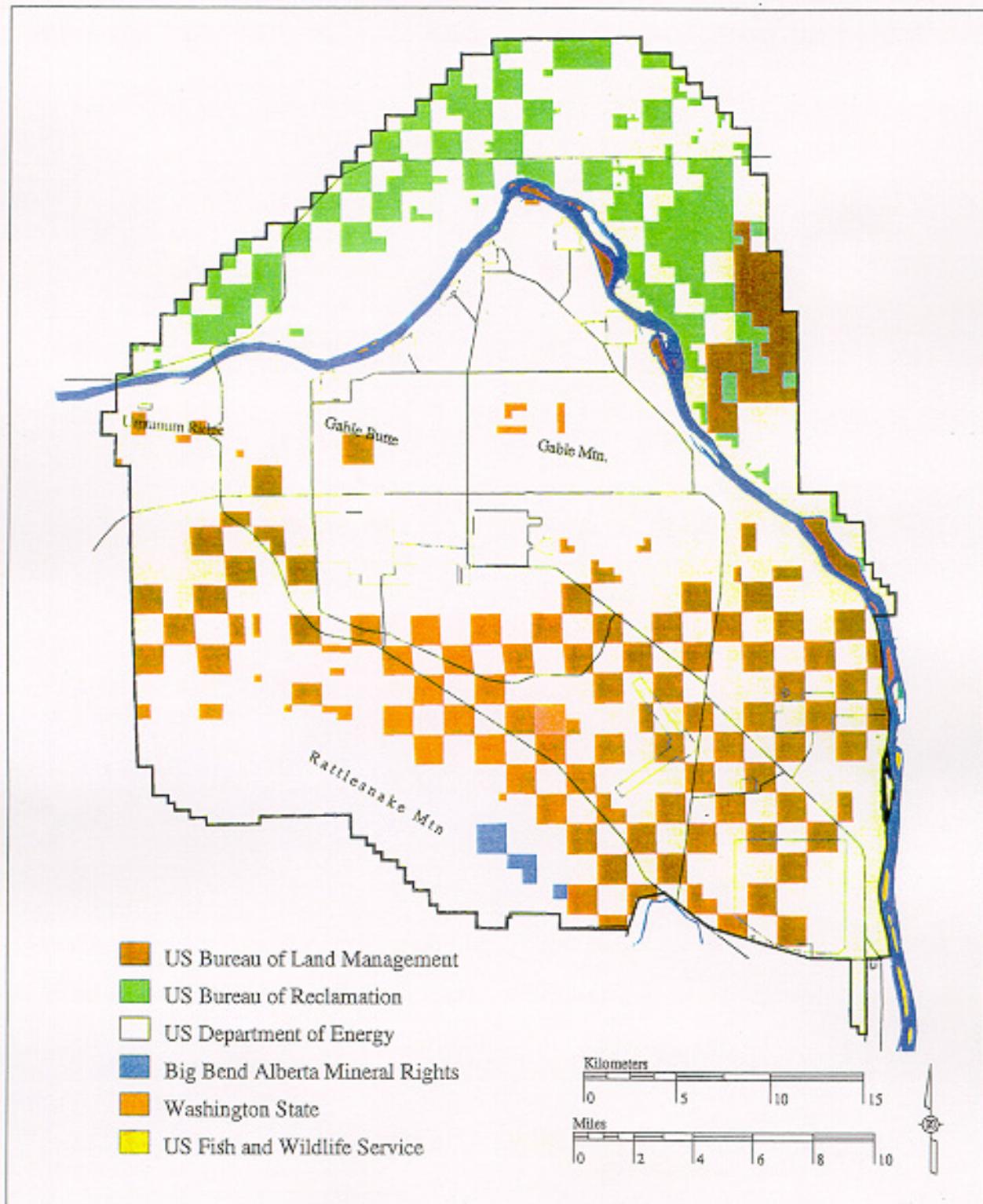
Natural gas was discovered on Rattlesnake Mountain in 1913. The small, shallow field was developed in 1929 and produced natural gas until the field was closed in 1941. The mineral rights to a 518 ha (1,280 ac) area of the ALE Reserve are still owned by a private company.

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

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

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

Figure S-20. Hanford Site Land Ownership.



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1 **S4.4 Water Resources**

2

3 Primary surface-water features associated with the Hanford Site are the Columbia and
4 Yakima Rivers. In addition, several surface ponds and ditches are associated with Hanford Site
5 operation (Figure S-22). Several springs are found on the slopes of the Rattlesnake Hills along
6 the western edge of the Hanford Site. Rattlesnake and Snively Springs form small surface
7 streams. Water discharged from Rattlesnake Springs flows down Dry Creek for about 3 km
8 (1.9 mi) before disappearing into the ground. Cold Creek and its tributary, Dry Creek, are
9 ephemeral streams within the Yakima River drainage system in the southwestern portion of the
10 Hanford Site.

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

18 Flow along the Hanford Reach is controlled by the Priest Rapids Dam. The likelihood of
19 recurrence of large-scale flooding has been reduced by the construction of flood control and
20 water storage dams upstream of the Hanford Site (Figure S-24). Artificial wetlands (caused by
21 irrigation water) exist on the Wahluke Slope. The State of Washington has classified the stretch
22 of the Columbia River from Grand Coulee to the Washington-Oregon border, which includes the
23 Hanford Reach, as Class A, Excellent. Class A waters are to be suitable for essentially all uses,
24 including raw drinking water, recreation, and wildlife habitat. Potential well head protection areas
25 would be associated with areas of high recharge potential (Figure S-25). State and Federal
26 Drinking Water Standards apply to the Columbia River and are currently being met. Radionuclide
27 concentrations in the Columbia River are well below drinking water standards at all monitoring
28 locations.

29 Groundwater beneath large areas of the Hanford Site has been impacted by radiological
30 and chemical contaminants resulting from past Hanford Site operations. These contaminants
31 were primarily introduced through wastewater discharged to cribs, ditches, trenches, and ponds.
32 Contaminants from spills, injection wells, and leaking waste tanks have also impacted
33 groundwater in some areas. Groundwater contamination is being actively remediated in several
34 areas through pump and treat operations.

35 In addition to contaminants within the aquifer, there are contaminants within the vadose
36 zone beneath waste sites, which have a potential to move downward into the aquifer. The rate of
37 movement of contamination through the vadose zone depends on contaminant and soil
38 chemistry, stratigraphy, and infiltration of recharge. Vadose zone contamination is being
39 remediated in selected areas through excavation and disposal of shallow contaminated
40 sediments in the 100 areas and vapor extraction for carbon tetrachloride found in the
41 200 West Area.

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

45 The Hanford Site and the Department of Defense Yakima Training Center (located to the
46 west of the Hanford Site) contain the largest remaining remnant of shrub-steppe vegetation in the
47 Columbia Basin. Washington State is rapidly losing shrub-steppe habitat. The State of

1 Washington has designated shrub-steppe habitat as priority habitat because shrub-steppe areas
2 possess unique or significant value to many species. The DOI National Biological Service
3 identifies native shrub and grassland steppe in Washington and Oregon as endangered
4 ecosystem (with an 85 to 98 percent decline). The ALE Reserve supports one of the largest
5 remnants of relatively undisturbed shrub-steppe ecosystem in the State of Washington.

6 Elk first appeared on the Hanford Site in 1972 and have increased from approximately 8
7 animals in 1975 to a herd of approximately 800 present today on the ALE Reserve and on private
8 lands that adjoin the reserve to the north and west. The elk are occasionally seen on the 200
9 Area Plateau and have been sighted at the White Bluffs boat launch. The herd tends to
10 congregate on ALE in the winter and disperses during the summer months onto the Site proper,
11 private land to the west of ALE, and the Yakima Firing Center.
12

14 **S4.5 Air Resources**

15 The Hanford Site climate is semiarid with an average annual precipitation of 16 cm
16 (6.3 in). Summers are warm and dry with abundant sunshine. Prevailing wind directions on the
17 200 Area Plateau are from the northwest during all months of the year. Regional air quality is
18 generally good. Phenomena causing restrictions to visibility (i.e., visibility \leq 9.6 km [6 mi.]) include
19 dust, blowing dust, and smoke from field burning. Particulate standards have been exceeded 20
20 times in the last 10 years due to blowing dust.
21

23 **S4.6 Biological Resources**

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.
27

28 The WDFW identifies priority habitats and priority species within Washington State
29 (Figures S-26, S-27, and S-28). Because biological resources are temporal, they may not be
30 found in the same place from year to year or require the same mitigation steps at different times
31 of the year. Also, because many of the siting data used to develop these maps were obtained
32 from incidental sightings (i.e., driving [road] surveys) as opposed to thorough surveying, areas
33 with no record sighting are not necessarily devoid of the species. For these reasons, biological
34 resources are generally inventoried prior to the undertaking of specific projects.
35

36 The block of habitat directly south of the 200 East and West Areas contains high quality
37 habitat and some of the Hanford Site's best sage sparrow and loggerhead shrike habitat.
38 However, since some of these areas have never been officially surveyed for these species, the
39 species frequently do not show up on maps even though they most likely occur there.
40

41 Counties and cities may use information prepared by the WDFW to classify and
42 designate locally important habitats and species. While these priorities are those of the
43 Department, they and the data on which they are based may be considered by counties and
44 cities when developing their land-use plans under the GMA.
45

46 The Hanford Site is a relatively large, mostly undisturbed area of shrub-steppe habitat
47 containing numerous plant and animal species adapted to the semiarid environment of the region
48 characterized as a shrub-steppe ecosystem. In the early 1800s, the dominant plant in the area
49 was big sagebrush with an understory of perennial bunchgrasses, especially Sandberg's
50 bluegrass and bluebunch wheatgrass. With the advent of settlement that brought increased
51 livestock grazing and crop raising, the natural vegetation has been invaded by non-native annual
52 species, especially cheatgrass. The dryland areas of the Hanford Site were treeless in the years
53

1 before land settlement; however, trees were planted and irrigated on most of the farms to provide
2 windbreaks and shade. Some of the trees died when the farms were abandoned in 1943. Today
3 these trees serve as nesting platforms for several species of birds (e.g., hawks, owls, ravens,
4 magpies, and great blue herons), and as night roosts for wintering bald eagles.
5

6 Several large portions of the Hanford Site are administered in a manner to protect and
7 preserve biological resources, such as the ALE Reserve and the Wahluke Slope. The ALE
8 Reserve has been used for ecological research dating back to 1952. As a result of a Federal
9 interagency cooperative agreement, the ALE Reserve was designated as the Rattlesnake Hills
10 Research Natural Area in 1971 and is now managed by the USFWS under a 1998 DOE permit.
11 The ALE Reserve is a protected environmental and valuable ecological study site.
12

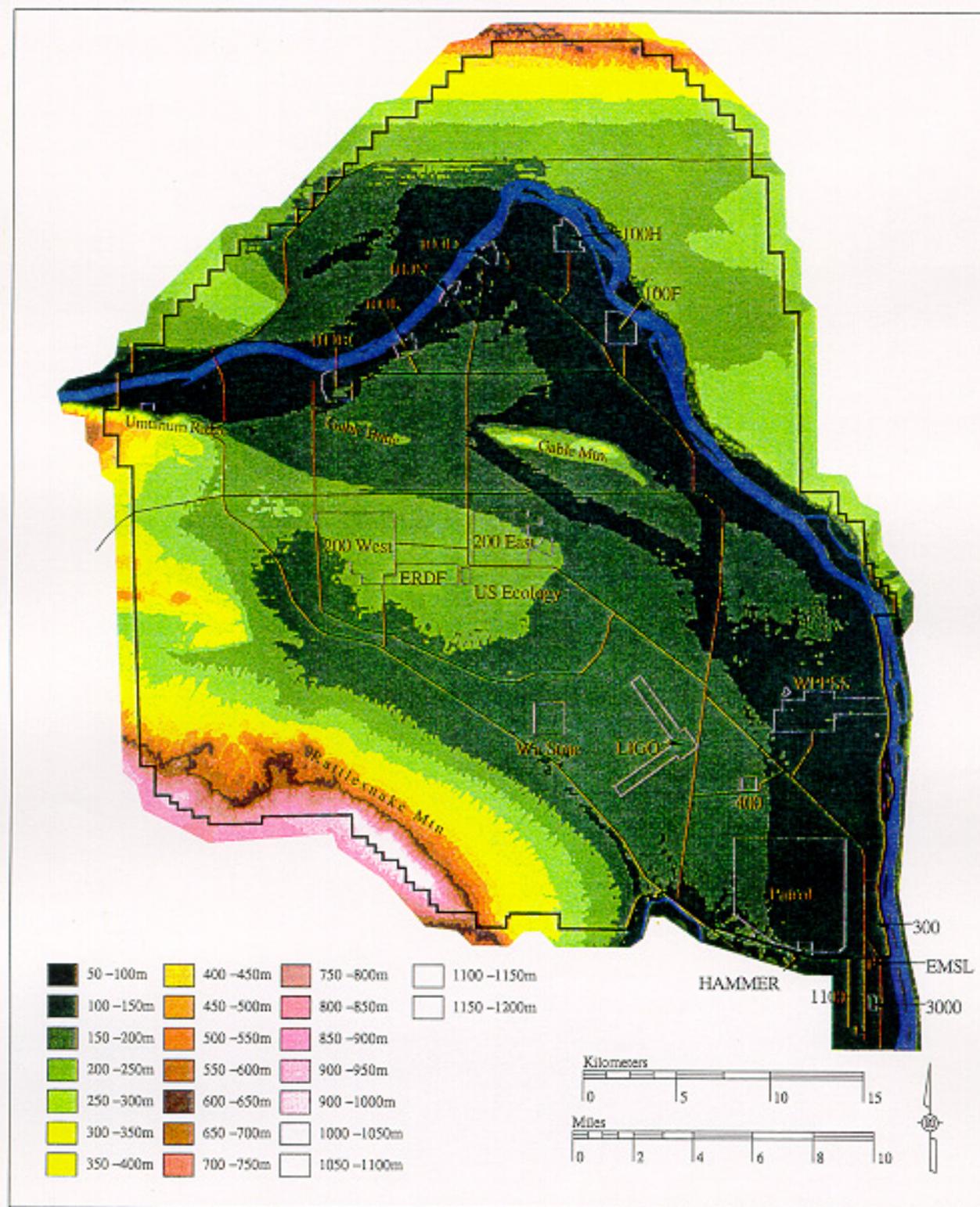
13 Mule deer are found throughout the Hanford Site, although areas of the highest
14 concentrations are on the ALE Reserve and along the Columbia River. Islands in the Hanford
15 Reach are used extensively as fawning sites by deer.
16

17 No mammals on the Federal list of threatened and endangered wildlife and plants (50
18 CFR 17) are known to occur on the Hanford Site. There are, however, two species of birds, two
19 fish species (two ESU for steelhead), and one plant, suspected to occur on the Hanford Site, that
20 are federally listed. In addition, several state endangered, state threatened, and state sensitive
21 plants are found on the Hanford site.
22

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

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

Figure S-21. Topography of the Hanford Site.



H:\pp\04\23\96\clutopol.aml Database: 04-FEB-1998

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

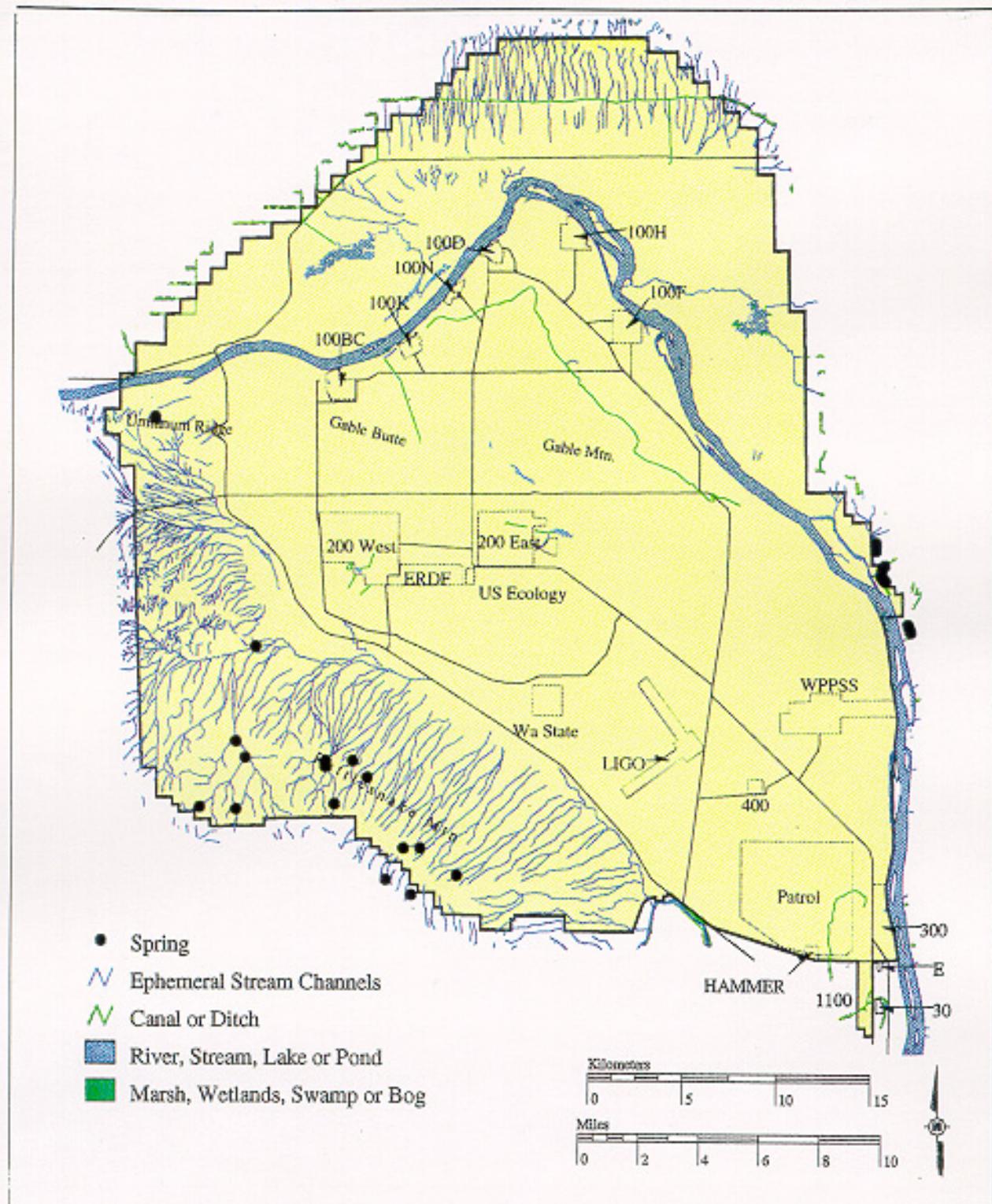
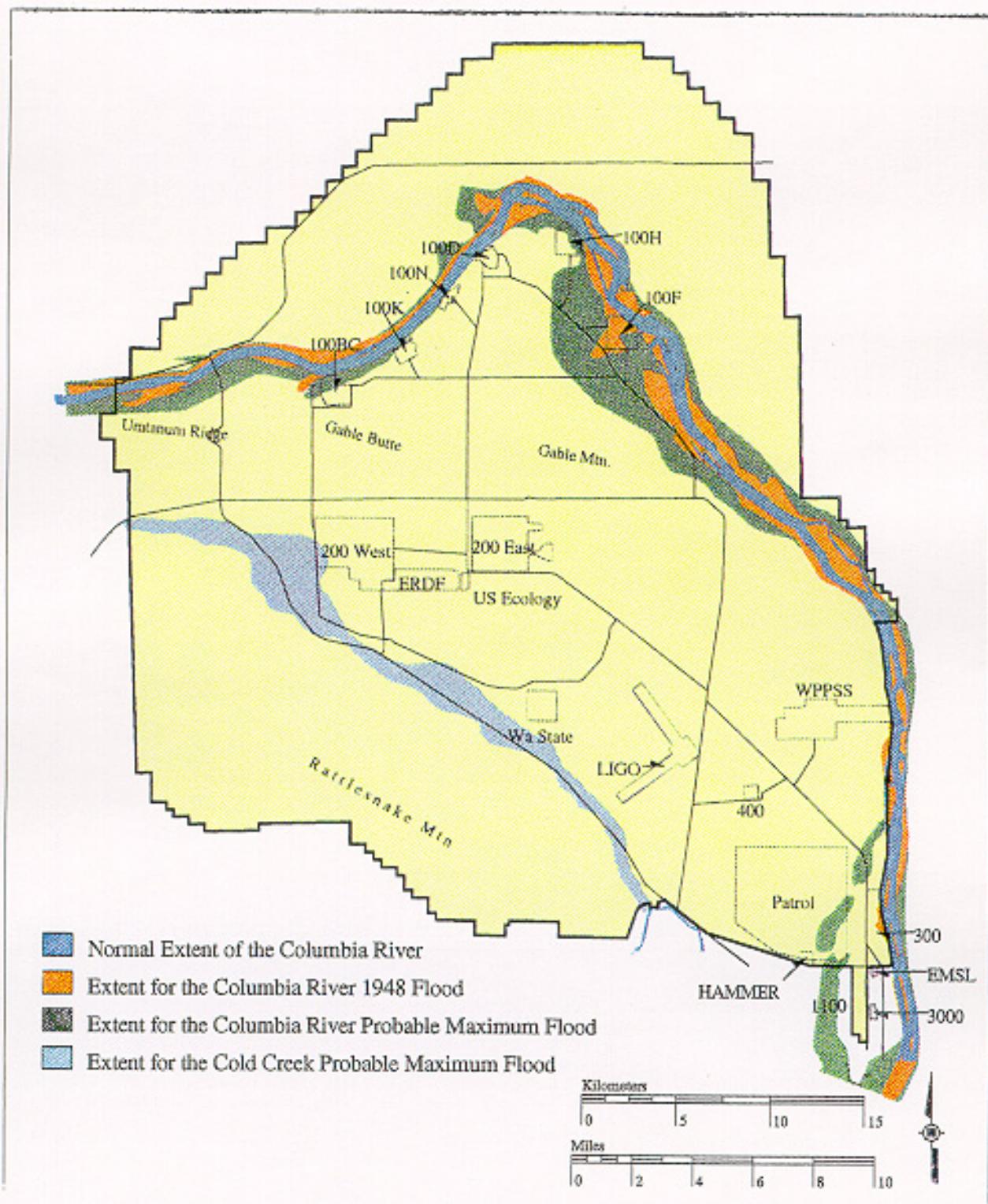


Figure S-23. Wetlands on the Hanford Site.



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



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

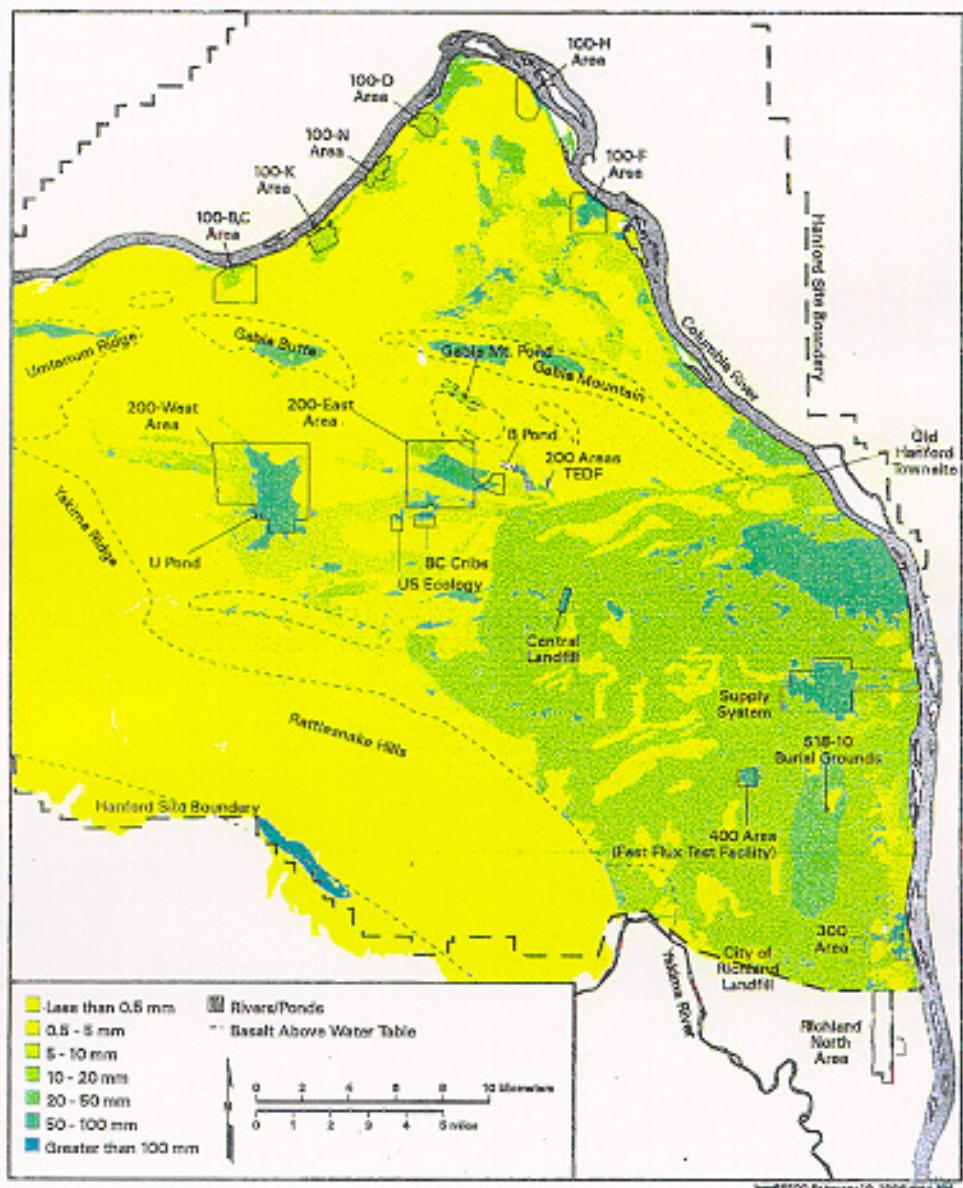
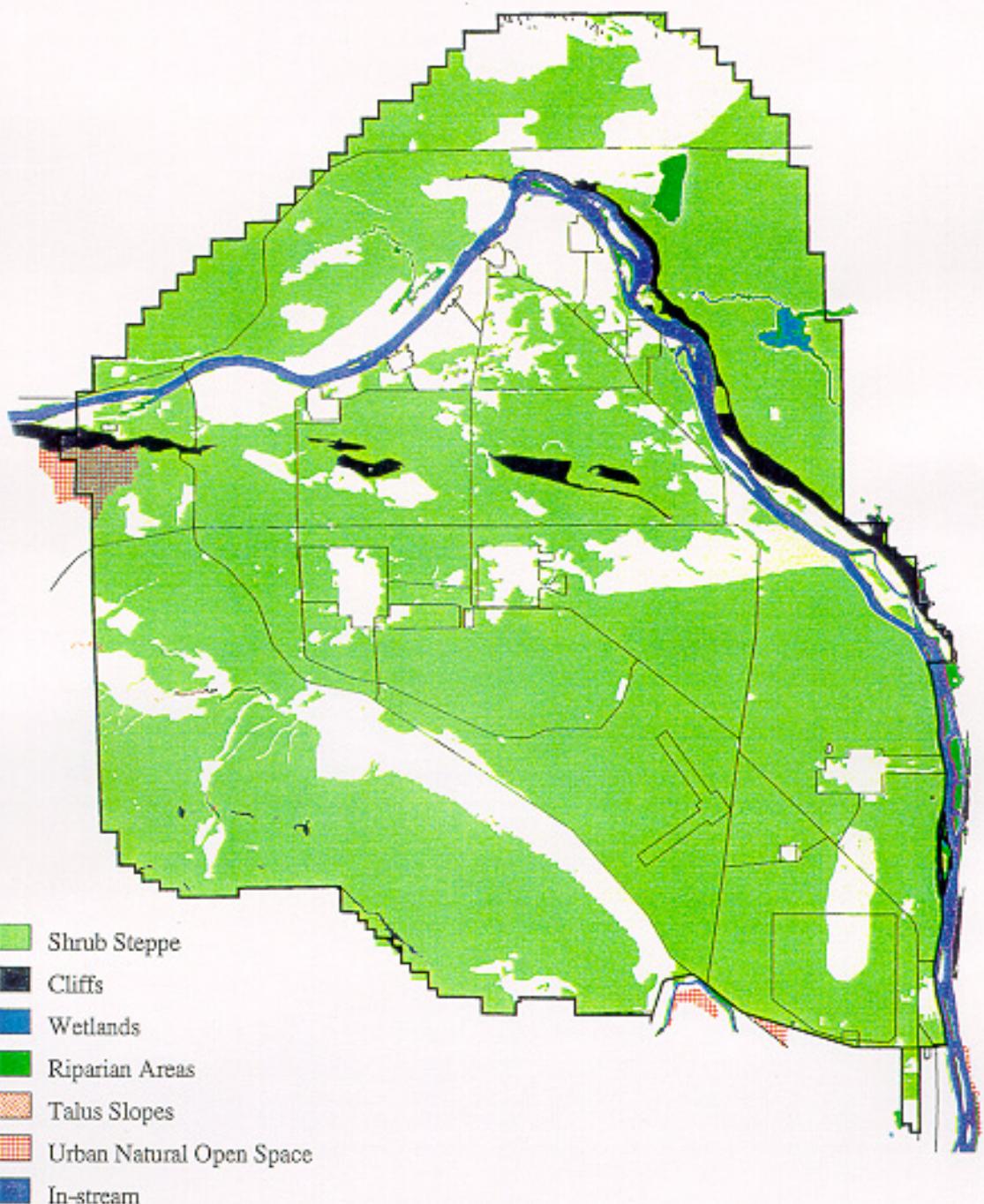
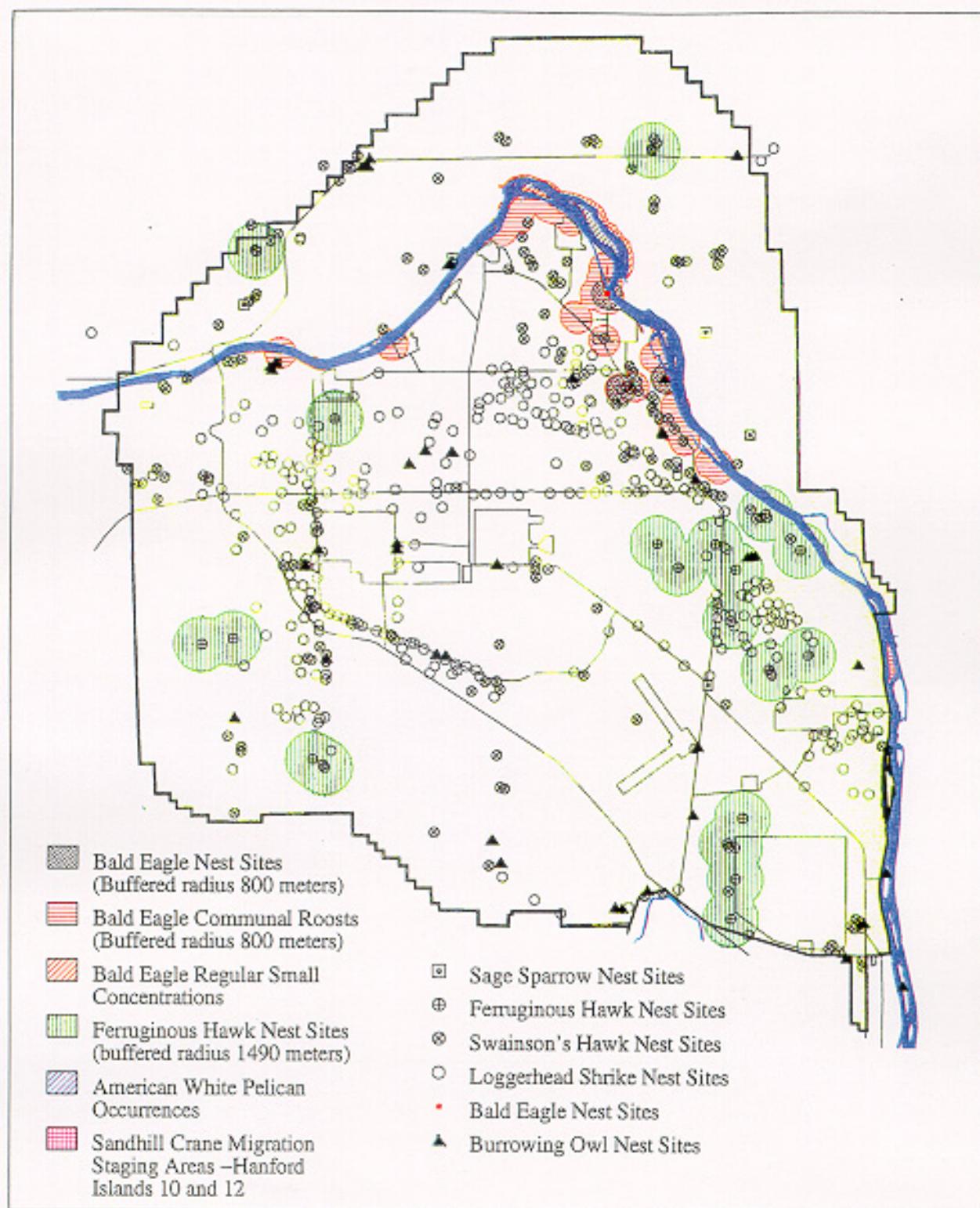


Figure S-26. WDFW Priority Habitats on the Hanford Site.



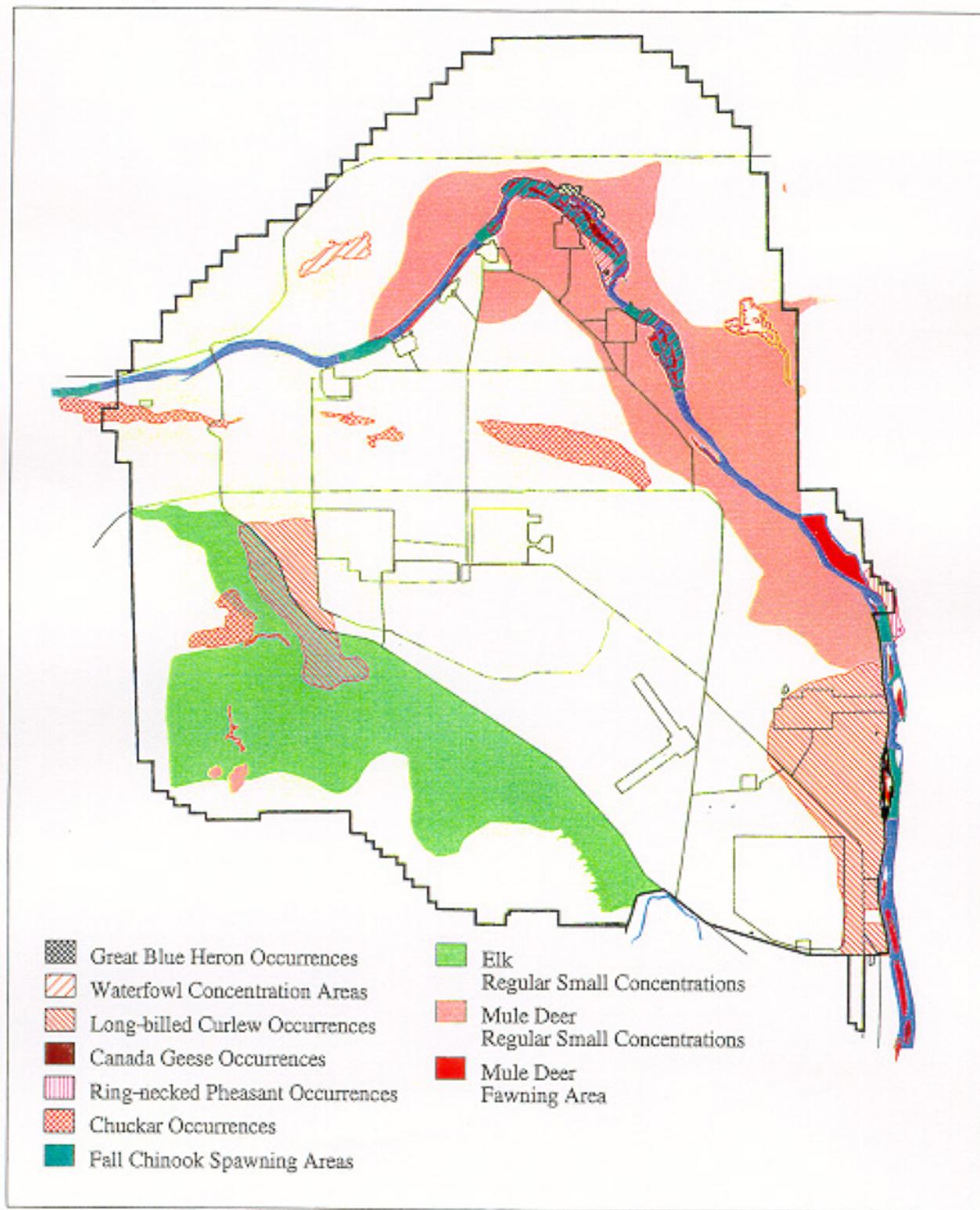
BHE:pp 07/06/98 draft_2/wadfw1.aml Database: 03-AUG-1998

1
3
Figure S-27. WDFW Priority Species: State Listed and Candidate.



BETapp 11/06/98 draft_2/wdfw2.xls Database: 03-AUG-1998

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



BHLapp 07/07/98 draft_2/wdfw3.aml Database: 31-AUG-1998

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

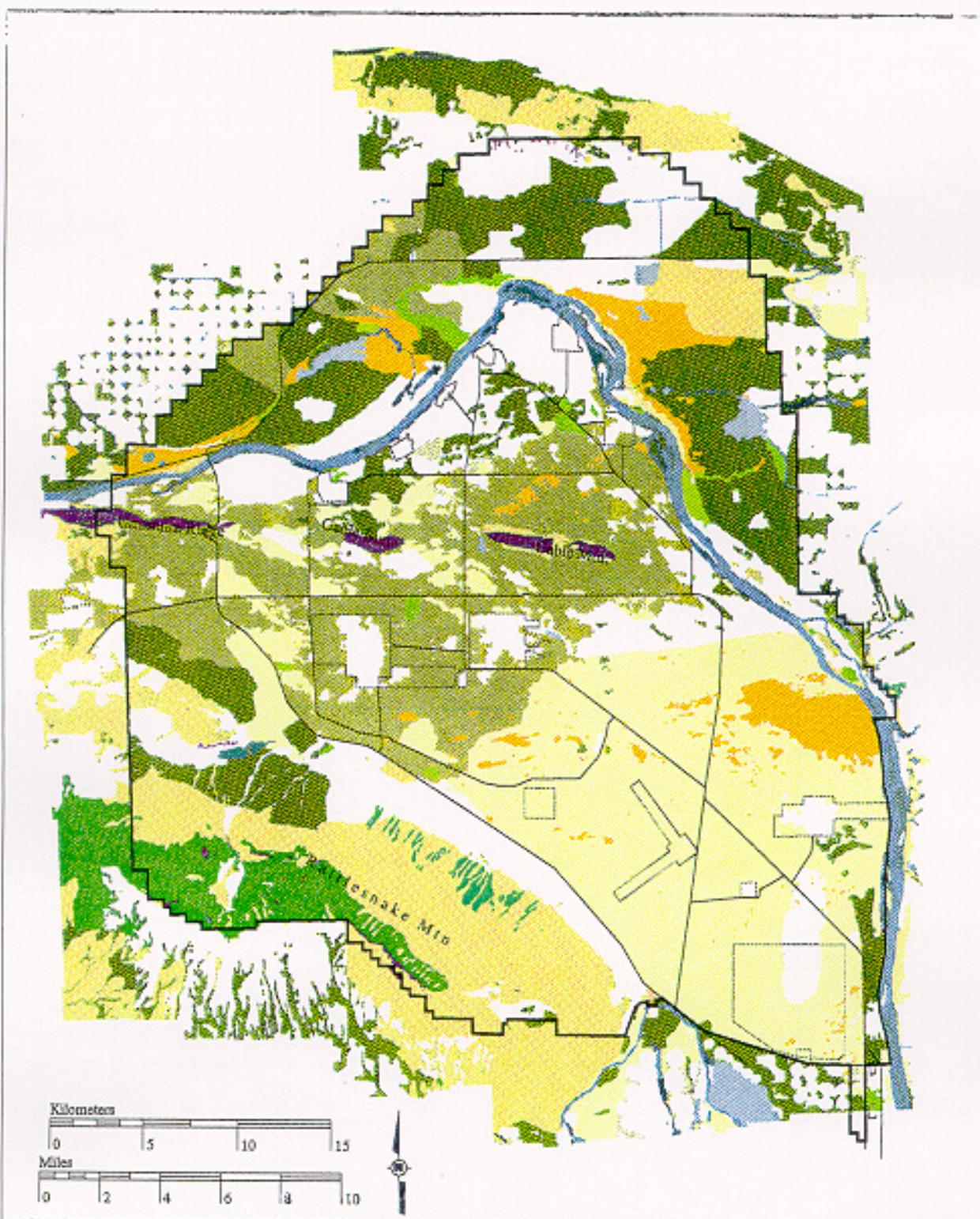
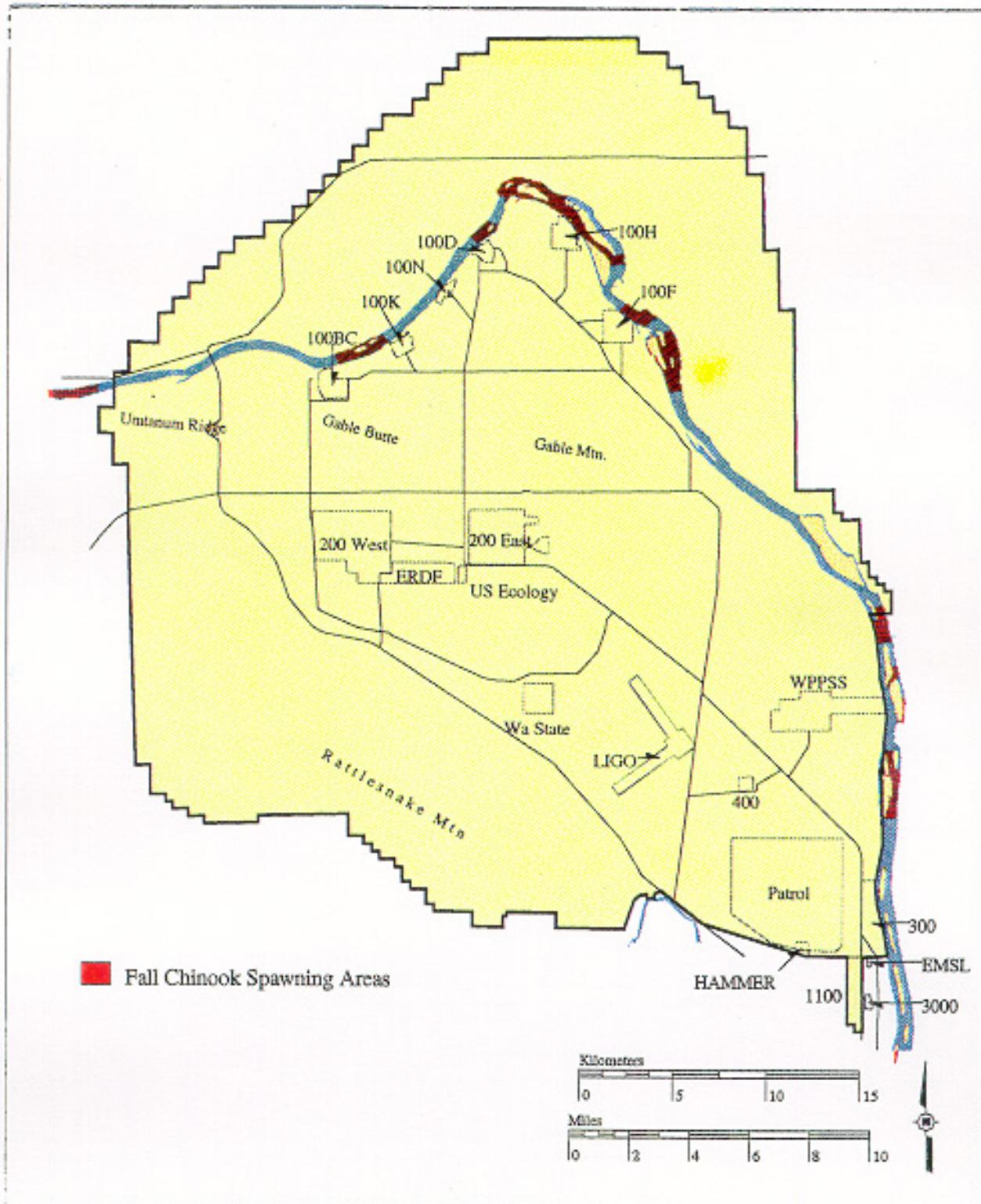


Figure S-29. Plant Communities of Concern on the Hanford Site (Legend).

- [Light Green Box] Post-Fire Shrub-Steppe on the Columbia River Plain
 - [Dark Green Box] Rabbitbrush / Bunchgrasses
 - [Dark Green Box] Big Sagebrush / Bunchgrasses -Cheatgrass
 - [Yellow Box] Big Sagebrush -Spiny Hopsage / Bunchgrasses -Cheatgrass
 - [Dark Green Box] Threetip Sagebrush / Bunchgrasses
 - [Yellow Box] Spiny Hopsage / Bunchgrasses
 - [Yellow Box] Spiny Hopsage / Cheatgrass
 - [Dark Blue Box] Black Greasewood / Sandberg's Bluegrass
 - [Dark Green Box] Winterfat / Bunchgrasses
 - [Yellow Box] Winterfat / Cheatgrass
 - [Dark Blue Box] Snow Buckwheat / Indian Ricegrass
 - [Yellow Box] Bunchgrasses
 - [Yellow Box] Planted Non-native Grass
 - [Yellow Box] Bitterbrush / Bunchgrasses Sand Dune Complex
 - [Yellow Box] Bitterbrush / Cheatgrass
 - [Yellow Box] Alkali Saltgrass -Cheatgrass
 - [Dark Blue Box] Riparian
 - [Purple Box] Basalt Outcrops
 - [Yellow Box] White Bluffs Cliffs
 - [Dark Blue Box] Riverine Wetlands and Associated Deepwater Habitats
 - [Dark Blue Box] Non-Riverine Wetlands and Associated Deepwater Habitats
- Habitats of Low Value
Rabbitbrush / Cheatgrass
Cheatgrass -Sandberg's Bluegrass
Agricultural Areas
Abandoned Old Fields and Farms
Buildings / Parking Lots / Gravel Pits / Disturbed Areas

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



1 **S4.7 Cultural Resources**

2
3 The Hanford Site is rich in cultural resources, with well-preserved archaeological sites.
4 The Draft *Hanford Cultural Resources Management Plan* was developed to establish guidance
5 for the identification and management of archaeological, historic, and traditional cultural
6 resources. Hanford Site cultural resources include American Indian historic and prehistoric sites,
7 historic properties representing early Euro-American settlements, and more recent structures
8 associated with the Manhattan Project and Cold War eras.

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

18
19 Recent historic structures are the defense reactors and associated materials-processing
20 facilities that are present on the Hanford Site. Plutonium for the first atomic explosion (the Trinity
21 test) and the bomb that destroyed Nagasaki to end World War II were produced at the B Reactor
22 on the Hanford Site as part of the Manhattan Project.

23
24 **S4.8 Socioeconomic Environment**

25
26 Activity on the Hanford Site plays a dominant role in the socioeconomics of the Tri-Cities
27 and other parts of Benton and Franklin counties. The agricultural community also has a
28 significant effect on the local economy. The Tri-Cities serves as a market center for a much
29 broader area of eastern Washington and northeastern Oregon. Socioeconomic impacts of
30 changes at Hanford are mostly confined to the immediate Tri-Cities community and Benton and
31 Franklin counties (and Yakima County, to a lesser extent).

32
33 The 1998 estimated population of the three Tri-Cities was as follows: Richland, 36,860;
34 Pasco, 26,090; and Kennewick, 50,390. Estimates for 1998 placed population totals for Benton
35 and Franklin counties at 137,500 and 44,400, respectively.

36
37 Approximately 384,000 people reside within an 80 km (50 mi) radius of the Hanford Site.
38 The minority population within the area consists of about 95,000 people and represents
39 approximately 25 percent of the population. The ethnic composition of the minority population is
40 primarily Hispanic (approximately 80 percent) and American Indian (8 percent). Low-income
41 population represents approximately 42 percent of the households in the area.

42
43 Three major sectors have been the principal driving forces of the economy in the
44 Tri-Cities since the early 1970s:

- 45
46 C **DOE and Hanford Site contractors** – Approximately 10,420 employees worked for
47 DOE and its Hanford contractors in 1998. In FY 1997, average employment was
48 11,120, and in 1996, average employment was 11,940. The drop between FY 1996
49 and FY 1998 reflects both employment declines and reorganization of the DOE
50 contractors under the Project Hanford Management Contract (PHMC) which was
51 created in 1996. Under the PHMC, almost 2,200 employees of the former M&O

1 contractor were moved into six “enterprise companies,” and ceased to be counted as
2 official Hanford employees.
3

4 C **Energy Northwest (formerly Washington Public Power and Supply System**

5 **[WPPSS])** – As part of an effort to reduce electricity production costs, Energy
6 Northwest headquarters has decreased the size of its workforce from over 1,900 in
7 1994 to 1,069 at the end of 1998. The decommissioning of two mothballed nuclear
8 power plants (WNP-1 and WNP-4) began in 1995. In 1998, Energy Northwest
9 employed around 46 people at the two plants, one-half the 90 people that were
10 employed in 1994, due to decommissioning activities.

11 C **Agriculture** – In 1997, agricultural production in the bi-county area generated about

12 10,392 wage and salary jobs, or about 13% of the area’s total employment, as
13 represented by the employees covered by unemployment insurance. Seasonal farm
14 workers are not included in that total but are estimated by the U.S. Department of
15 Labor for the agricultural areas in the state of Washington. In 1998, seasonal farm
16 workers in Benton, Franklin, and Walla Walla Counties averaged 7,028 per month,
17 ranging from 1,373 workers during the winter pruning season to 15,711 workers at the
18 peak of harvest. Area farms and ranches generate a sizable number of jobs in
19 supporting sectors, such as agricultural services (e.g., application of pesticides and
20 fertilizers or irrigation system development) and farm supply and equipment sales.
21 More than 20 food processors in Benton and Franklin counties produce items such as
22 potato products, canned fruits and vegetables, wine, and animal feed.

23
24 Per capita income in 1996 for Benton County was \$22,354, Franklin County was \$17,493,
25 and Washington State was \$25,277. The median household income in 1996 for Benton County
26 was estimated to be \$42,833, down from \$43,684 in 1994. The median household income in
27 1996 for Franklin County was estimated at \$30,903, down from \$31,121 in 1994, while the State
28 of Washington median household income was estimated at \$39,899, up from \$38,094 in 1994.

29
30 In 1998, 90 percent of all housing (47,111 total units) in the Tri-Cities was occupied.
31 Single-unit housing, which represents nearly 59 percent of the total units, had a 94 percent
32 occupancy rate throughout the Tri-Cities.
33

34
35 The Hanford Site infrastructure is a significant resource for furthering industrial
36 development of the region. Key elements of this infrastructure include facilities, road and rail
37 systems, utilities, and support services.
38
39

40 **S4.9 Visual and Aesthetic Resources**

41
42 The land in the vicinity of the Hanford Site is generally flat with little relief. Rattlesnake
43 Mountain, rising to 1,060 m (3,477 ft) above sea level, forms the southeastern boundary of the
44 Hanford Site. Gable Mountain and Gable Butte are the highest land forms within the Hanford Site.
45 The view toward Rattlesnake Mountain is aesthetically appealing, particularly in the spring when
46 wildflowers are in bloom. Large rolling hills are located to the west and far north. The Columbia
47 River, flowing across the northern part of the Hanford Site and forming the Site’s eastern
48 boundary, is scenic with its contrasting blue against a background of brown basaltic rocks and
49 desert sagebrush. The White Bluffs, steep whitish-brown bluffs adjacent to the Columbia River,
50 are a striking natural feature of the landscape.

1 **S4.10 Noise**

2
3 Most industrial facilities on the Hanford Site are located far enough away from the Site |
4 boundary that noise levels at the boundary are not measurable or are barely distinguishable from |
5 background noise levels.

6
7 **S4.11 Contaminated Areas**

8
9
10 Three operating areas of the Hanford Site (the 100, 200, and 300 Areas) are still included |
11 on the EPA's National Priorities List. Radioactive and hazardous materials have been disposed |
12 onsite throughout the period of active Hanford Site operations, resulting in contamination of the |
13 vadose zone and groundwater.

14
15 The Columbia River has received radiological and chemical contamination as a result of |
16 past operations at the Hanford Site. Sediments in the Columbia River contain low levels of |
17 Hanford radionuclides (e.g., cobalt-60 and europium-154), metals, and radionuclides from |
18 worldwide nuclear weapons testing fallout, which collect in slack water habitats.

19
20 In the 100 Area, contamination (e.g., strontium-90, tritium, nitrate, and chromium) exists in |
21 some areas of surface soils, subsurface soils, and groundwater.

22
23 The Central Plateau has been used for fuel reprocessing, Waste Management, and |
24 disposal activities and is the most extensively contaminated area at the Hanford Site. |
25 Contaminants include extensive groundwater plumes of technetium-99, iodine-129, nitrate, |
26 tritium, uranium, and chlorinated hydrocarbons (e.g., carbon tetrachloride, chloroform, and |
27 trichloroethylene).

28
29 The 600 Area presents a diverse range of existing contamination. Portions of the |
30 600 Area vadose zone are essentially uncontaminated, while nearby operating areas, such as the |
31 300 Area, present significant environmental remediation challenges. Extensive groundwater |
32 contamination (e.g., nitrate, tritium, technetium-99, and iodine-129) is present in the 600 Area.

33
34 **S4.12 Hanford Site Protective Safety Buffer Zones**

35
36 Existing and planned waste disposal sites, waste processing facilities, and hazardous or |
37 radiological materials storage facilities are found throughout the Hanford Site. To protect the |
38 public from routine or accidental releases of radiological contaminants and/or hazardous |
39 materials, protective measures for waste remediation, processing, and disposal facilities are |
40 required by DOE Order 420.1 Facility Safety, DOE Order 151.1, *Comprehensive Emergency* |
41 *Management System* (DOE 1996f), and Occupational Safety and Health Administration (OSHA) |
42 regulations 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response (Site |
43 Safety and Control Plan)," 29 CFR 1910.119, "Process Safety Management (PSM) Rule" the |
44 PSM complement, EPA's Risk Management Planning (RMP) under the Clean Air Act, 40 CFR |
45 68.10(a), and WAC 246-247. These buffer zones limit public exposure to radiological and |
46 hazardous chemicals from routine operations and accidents. A methodology that used the air |
47 dispersion model GXQ with 95-percent meteorological conditions based on the Nuclear |
48 Regulatory Commission's Regulatory Guide 1.145 was developed to determine the location, size, |
49 shape, and characteristics of the buffer zones needed for the Hanford Site, using existing safety |
50 analysis reports, hazard assessments, and emergency planning zone studies. This |
51 methodology allows decision makers to restrict potential land uses in areas where hazardous or |
52 radioactive material handling could pose an unacceptable risk to human health. Actual DOE |
53 facility siting decisions would be made with site-specific wind data at 99.5-percent meteorological |
54 conditions.

1 Buffer zones necessary to protect human health and safety in potential accidents are
2 divided into two main components — an inner exclusive-use zone (EUZ) and an emergency
3 planning zone (EPZ).

4 C DOE Orders 420.1 and 5480.23, along with the guidance document DOE-ST-
5 3009, require that a hazard analysis be developed as the basis for a conclusion
6 that off-site personnel are sufficiently protected from accidents at a nuclear facility.
7 That conclusion is to be reached through analysis showing that the estimated
8 individual dose off-site from any design basis accident or evaluation basis accident
9 would be less than some guideline amount. No guideline value has been issued
10 by DOE, but a value of 25 rem committed effective dose equivalent (CEDE) is
11 frequently used by DOE's contractors in the absence of a specified value
12 (DNFSB/TECH-20). The EUZ is an area designated for operation activities
13 associated with a waste site or facility. In DOE O 420.1, Section 4.1.1.2, *Design*
14 *Requirements*, each DOE nuclear facility is required to "be sited and designed in
15 such a manner that gives adequate protection for the health and safety of the
16 public and for workers, including those at adjacent facilities, from the effects of
17 potential facility accidents involving the release of radioactive materials
18 (DOE Order 420.1)." |

19
20
21 Hanford contractors have interpreted this requirement as to maintain a public
22 buffer zone where 25 rem would not be exceeded in the event of an unmitigated
23 low probability accident (10^{-4} to 10^{-6}), where 5 rem would not be exceeded in the
24 event of an unmitigated medium probability accident (10^{-2} to 10^{-4}), or where 0.5
25 rem would not be exceeded in the event of an unmitigated high probability accident
26 (10^{-2} to 1) (WHC-85M00-JCVK-95008). The EUZ is reserved for DOE or other
27 hazardous operations with severely restricted public access. This zone extends
28 from the facility fence line to a distance at which threats to the public from routine
29 and accidental releases diminish to the point where public access can be routinely
30 allowed while ensuring the intent of DOE O 420.1 is achieved. The EUZ is located
31 inside the EPZ. |

32
33 C The EPZ is an area surrounding a facility for which emergency planning and
34 preparedness efforts are carried out per DOE's *Comprehensive Emergency*
35 *Management System Order* (DOE Order 151.1) to ensure that prompt and
36 effective actions can be taken to minimize the impact to onsite personnel, public
37 health and safety, and the environment in the event of an operational emergency.
38 The EPZ begins at the boundary of the facility and ends at a distance for which
39 special planning and preparedness efforts are no longer required. Access
40 restrictions are not required within an EPZ; however, DOE would be responsible
41 for ensuring adequate planning and preparedness efforts. |

42
43 The protective buffer zones for the Hanford Site (Figure 4-40) were established using
44 boundaries calculated for individual limiting facilities (i.e., facilities with accidents of maximum
45 potential public health impact). Accidents initiated by sabotage are not applicable to EPZs. |

46
47 In addition to DOE's desire for land to isolate from the public hazardous processes and
48 facilities that could produce a 25 rem radiological dose under an accident condition, the current
49 Hanford Site boundary has been used to identify and design safety class systems, structures and
50 components that are required to keep an accident from exceeding 500 mrem at the Site |

boundary. The current Site boundary is also the point-of-compliance for protection of the public to assure that routine releases from all DOE activities are less than 100 mrem (DOE Order 5400.5), and that not more than 10 mrem is from airborne sources (40 CFR 61) or that not more than 4 mrem are from groundwater sources (40 CFR 141). In addition to radiological accident conditions, DOE also uses the current Hanford Site boundary to protect the public from potential hazardous chemical accidents such as a chlorine gas leak. If the CLUP policies and implementing procedures on EUZs are adopted in the ROD, then DOE expects to use DOE's annual review of safety and environmental permitting documentation to be the basis for implementing the EUZ policies (see Chapter S6).

S5.0 Environmental Consequences

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

S5.1 Analysis Approach

S5.1.1 Methods and Assumptions for Estimating Environmental Impacts

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

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

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

- C **Level I** – Biological resources that require some level of status monitoring because of the recreational, commercial, or ecological role or previous protection status
- C **Level II** – Biological resources that require consideration of compliance with laws such as NEPA and CERCLA

- 1 C **Level III** – Biological resources that require mitigation because the resource is listed
2 by the State of Washington, is a candidate for Federal or state listing, has unique or
3 significant value, has a special administrative designation, or is environmentally
4 sensitive
5
6 C **Level IV** – Biological resources that justify preservation because these resources are
7 Federally protected or have regional and national significance. These include high
8 quality or rare plant communities, habitats, and species.
9

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

- 12 C Mining
13 C Livestock grazing
14 C Cultivated agriculture
15 C Development
16 C Recreation.
17

18
19 These five impacting activities were used to identify and describe the potential impacts to
20 resource elements under each land-use designation.
21

22 **S5.1.2 Methods and Assumptions for Estimating Socioeconomic Impacts**

23

24 The socioeconomic analysis focused on opportunities for economic development.
25

26 **S5.1.2.1 Industrial Land Use.** The socioeconomic impacts of the Industrial land use
27 designation were evaluated by comparing the industrial use land area under each alternative to
28 the estimated land needed for industrial development. The Benton County Planning Department
29 estimated industrial land development needs for the next 50 years to be 1,620 ha (4,050 ac).
30

31 The area of land designated for Industrial was then correlated with potential employment
32 levels expressed as three ranges: less than 100 employees, 100 to 1,000 employees, and over
33 1,000 employees. The potential for future Federally sponsored industrial projects was also
34 considered by estimating land available for industrial development land in excess of identified
35 needs.
36

37 **S5.1.2.2 Industrial-Exclusive.** The Industrial-Exclusive land-use designation applies to the
38 Central Plateau, where DOE would continue to manage radioactive and/or hazardous waste. In
39 general, this designation involves the same land and activities for all alternatives; however, the
40 areas in Alternatives One and Two are slightly smaller.
41

42 **S5.1.2.3 Agricultural.** The evaluation of these impacts was based on the increase in land
43 available for agriculture use, as a percentage of agricultural land in Benton, Franklin, and Grant
44 counties.
45

46 Three scenarios for agricultural development on the Wahluke Slope were identified:
47

- 48 C **Scenario 1** – All agricultural lands would be used to produce a mix of crops similar to
49 those currently produced in the three-county study area. Lands in the BoR's Red
50 Zone would be used for grazing.
51
52 C **Scenario 2** – All agricultural lands would be used to produce a mix of crops similar to
53 those currently produced in the three-county study area.
54

1 C **Scenario 3** – All agricultural lands would be used to produce specialty crops such as
2 irrigated fruits and vegetables. Lands in the BoR's Red Zone would be used for
3 grazing.
4

5 **S5.1.2.4 Research and Development.** The Research and Development land-use designation
6 involves the siting of large-scale or isolated facilities. This land-use designation was evaluated by
7 estimating potential employment levels that could be supported under each alternative.
8

9 **S5.1.2.5 High-Intensity Recreation.** The High-Intensity Recreation land-use designation would
10 involve intensive development of the Vernita Terrace area along the Columbia River including a B-
11 Reactor Museum, golf course, and a recreational vehicle park at Vernita Terrace. The economic
12 impacts of intensive recreational use were estimated using regional averages of recreational
13 expenditures and data from golf courses in the area.
14

15 **S5.1.2.6 Low-Intensity Recreation.** The socioeconomic impacts of the Low-Intensity
16 Recreation land-use designation were evaluated using the data for sport fishing and day-use
17 activities.
18

19 **S5.1.2.7 Conservation (Mining and Grazing) and Conservation (Mining).** Limited mining
20 and commercial grazing would be allowed under this land use. The economic impact of grazing
21 was based on the increase in the number of cattle that could be supported over the current
22 baseline. The economic effects of limited mining under the Conservation land-use designation
23 could not be quantified because of the lack of data on mining in the study area.
24

25 **S5.1.2.8 Preservation.** The Preservation land-use designation would have little direct impact,
26 but may have indirect impacts on the quality of life, new educational and research opportunities,
27 and ecologically based tourism.
28
29

30 **S5.2 Human Health Impacts** 31

32 Health risks are based on occupational activities that would be expected to occur under
33 different land-use scenarios. Human health risk associated with contamination at the Hanford
34 Site will continue to be addressed through the RCRA and CERCLA processes.
35
36
37
38

1 **Table S-4. Annual Occupational Fatality Rates for Selected Occupations (1996)**
 2 **(3 pages).**

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

Characteristic	Fatalities		Employed ¹ (thousands)	Fatalities per 100,000 workers ²	Relative Standard error ³ (percent)
	Number	Percent			
TOTAL	6,112	100	127,997	4.8	.2
Employee Status					
Wage and salary workers	4,905	80	117,329	4.2	.2
Self-employed	1,207	20	10,668	11.1	1.1
Gender					
Men	5,605	92	69,329	8.1	.3
Women	507	8	58,668	0.9	.4
Age					
Under 16 years	27	--	--	--	--
16 to 17 years	43	1	2,648	1.6	2.2
18 to 19 years	124	2	3,941	3.1	1.8
20 to 24 years	440	7	12,532	3.5	1.0
25 to 34 years	1,336	22	32,579	4.1	.6
35 to 44 years	1,563	26	35,319	4.4	.5
45 to 54 years	1,226	20	25,550	4.8	.6
55 to 64 years	847	14	11,741	7.2	1.0
65 years and over	492	8	3,690	13.3	1.8
Not reported	14	--	--	--	--
Race					
White	5,047	83	108,805	4.6	.2
Black	617	10	13,789	4.5	.9
American Indian, Eskimo, and Aleut	35	1	--	--	--
Asian and Pacific Islander	163	3	--	--	--
Other	91	1	--	--	--
Not reported	159	3	--	--	--
Hispanic origin					
Hispanic	626	10	11,725	5.3	1.0
Industry					
PRIVATE INDUSTRY	5,521	90	108,472	5.1	.2
Agriculture, forestry, and fishing	798	13	3,505	22.2	1.9
Agricultural production, crops	335	5	1,025	31.3	3.5
Agricultural production, livestock	154	3	1,214	12.2	3.2
Agricultural services	171	3	1,189	14.3	3.2
Fishing, hunting and trapping	73	1	53	137.7	15.4
Mining	152	2	567	26.8	4.7
Coal mining	39	1	98	39.8	11.3
Oil and gas extraction	82	1	302	27.2	6.5
Construction	1,039	17	7,464	13.9	1.3
Manufacturing	715	12	20,434	3.5	.7
Food and kindred products	70	1	1,706	4.1	2.7
Lumber and wood products	203	3	794	25.6	4.0
Transportation and public utilities	947	15	7,248	13.1	1.3
Local and interurban passenger transit	78	1	503	15.5	5.0

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

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

Characteristic	Fatalities		Employed ¹ (thousands)	Fatalities per 100,000 workers ²	Relative Standard error ³ (percent)
	Number	Percent			
1 Trucking and warehousing	511	8	2,451	20.8	2.3
2 Transportation by air	113	2	778	14.5	4.0
3 Electric, gas, and sanitary services	88	1	1,066	8.3	3.4
4 Wholesale trade	267	4	4,942	5.4	1.6
5 Retail trade	672	11	21,443	3.1	.7
6 Food stores	173	3	3,507	4.9	1.9
7 Automotive dealers and service stations	98	2	2,165	4.5	2.4
8 Eating and drinking places	166	3	6,483	2.6	1.4
9 Finance, insurance, and real estate	114	2	7,862	1.5	1.2
10 Services	767	13	35,008	2.2	.5
11 Business services	168	3	5,680	3.0	1.5
12 Auto repair, services, and parking	103	2	1,618	6.4	2.8
13 Not reported	50	1	--	--	—
14 GOVERNMENT	591	10	19,525	3.0	.8
15 Federal	178	3	4,583	3.9	1.6
16 State	127	2	5,150	2.5	1.5
17 Local	284	5	9,791	2.9	1.1
18 Managerial and professional specialty occupations	711	12	36,497	1.9	.5
19 Executive, administrative, and managerial occupations	437	7	17,746	2.5	.8
20 Managers, food serving and lodging establishments	75	1	1,383	5.4	3.0
21 Professional specialty	274	4	18,752	1.5	.8
22 Technical, sales, and administrative support occupations	761	12	37,683	2.0	.5
23 Technicians and related support occupations	163	3	3,926	4.2	1.8
24 Airplane pilots and navigators	100	2	114	87.7	10.5
25 Sales occupations	503	8	15,404	3.3	.9
26 Supervisors and proprietors, sales occupations	225	4	4,501	5.0	1.7
27 Cashiers	94	2	2,856	3.3	2.1
28 Administrative support occupations, including clerical	95	2	18,353	0.5	.8
29 Messengers	8	--	175	4.6	8.5
30 Service occupations	492	8	17,177	2.9	.8
31 Protective service occupations	248	4	2,187	11.3	2.4
32 Fire fighting and fire prevention occupations ⁴	37	1	270	13.7	6.8
33 Police and detectives	114	2	1,057	10.8	3.4
34 Guards	97	2	859	11.3	3.8
35 Farming, forestry, and fishing occupations	883	14	3,566	24.2	1.9
36 Farm occupations	569	9	2,212	24.8	2.4
37 Groundskeepers and gardeners, except farm	90	1	875	10.3	3.8
38 Forestry and logging occupations	134	2	108	124.1	10.8
39 Timber cutting and logging occupations	118	2	75	157.3	13.0
40 Fishers, hunters, and trappers	72	1	49	146.9	16.0
41 Fishers ⁵	72	1	47	153.2	16.4
42 Precision production, craft, and repair occupations	1,072	18	13,587	7.9	.9
43 Mechanics and repairers	282	5	4,521	6.2	1.6
44 Automobile mechanics and apprentices	35	1	889	3.9	3.8
45 Heavy equipment mechanics	38	1	156	24.4	9.0

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

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

Characteristic	Fatalities		Employed ¹ (thousands)	Fatalities per 100,000 workers ²	Relative Standard error ³ (percent)
	Number	Percent			
Construction trades	592	10	5,108	11.6	1.5
Carpenters and apprentices	87	1	1,220	7.1	3.2
Electricians and apprentices	98	2	763	12.8	4.1
Electrical power installers and repairers	38	1	126	30.2	10.0
Painters, construction and maintenance	45	1	504	8.9	5.0
Plumbers, pipefitters, steamfitters, and apprentices	32	1	555	5.8	4.8
Roofers	61	1	197	31.0	8.0
Structural metal workers	52	1	61	85.2	14.4
Extractive occupations	87	1	130	66.9	9.8
Drillers, oil wells	22	--	22	100.0	23.9
Mining machine operators	28	--	39	71.8	18.0
Operators, fabricators, and laborers	2,006	33	18,197	11.0	.8
Machine operators, assemblers, and inspectors	218	4	7,874	2.8	1.2
Welders and cutters	62	1	605	10.2	4.6
Transportation and material moving occupations	1,154	19	5,302	21.8	1.5
Motor vehicle operators	913	15	4,025	22.7	1.7
Truck drivers	785	13	3,019	26.0	2.0
Drivers-sales workers	35	1	156	22.4	9.0
Taxicab drivers and chauffeurs	65	1	203	32.0	7.9
Water transportation occupations	42	1	69	60.9	13.5
Sailors and deckhands	33	1	25	132.0	22.5
Material moving equipment operators	177	3	1,093	16.2	3.4
Operating engineers	38	1	245	15.5	7.2
Excavating and loading machine operators	26	--	92	28.3	11.7
Industrial truck and tractor equipment operators	46	1	512	9.0	5.0
Handlers, equipment cleaners, helpers, and laborers	634	10	5,021	12.6	1.6
Construction laborers	291	5	809	35.7	3.9
Garbage collectors	21	--	43	48.8	17.1
Laborers, except construction	213	3	1,334	15.9	3.1
Military	123	2	1,289	9.5	--
Not reported	64	1	--	--	--

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

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

³ The relative standard errors of the CPS employment estimates can be used to approximate confidence ranges for the fatality rates. For example, a confidence range for the roofers rate can be approximated as follows: $31.0 \times .08 \times 1.6 = 4.0$, 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).

⁴ Includes supervisors.

⁵ Includes captains and other officers.

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

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

1 S5.3 Resource Impacts

2
3 Table S-5 shows the implementing controls (Resource Management Plans (RMPs) and Area
4 Management Plans (AMPs) required for implementation of the CLUP. These controls are tools to
5 ensure that land-use actions are consistent with the CLUP, and the CLUP properly balances
6 resource mitigation with resource consumption. Prior to the adoption of the controls, each RMP
7 and AMP would be reviewed for consistency and alignment with the CLUP.

8
9 **Table S-5. Current Status of CLUP Implementing Controls (RMPs and AMPs).**

10 Resource Management Plans (RMPs)	11 To Be Prepared	12 Current Draft	13 Current Final	14 Revision Planned
15 Hanford Cultural Resources Management Plan	16 U	17	18	19 U
20 Hanford Biological Resources Management Plan	21	22 U	23	24 U
25 Hanford Bald Eagle Management Plan	26	27	28 U	29 U
30 Fire Management Plan	31	32	33 U	34 U
35 Noxious Weed Management Plan	36	37	38 U	39 U
40 Chinook Salmon - Upper Columbia River Spring run Hanford Management Plan	41	42	43	44 U
45 Steelhead - Middle Columbia River run Hanford Management Plan	46	47	48	49 U
50 Steelhead Upper Columbia River run Hanford Management Plan	51	52	53	54 U
55 Aesthetic and Visual Resources Management Plan	56	57	58	59 U
60 Facility and Infrastructure Assessment and Strategy	61	62	63	64 U
65 Mineral Resources Management Plan (i.e., soils, sand, gravel, and basalt)	66	67	68	69 U
70 Hanford Site Watershed Management Plan	71	72	73	74 U
75 Hanford Site Ground-Water Protection Management Plan	76	77	78 U	79 U
80 Groundwater Vadose Zone Integration Project Summary Description	81	82	83	84 U
85 Hanford Institutional Control Plan (i.e., long-term stewardship plan)	86	87	88	89 U
90 Area Management Plans (AMPs)	91 To Be Prepared	92 Current Draft	93 Current Final	94 Revision Planned
95 ALE Reserve Comprehensive Conservation Plan	96	97	98 U	99 U
100 Wahluke Slope Comprehensive Conservation Plan	101	102	103	104
105 Columbia River Corridor Area Management Plan	106	107	108	109
110 South 600 Area Management Plan (includes 300 Area)	111	112	113	114

39 Resource impacts are presented by alternative in Table S-6. The follow sections are
40 summaries of the types of impacts to resources that can be expected with changes in land uses.
41 As the eventual usage pattern in of the land in both space and time is speculative, the analysis of
42 impacts can not be detailed. Many Resource Management Plans exist for Hanford and many are
43 to be developed to assist the land manager with the federal trustee duties

44 **S5.3.1 Geologic Resources**

45 Impacts to unique geologic features would occur from mining under the Conservation land-
46 use designations. Development under the Industrial, Research and Development, and High-

1 Intensity Recreation land-use designations could also result in destruction of unique features.
2 Grazing is not anticipated to have impacts on these features, although overgrazing could result in
3 increased erosion of some features and terracing on the hillsides.

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

- 9
- 10 C Perform scientific investigation of unique features so the scientific value would not be
11 lost
 - 12
 - 13 C Regulate recreational uses to protect areas containing unique geologic features
 - 14
 - 15 C Employ irrigation methods to minimize groundwater recharge in the White Bluffs area.
 - 16

17 **S5.3.2 Water Resources**

18

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

23

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

27

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

- 31
- 32 C Minimize the use of groundwater
 - 33
 - 34 C Restrict irrigated agriculture on the Wahluke Slope or require efficient irrigation
35 methods to protect the White Bluffs
 - 36
 - 37 C Designate "no-wake" zones along areas of the Columbia River vulnerable to erosion
 - 38 • Employ agricultural practices that minimize the use of agricultural chemicals
 - 39
 - 40 C Employ agricultural practices that minimize soil erosion
 - 41
 - 42 C Use silt fences to contain soil erosion at development sites
 - 43
 - 44 C Implement water conservation measures wherever possible
 - 45
 - 46 C Implement spill control and cleanup measures to minimize the risk from accidental
47 releases
 - 48
 - 49 C Manage grazing activities to minimize livestock access to wetlands and riverbanks.
 - 50

1
2 **S5.3.3 Biological Resources**
3

4 Sensitive biological resources are present on the Hanford Site in association with the
5 Columbia River, basalt outcrops, and other unique features. Biological resource elements
6 considered for each alternative include terrestrial vegetation and habitat, plant communities of
7 concern, wildlife and habitat, aquatic species and habitats, wetlands, and biodiversity.
8

9 The CLUP planning process would screen development proposals for Hanford Site lands.
10 Some activities would not be permitted and others would be modified or required to incorporate
11 mitigation measures to reduce impacts. Examples of mitigation measures include the following:
12

- 13 C Eliminate all disturbances around winter roosts for bald eagles and avoid habitat
14 alteration within 400 m (0.25 mi) of bald eagle roosts
- 15 C Minimize disturbance of wetlands and replace disturbed wetlands through purchase,
16 construction, or restoration of wetlands
- 17 C Compensate for adverse impacts to habitats by restoration of comparable habitats on
18 the Hanford Site
- 19 C Revegetate disturbed areas using native vegetation.

20
21 **S5.3.4 Cultural Resources**
22

23 Impacts to cultural resources include damage or destruction of archaeological and historic
24 sites and artifacts, and disruption of religious and traditional uses of the American Indians.
25

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

- 30 C Survey cultural resources of proposed project locations
- 31 C Consult with American Indians concerning traditional and religious uses
- 32 C Consult with DOE's Cultural Resources Program Manager, the Washington State
33 Historic Preservation Office, and American Indian tribal representatives concerning any
34 survey findings.

35
36 **S5.3.5 Aesthetic Resources**
37

38 Key aesthetic resources include viewing locations, viewsheds, visibility (ambient air
39 quality), and ambient noise levels. Impacts to aesthetic resources would result from altering
40 viewing locations, viewsheds, or visibility through mining or development; releasing atmospheric
41 pollutants from industrial activities; releasing fugitive dust from construction and agricultural
42 activities, and resulting new noise impacts from development, mining, or recreation.
43

44 Under all alternatives, new development projects would be subject to a New Source
45 Review (*Washington Administrative Code [WAC] 173-400*) that would identify probable air
46 emissions and air emission control technology required to comply with state air quality standards.
47

1 The CLUP planning process would screen development proposals. Proposed projects
2 would be planned to be consistent with the CLUP policies requiring protection of aesthetic
3 resources. Potential mitigation measures for aesthetic resources include the following:
4

- 5 C Implement dust control measures, such as use of water or other dust suppressants
6
7 C Cover loads when hauling materials away from construction or excavation sites
8
9 C Site development or mining activities in areas with the least impact on the viewshed
10
11 C Minimize noise impacts to wildlife.
12
13

14 **S5.4 Socioeconomic Impacts**

15

16 Socioeconomic impacts are divided in approach between an increased opportunity for
17 ecotourism with the expansion of an existing Federal wildlife refuge as typified by Alternative One,
18 and an increased opportunity of Industrial development and High-Intensity Recreation as typified by
19 Alternative Three.

20 **S5.4.1 No-Action Alternative**

21 Under this alternative, facility planning and siting would continue on a project-by-project
22 basis. The potential socioeconomic impacts from this alternative cannot be predicted. The lack of
23 a land-use plan may discourage new uses for the Hanford Site. In the absence of a land-use plan,
24 it is also unlikely that new recreational opportunities would be developed. It is assumed that this
25 alternative would allow industrial development and research and development activities to occur in
26 the southern portion of the 600 Area. The impacts of research and development and industrial
27 development could exceed the City of Richland's capacity to provide supporting infrastructure.
28
29

30 **S5.4.2 DOE's Preferred Alternative**

31 This alternative would increase the land base available for industrial uses and research
32 and development, which would allow the siting of manufacturing facilities with a total employment
33 of 1,000 or more. Lands under the Research and Development land-use designation could
34 support 100 to 300 employees.
35
36

37 Future industrial development on Hanford Site lands would require additional infrastructure
38 such as roads and utilities. Additional industrial development on Hanford Site lands under the
39 Preferred Alternative could exceed the City of Richland's capacity to provide supporting
40 infrastructure.
41
42

43 The DOE Preferred Alternative would also keep portions of the Hanford Site available for
44 mining. Because mining is for governmental purposes, this alternative would not support new
45 private claims for sand, gravel, and natural gas development. The possible socioeconomic effects
46 were not estimated in this analysis.
47
48

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

1 **S5.4.3 Alternative One**

2
3 Alternative One would create an increased opportunity for ecotourism with the expansion of
4 an existing Federal wildlife refuge. Alternative One would allow continued industrial development
5 and limited recreational uses on Hanford Site lands. The areas allowed for industrial development
6 would exceed the estimated need and would provide land to support possible future DOE
7 missions. This would allow the siting of several manufacturing facilities, with a total employment
8 of 100 to 1,000. Additional industrial development on Hanford Site lands under this alternative
9 could exceed the City of Richland's capacity to provide supporting infrastructure (e.g., the
10 proposed aluminum smelter would be expected to provide more than 1,000 jobs). |

11
12 Alternative One would allow High-Intensity Recreational uses at the B Reactor and Vernita
13 Bridge, along with additional boat launches along the Columbia River Corridor, which would have
14 economic impacts similar to the Preferred Alternative.

15 **S5.4.4 Alternative Two**

16
17 Alternative Two would allow limited industrial development and recreational uses on the
18 Hanford Site and would have the least economic potential of the alternatives being considered.
19 The relatively small amount of vacant land designated for industrial development under this
20 alternative would probably limit new industrial employment to less than 100. The Research and
21 Development land uses would be limited to existing uses at LIGO and the K Reactor Basins.
22

23
24 This alternative would allow High-Intensity Recreation associated with the B Reactor
25 museum only. It would not increase recreational access to the river. The economic benefit would
26 be substantially less than those estimated for the recreational uses under the other alternatives.
27

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

31 **S5.4.5 Alternative Three**

32
33 Alternative Three would have the highest potential for economic development. The
34 economic impact of agricultural development on former Hanford Site lands would increase from
35 1.7 to 9.4 percent corresponding to \$16 million to \$88 million (using 1992 prices) in additional
36 revenues. Livestock grazing on the Wahluke Slope would increase the total grazing by 2 percent
37 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 Research
42 and Development land-use designation would support total employment of 300 or more. Additional
43 industrial development on Hanford Site lands under this alternative could exceed the City of
44 Richland's capacity to provide supporting infrastructure.
45

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

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

S5.4.6 Alternative Four

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

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

S5.5 Environmental Justice Impacts

Under the Executive Order 12898, 59 Fed. Reg. 7629, 1994, Federal agencies are required | to identify and address disproportionately high and adverse human health or environmental effects | of programs on minority and low-income populations.

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

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

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

S5.5.1 Health Impacts from Subsistence Consumption of Fish and Wildlife

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

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

4
5 The *Screening Assessment and Requirements for a Comprehensive Assessment, Columbia River Comprehensive Impact Assessment* (CRCIA) evaluated both chemical and
6 radiological health risk potential for a variety of site use scenarios including Native American
7 subsistence scenarios. These Native American scenarios were developed by a Native American
8 representative on the CRCIA team specifically for the CRCIA effort. Environmental
9 measurements used for the CRCIA analysis were based on data collected from 1990 through
10 1996 and, as a consequence, would not necessarily reflect the future condition of the site as these
11 scenarios do not assume cleanup.

12
13 In these Native American scenarios, people who live along the Columbia River were
14 assumed to eat substantial quantities of food grown in the riparian zone, to eat fish and wildlife
15 from the river, and to drink seep water. They would have a much larger potential exposure to
16 contaminants and, thus, estimated health risk. Significant health risks (e.g., for carcinogens
17 lifetime health risk greater than 10 in 100,000) were found in many sections of the river as a result
18 of potential exposure to chromium, copper, strontium-90, uranium-238, lead, and tritium. The
19 contaminants assessed fell into one of three categories: carcinogenic chemicals, toxic
20 chemicals, and radionuclides. Because the three categories of contaminants resulted in different
21 types of risk, the estimates for each category were reported differently. The estimates for
22 carcinogenic chemicals were reported as the probability of the incidence of cancer. The
23 estimates for toxic chemicals were reported as a ratio (a hazard index) between the reference
24 dose determined by EPA to be safe and the dose that had been estimated. The estimates for
25 radionuclides were reported as the risk of cancer fatality.

26
27 Although many cultural differences exist between the general population and American
28 Indians, the common pathways of food and water consumption could affect both groups.

31 **S5.5.2 Environmental Impacts to Low-Income and Minority Populations**

32
33 Low-income and minority populations in the vicinity of the Hanford Site could be affected by
34 potential socioeconomic impacts and impacts to biological and cultural resources valued by
35 American Indians.

37 **S5.5.3 Environmental Justice Impacts to American Indians**

38
39 Under separate treaties signed in 1855, lands occupied by the present Hanford Site were
40 ceded to the United States by the Confederated Tribes and Bands of the Yakama Indian Nation
41 and by the CTUIR. Under these treaties, Tribal members retained the right to fish in their usual
42 and accustomed places in common with the citizens of the Territories. The treaties also retained
43 to Tribal members the privilege of hunting, gathering roots and berries, and pasturing horses and
44 cattle on open unclaimed lands. The 1855 Treaty with the Nez Perce also retained the right to fish
45 at usual and accustomed places. The Wanapum People did not sign a treaty with the United
46 States and are not a Federally recognized Tribe; however, the Wanapum People were historical
47 residents of what would become the Hanford Site and their interests in the area have been
48 acknowledged by the State of Washington.

49
50 Tribal members' fishing rights reserved under the treaties have been recognized as
51 effective within the Hanford Reach. Tribal members also have an interest in renewing traditional
52 uses, such as gathering of foods and medicines, hunting, and pasturing horses and cattle on
53 Hanford Site lands.

1 Future opportunities of Tribal members to exercise reserved treaty rights are dependent
2 upon the health of the ecosystems. Tribal members assert that a treaty-reserved right to hunt,
3 fish, or gather plants is diminished (if not voided) if the fish, wildlife, or plants have vanished or are
4 contaminated to the extent that they threaten human health. These resources, particularly the
5 resources with cultural and religious connotations, do not have equivalent value for the general
6 population.

7
8 Cultural and biological resources valued by American Indians have, in effect, been
9 preserved by the presence of the Hanford Site. The Conservation and Preservation land-use
10 designations would continue to protect these resources and could allow Tribal members to
11 resume traditional uses of these resources. However, the Agricultural, Industrial-Exclusive,
12 Industrial, and High-Intensity Recreation land-use designations are likely to result in damage or
13 destruction of cultural and biological resources important to American Indians. The Research and
14 Development and Low-Intensity Recreation designations would be less likely to result in resource
15 destruction. However, these uses may not be compatible with traditional subsistence uses by
16 American Indians.
17

18 High promontories that provide a commanding and panoramic view of the surrounding
19 terrain are culturally significant to American Indian Tribes, which historically used the land that
20 would become the Hanford Site. Alteration of the viewshed from these sites could
21 disproportionately impact American Indian populations. This alteration could occur under the
22 Agricultural, Industrial, Research and Development, and High-Intensity Recreation land-use
23 designations. Mining activities under the Conservation designation could also have adverse
24 effects, either directly by mining of basalt outcrops or indirectly by altering the viewshed. Mining of
25 the basalt outcrops would be considered an environmental justice impact, because these sites are
26 sacred to American Indians but are of less significance to the general population.
27

28 **S5.5.4 Occupational Human Health Impacts** 29

30 Occupational injury and illness incidence rates at the Hanford Site have been decreasing
31 since 1994. There were 4.9 Total Recordable Cases per 200,000 worker hours (100 worker
32 years) in 1994. By 1997, the rate had decreased to 3.0 cases per 200,000 worker hours and
33 during the first six months of 1998, the rate further decreased to 2.3 cases per 200,000 worker
34 hours. Total Recordable Cases are work-related deaths, illnesses, or injuries that resulted in loss
35 of consciousness, restriction of work or motion, transfer to another job, or required medical
36 treatment for first aid.
37

38 The transfer of jobs from the government to the private sector statistically doubles the
39 accident fatality risk for the average worker in 1997. Some comparisons can be made regarding
40 occupational health risks among the land-use designations using statistics from the U.S. Bureau
41 of Labor Statistics. The data indicate that the riskiest occupation is logging with an annual fatality
42 rate of 157.3 per 100,000 workers (equivalent to a 10^{-3} risk per year). Industrial activities
43 associated with Industrial, Industrial-Exclusive, and Research and Development have annual fatal
44 accident rates that vary from administrative support operations at 0.5 fatalities per 100,000
45 workers, to 4.1 fatalities per 100,000 workers for food manufacturing workers, to 20.8 fatalities per
46 100,000 workers for trucking and warehousing workers.
47

48 The land-use designations of Preservation, Conservation (Mining), Conservation (Mining
49 and Grazing), Low-Intensity Recreation, High-Intensity Recreation have a different set of
50 occupational hazards associated with recreational activities. Fishing, hunting and trapping are
51 very risky occupations (second to logging) with an annual fatality rate of 137.7 fatalities per
52 100,000 workers. For sand and gravel mining operations, excavating and loading machine

Table S-6. Summary of Potential Impacts to Hanford Site Resources. (9 pages)

Resource	Preferred Alternative	Alternative One	Alternative Two	Alternative Three	Alternative Four	No-Action Alternative
GEOLOGIC RESOURCES						
Features	Unique geologic features such as Gable Mountain, Gable Butte, the White Bluffs; and active sand dunes would be protected.	Same as the Preferred Alternative.	Same as the Preferred Alternative. Stabilized sand dunes would also be protected.	Unique geologic features could be developed to obtain materials for remediation and economic development.	Same as the Preferred Alternative except stabilized sand dunes would also be protected.	Unique geologic features could be developed.
Missoula Flood Deposits	Missoula Flood features would be protected by Plan Policies and Procedures.	Missoula Flood features would be protected by Plan Policies and Procedures.	Missoula Flood features would be protected by Plan Policies and Procedures.	Missoula Flood features would be protected by Plan Policies and Procedures.	Missoula Flood features would be protected.	Same as Preferred Alternative because of their cultural significance.
Geologic Materials	Viable sources of geologic materials for governmental purposes 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 types of impacts as the Preferred Alternative, but applied to 66% more surface area.	Geologic materials could be developed only to support remediation.	Commercial development of geologic resources would not be restricted.
Natural Gas	Existing natural gas claims on the ALE Reserve could be developed, but the Preservation designation surrounding those claims would preclude construction of an access road.	Same as Preferred Alternative.	Same as Preferred Alternative.	Existing natural gas claims could be developed and an access road could be constructed under the Conservation (Mining) designation.	Same as Preferred Alternative.	Existing natural gas claims could be developed and an access road could be constructed.
Soils	Soil compaction and erosion could occur around quarry sites.	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.	Mining and cultivated agriculture could increase soil compaction or erosion.

Table S-6. Summary of Potential Impacts to Hanford Site Resources. (9 pages)

Resource	Preferred Alternative	Alternative One	Alternative Two	Alternative Three	Alternative Four	No-Action Alternative	
1 WATER RESOURCES							
2 3 4	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.	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.	Same types of impacts as the Preferred Alternative, but applied to 66% more surface area.	Similar to the Preferred Alternative.	Same as Alternative Two.
5	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 types of impacts as the Preferred Alternative, but applied to 66% more surface area.	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 Agriculture similar to Alternative Three.

Table S-6. Summary of Potential Impacts to Hanford Site Resources. (9 pages)

Resource	Preferred Alternative	Alternative One	Alternative Two	Alternative Three	Alternative Four	No-Action Alternative
1 BIOLOGICAL RESOURCES						
2 Federal Endangered Species	Increased protection of the river from development would ensure salmon and steelhead spawning areas are protected. Increased recreational access to the Columbia River could adversely affect salmonid spawning areas and the proposed Tribal Village and White Bluffs boat launch could impact the Bald Eagle nesting attempts.	Protects all species from development and restricts access to the Columbia River. Does not assume consumptive use of species through treaty-reserved rights. Is the Environmentally Preferable Alternative.	Protects all species from development and restricts access to the Columbia River. Allows consumptive use of species through treaty-reserved rights.	Increased threat to habitat from Wahluke Slope development. Increased protection of the river from development would help protect salmon and steelhead spawning areas. Increased recreational access to the Columbia River could adversely affect salmonid spawning areas. Proposed High Intensity Recreation Area and White Bluffs boat launch could impact the Bald Eagle nesting attempts.	Protects all species from development and restricts access to the Columbia River. Allows consumptive use of species through treaty-reserved rights.	Between Preferred Alternative and Alternative One.
3						
4 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.
5 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.
6 Grazing	Grazing is not allowed under this alternative.	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	Grazing is not allowed under this alternative.	Grazing impacts restricted to the Wahluke Slope north of State Highway 24.

Table S-6. Summary of Potential Impacts to Hanford Site Resources. (9 pages)

	Resource	Preferred Alternative	Alternative One	Alternative Two	Alternative Three	Alternative Four	No-Action Alternative
1	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.
2	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.
3	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 92% 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% of BRMaP Level IV resources.	Preservation designation would protect 85% of BRMaP Level III and 85% of BRMaP Level IV resources.	The No-Action Alternative does not specifically designate land for Preservation.
CULTURAL RESOURCES							
4	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 CRMP Plan Policies and Procedures.
5	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.

Table S-6. Summary of Potential Impacts to Hanford Site Resources. (9 pages)

		Resource	Preferred Alternative	Alternative One	Alternative Two	Alternative Three	Alternative Four	No-Action Alternative		
1	2	Natural Resource Gathering Areas	Damage to natural resource gathering areas from development and increased recreational use of the Columbia River.	Less than the Preferred Alternative.	Impacts to natural resource gathering areas would be minimal.	Same types of impacts as the Preferred Alternative but, applied to 66% more surface area.	Less than the Preferred Alternative.	Greater than the Preferred Alternative.		
3	4	Cultural Sites	Damage to cultural sites from 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.		
5	6	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.		
7	8	AESTHETIC RESOURCES		Viewsheds	Viewing locations associated with Gable Butte and Gable Mountain would be protected. Locations associated with the Columbia River would be disrupted. Viewsheds could be disrupted.	Same as the Preferred Alternative.	Minimal impacts; less than the Preferred Alternative.	Viewing locations associated with basalt outcrops could be adversely impacted, but locations along the river would be protected. Viewsheds could be disrupted.	Viewing locations would be protected. Minimal impacts to viewsheds. Less than the Preferred Alternative.	Viewing locations and viewsheds could be adversely impacted. Greater than the Preferred Alternative.
9	10	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.		

Table S-6. Summary of Potential Impacts to Hanford Site Resources. (9 pages)

	Resource	Preferred Alternative	Alternative One	Alternative Two	Alternative Three	Alternative Four	No-Action Alternative
1	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.
2	SOCIO-ECONOMICS AND INDUSTRIAL DEVELOPMENT	15,335 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 current Site Strategic Plan. At least 22,534 ha available to support future Industrial or Research and Development DOE missions
3							
4							
5							
6	RESEARCH AND DEVELOPMENT	4,912 ha designated for Research and Development could support up to 300 employees.	414 ha designated for Research and Development, but limited to previously developed areas.	Research and Development limited to 699 ha of existing uses at LIGO and the K Reactor water supply used for fish rearing.	Greater than the Preferred Alternative 8,177 ha designated for Research and Development could support up to 600 employees	4,388 ha designated for Research and Development could support up to 300 employees	Facility siting conducted on a project-by-project basis. Ample land available. At least 22,534 ha available to support future Industrial or Research and Development DOE missions
7							
8	GRAZING AND AGRICULTURE	No lands designated for grazing or cultivated agriculture.	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.
9							

Table S-6. Summary of Potential Impacts to Hanford Site Resources. (9 pages)

	Resource	Preferred Alternative	Alternative One	Alternative Two	Alternative Three	Alternative Four	No-Action Alternative
1 2 3	MINERAL RESOURCES (Privately held)	Existing natural gas claims could be developed, but the Preservation designation in the surrounding area 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.
4	RECREATION	Increased recreation could increase revenues generated by tourism.	Less than the Preferred Alternative.	Less than the Preferred Alternative.	A destination resort/conference center at Vernita Terrace could generate up to \$2 million to \$4 million in payroll.	Less than the Preferred Alternative.	New revenue generating recreational opportunities would be unlikely.

Table S-6. Summary of Potential Impacts to Hanford Site Resources. (9 pages)

Resource	Preferred Alternative	Alternative One	Alternative Two	Alternative Three	Alternative Four	No-Action Alternative	
1 2 S 97	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 and adverse impacts would occur.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
		Areas of cultural value to American Indians would be protected, but development would be allowed within the viewscapes of some of those areas.	Same as the Preferred Alternative.	Same as the Preferred Alternative, but viewscapes would also be protected.	Areas of cultural value to American Indian tribes could be developed and development could occur within culturally significant viewscapes.	Same as Alternative Two.	Same as Alternative Three.
		Economic development of Hanford Site lands would be neutral in low-income and minority communities within the assessment area.	Limitation on development could adversely impact low-income populations. However, local low-income populations are not greatly influenced by Hanford Site spending.	Same as Alternative One.	Same as Preferred Alternative.	Same as Preferred Alternative.	Same as Preferred Alternative.
		Prohibiting agriculture on the Wahluke Slope would not change the current condition.	Same as the Preferred Alternative.	Same as the Preferred Alternative.	Agriculture would be allowed on the Wahluke Slope, potentially benefitting low-income and minority populations.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
3	HUMAN HEALTH	Increased access to Hanford Site lands would increase the potential for health risks.	Less than the Preferred Alternative.	Access to Hanford would be limited and the potential for health risks would be minimized.	Greater than the Preferred Alternative because of the intensity of use.	Less than the Preferred Alternative.	Access would be restricted and risks would be less than for the Preferred Alternative.

Table S-6. Summary of Potential Impacts to Hanford Site Resources. (9 pages)

Resource	Preferred Alternative	Alternative One	Alternative Two	Alternative Three	Alternative Four	No-Action Alternative
1 598	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 3 4 Summary	Remediation to an Industrial standard in the 300 and 200 areas would involve less remediation worker risk from hazardous materials exposure and cumulative equipment operation time than some of the CRCIA scenarios could require for non-industrial uses. Actual remediation scenario will be picked through the CERCLA/RCRA process which could require more or less remediation based on the scenario chosen.	Minimum Industrial development could require more remediation worker risk exposure than Preferred Alternative.	Minimum Industrial development could require the most remediation worker risk exposure.	Maximum Industrial development could require the least remediation worker risk exposure.	Industrial development between Alternative One and the Preferred Alternative.	Minimal increase in changes of land use from open space reserved designation. The validity of an Industrial remediation scenario could be questioned without an integrated GMA Industrial designation. Actual remediation scenario will be picked through the CERCLA/RCRA process which could require more or less remediation based on the scenario chosen.

1 operators have an annual 28.3 fatalities per 100,000 workers. The Agriculture land-use
2 designation would expose workers to annual occupational fatality rates of 31.3 fatalities per
3 100,000 workers for crop production, 12.2 fatalities per 100,000 workers for livestock production
4 and 14.3 fatalities per 100,000 workers for agricultural services (see Table S-4).

5

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

13

14 **S5.6 Cumulative Impacts**

15

16 This section summarizes cumulative impacts associated with Hanford Site land-use
17 designations for each alternative identified in Chapter S3. Cumulative impacts result

18

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

24

25 Reasonably foreseeable actions are identified and the relationship between these actions and
26 the proposed land-use designations is discussed. The description of potential cumulative
27 impacts couples impacts of each alternative with impacts from past and existing operations at
28 the Hanford Site and impacts that may be associated with anticipated future actions.
29 Section S5.6.1 discusses cumulative impacts to land use associated with present and
30 reasonably foreseeable actions; Section S5.6.2 discusses cumulative impacts to trustee
31 resources; and Sections S5.6.3 and S5.6.4 discuss cumulative socioeconomic impacts and
32 cumulative human health risk, respectively.

33

34 **S5.6.1 Cumulative Impacts to Land Use**

35

36 The alternatives analyzed in this document would establish acceptable uses for Hanford
37 Site lands for at least the next 50 years. The alternative identified and selected for
38 implementation in the ROD would allocate lands for use under the defined land-use
39 designations. Other present and reasonably foreseeable actions at the Hanford Site that involve
40 siting new facilities or using Site resources also would, in effect, allocate lands for certain uses.
41 Those present and reasonably foreseeable actions that involve land uses that are compatible
42 with the proposed land-use designations under all the alternatives would not have cumulative
43 impacts for land use; these actions are listed in Table S-7. However, those present and
44 reasonably foreseeable actions that do not conform with the proposed land-use designations
45 would change the land-use allocations and, in this sense, could be considered to have
46 cumulative impacts. Those present and reasonably foreseeable actions involving
47 nonconforming uses are listed in Table S-8.

48

49 The five actions listed in Table S-8 could involve land uses that conflict with land-use
50 designations under some alternatives. The USFWS is initiating a Comprehensive Conservation
51 Plan (CCP) for the ALE Reserve. Assuming that the USFWS management plan would call for
52 maintaining the ALE Reserve in its present, Preservation and Conservation type of
53 management, the management plan would not conflict with any of the proposed land-use
54 designations. If the USFWS plan only addresses preservation, then the proposed mining

1 alternative on ALE, in lieu of the McGee Ranch mining area, would be in conflict with the DOE
2 Preferred Alternative and Alternatives Three and Four.

3

4 A similar situation exists with the alternative selected in the ROD for the Hanford Reach,
5 which calls for designating the Wahluke Slope as an overlay wildlife refuge and designating the
6 Columbia River Corridor on the Hanford Site (i.e., the Hanford Reach) as a Wild and Scenic
7 Recreational River. These designations could result in the management of the Wahluke Slope
8 and the Columbia River Corridor as Preservation, Conservation, or Agriculture depending on the
9 USFWS's CCP and intent for establishing the refuge. The management of the Wahluke Slope
10 as a wildlife refuge could conflict with the Agriculture land-use designation under Alternative
11 Three unless a purpose of establishing the refuge as defined in the USFWS's CCP included
12 sharecropping for wildlife. The need to link agriculture to furthering the purposes of wildlife is the
13 reason agriculture appears as a conflict in Table S-7. Of the 181 National Wildlife Refuges with
14 farming programs in 1989, 612 km² (233 mi²) of the 129 refuges were farmed by permittees who
15 retained a share of the crop in return for costs incurred to farm the land. On the remaining
16 refuges, Service personnel conducted farming operations with government equipment.

17

18 The remaining nonconforming uses listed in Table S-8 involve present or upcoming
19 actions that would conflict with land-use designations. The operation of LIGO would be
20 considered a pre-existing, nonconforming use under Alternative One, and also under Alternative
21 Four, which could require that the LIGO site be restored to the designated use at the end of the
22 facility's life. Operation of LIGO conflicts with Conservation mining designations because of the
23 facility's sensitivity to vibrations.

24

25 The Inert/Demolition Waste Landfill proposed for Pit 9 involves using an existing gravel
26 pit located north of the 300 Area for disposal of inert and demolition wastes from the 300 Area.
27 This would be classified as an Industrial land use, and would be considered a pre-existing,
28 nonconforming use under Alternative One, Alternative Two, and Alternative Four. The proposed
29 salvage and demolition of the 300 Area Steam Plant calls for obtaining fill from Pit 9 for filling
30 voids and constructing the final cover. The use of Pit 9 for quarrying materials would be a pre-
31 existing, nonconforming use under Alternative One, Alternative Two, and Alternative Four. The
32 B-Reactor Museum would be in conflict with the Preservation designation of Alternative Four.
33 Management and mitigation of these nonconforming land uses would be accomplished through
34 the CLUP policies and implementing procedures as explained in Chapter 6 of the EIS.

35

36 **S5.6.2 Cumulative Impacts by Trustee Resource**

37

38 **S5.6.2.1 Geologic Resources.** Geologic resources on the Hanford Site include unique
39 features that have been preserved while similar features in the region have been damaged or
40 destroyed by development. Mining of geologic materials for governmental purposes, if permitted |
41 by DOE, would be allowed under all alternatives being considered, except Alternative Two, and |
42 could damage or destroy unique geologic features, such as Missoula Floods features and sand |
43 dunes. Mining under the No-Action Alternative and Alternative Three, could also impact basalt |
44 outcrops, such as Umtanum Ridge, Gable Mountain, and Gable Butte. Because these features |
45 are rare and susceptible to development elsewhere in the region, damage or destruction of |
46 these features on the Hanford Site would increase their aesthetic and ecological value offsite, |
47 and decrease their availability for scientific study.

48

49 Alternative Three would allow development of cultivated agriculture on the Wahluke
50 Slope. Increasing irrigated lands in the vicinity of the White Bluffs would cumulatively increase
51 groundwater recharge in the area and also could result in additional slumping of the White Bluffs.
52 Additional slumping of the White Bluffs would further reduce their aesthetic, historic, and
53

1 **Table S-7. Present or Reasonably Foreseeable Future Actions Compatible with Land-Use**
 2 **Designations under All Alternatives.**

3 Present or Reasonably Foreseeable 4 Future Action	5 Location	6 Land Use
5 Wild and Scenic River Designation for Hanford Reach	6 Hanford Reach	7 Preservation
6 Decommissioning of Eight Surplus Production Reactors	200 Areas (disposal)	Industrial-Exclusive
7 Deactivation of the N Reactor	200 Areas (disposal)	Industrial-Exclusive
8 Safe Interim Storage of Hanford Tank Wastes	200 Areas	Industrial-Exclusive
9 Tank Waste Remediation System	200 Areas	Industrial-Exclusive
10 Plutonium Finishing Plant Stabilization	200 Areas	Industrial-Exclusive
11 Decommissioning of Building 232-Z and Building 233-S	200 Areas	Industrial-Exclusive
12 Environmental Restoration Disposal Facility Expansion	200 Areas	Industrial-Exclusive
13 Spent Nuclear Fuel Management	200 Areas	Industrial-Exclusive
14 200 Area Effluent Treatment Facility	200 Areas	Industrial-Exclusive
15 Operation of 200 Areas LLW Burial Grounds	200 Areas	Industrial-Exclusive
16 Operation of U.S. Ecology Commercial LLW Burial Ground	200 Areas	Industrial-Exclusive
17 Solid Waste Retrieval Complex, Enhanced Radioactive and 18 Mixed Waste Storage Facility, and Central Waste Support 19 Complex	200 Areas	Industrial-Exclusive
20 Tank 241-C-106 Sluicing and Waste Removal	200 Areas	Industrial-Exclusive
21 Special Case Waste Storage Facility	200 Areas	Industrial-Exclusive
22 Disposal of Decommissioned Naval Reactor Plants	200 Areas	Industrial-Exclusive
23 Environmental Molecular Sciences Laboratory	300 Area	Industrial, Research & Development (R&D)
24 Disposition of Sodium Test Loops	200 Areas, 300 Area	Industrial-Exclusive, Industrial, R&D
25 Fast Flux Test Facility	400 Area	Industrial, R&D
26 Disposal of S3G and D1G Prototype Reactor Plants	200 Areas	Industrial-Exclusive
27 Hanford Solid Waste EIS	200 Areas	Industrial-Exclusive
28 Offsite Thermal Treatment of Low-Level Mixed Waste	200 Areas, City of Richland	Industrial-Exclusive, Industrial, R&D
29 200 Area Emergency Facilities Campus	200 Areas	Industrial-Exclusive
30 300 Area Steam Replacement	300 Area	Industrial, R&D
31 Lead Test Assembly Irradiation and Analysis	200 Areas, 300 Area	Industrial-Exclusive, Industrial, R&D
32 Management of Hanford Site Non-Defense Production 33 Reactor Spent Nuclear Fuel	200 Areas	Industrial-Exclusive
34 Relocation and Storage of Sealed Isotopic Heat Sources	200 Areas	Industrial-Exclusive
35 Trench 33 and 36 Widening in 218-W-5 LLW Burial Ground	200 Areas	Industrial-Exclusive
36 <i>Idaho High Level Waste and Facility Disposition Environmental Impact Statement (DOE/EIS-0287)</i>	200 Areas	Industrial-Exclusive
38 Implementation of Final Waste Management Programmatic 39 EIS (DOE/EIS-0200) RODs	200 Areas	Industrial-Exclusive
40 Expansion of the Energy Northwest (formerly known as 41 WPPSS) area industrial facilities (natural gas fired electric 42 generator turbine or aluminum smelter)	600 Area	Industrial, R&D

43

1 **Table S-8. Present or Reasonably Foreseeable Future Actions with Nonconforming Land**
 2 **Uses.**

3 4 5 Present or Reasonably Foreseeable Future Action	Nonconforming Land-Use Designations T = nonconforming					
	No- Action	Preferred Alternative	Alternative One	Alternative Two	Alternative Three	Alternative Four
6 7 8 9 Development of a Comprehensive Conservation Plan for the ALE Reserve by the USFWS (Preservation)	N/A	T Conservation (Mining)			T Conservation (Mining)	T Conservation (Mining)
10 11 12 Designation of the Wahluke Slope as a National Wildlife Refuge (Preservation)	N/A				T Agriculture	
13 14 15 16 17 Operation of the Laser Interferometer Gravitational Wave Observatory (Research and Development)	N/A	T Conservation (Mining)	T Conservation (Mining)		T Conservation (Mining)	T Conservation (Mining)
18 19 Inert/Demolition Waste Landfill (Pit 9) (Industrial)	N/A		T Preservation	T Preservation		T Preservation
20 21 B-Reactor Museum (High-Intensity Recreation)	N/A					T Preservation

22
23 ecological value; would cumulatively increase sedimentation of the Columbia River; and could
24 accelerate riverbank and island erosion. The No-Action Alternative would also continue the
25 WDFW's management practice of growing crops for wildlife management purposes on the
26 Wahluke Slope as long as the practice is compatible with the USFWS's CCP.
27

28 **S5.6.2.2 Water Resources.** Water resources on the Hanford Site, including groundwater and
29 surface water, have been impacted by past waste disposal practices at Hanford. Remediation
30 strategies for cleaning up past contamination are designed for current and predicted future
31 hydrologic conditions. Additional development on the Hanford Site could alter hydrologic
32 conditions, disrupt CERCLA ROD conditions, and increase impacts to water quality from
33 contamination.

34
35 Industrial development would be allowed under all alternatives being considered and
36 would increase groundwater consumption and alter groundwater hydrology. Changes to
37 groundwater hydrology as a result of aquifer drawdown and discharges to the soil column could
38 alter the rate of the movement of contaminants toward the Columbia River or in any other
39 direction. Groundwater recharge from industrial waste water discharges and collection and
40 infiltration of runoff in quarries could mobilize contaminants in the vadose zone and cumulatively
41 increase contaminant levels in groundwater.
42

43 The DOE Preferred Alternative and Alternatives One, Three, and Four would increase
44 recreational use of the Columbia River over existing levels, which would cumulatively increase
45 levels of oil, gas, and engine exhaust discharged to the river; and increase riverbank and island
46 erosion from boat wakes. Unregulated non-point sources associated with industrial
47 development and mining could add to pollutants discharged to the river from upstream sources,
48 resulting in further water quality degradation. Mining and grazing along the Columbia River
49 Corridor, which would be allowed under the No-Action Alternative, would increase sedimentation
50 in the river, with possible cumulative impacts on spawning areas in the Columbia River.
51

52 **S5.6.2.3 Biological Resources.** Because the Hanford Site contains much of remaining
53 undisturbed Columbia Basin shrub-steppe habitat, proposed developments of undisturbed areas
54 would result in cumulative impacts to rare plants and animals, unique plant communities, and
55 terrestrial and aquatic ecosystems. In addition, the Hanford Site contains the last unimpounded,

1 nontidal segment of the Columbia River and further development along the Reach could result in
2 cumulative losses to species and habitats associated with the Hanford Reach. In some cases
3 (e.g., Upper Columbia River spring run chinook salmon [Endangered listed-3/99], Middle
4 Columbia River steelhead [Threatened listed-3/99], and Upper Columbia River steelhead
5 [Endangered listed -8/97]), further losses of habitat could endanger remaining populations.
6

7 The Industrial, Research and Development, and Industrial-Exclusive land-use
8 designations would allow industrial development to displace native plant communities and
9 wildlife habitats where the habitats still exist. In addition, ongoing remediation activities, such as
10 the decommissioning of surplus production reactors, would result in further habitat losses.
11 Many of the actions listed in Table S-7 for the 200 Areas would involve small losses of habitat,
12 but expansion of the Environmental Restoration and Disposal Facility (ERDF) and other future
13 actions in the 200 Areas could involve larger losses, with cumulative impacts to shrub-steppe
14 habitat. Alternatives One and Two would limit cumulative impacts in the 200 Areas by reducing
15 the size of the Industrial-Exclusive land-use designation.
16

17 The Conservation land-use designations could result in cumulative impacts by allowing
18 commercial livestock grazing and mining. Cumulative impacts from grazing are most likely
19 under the No-Action Alternative, which would allow commercial grazing over the largest area and|
20 could result in further losses of regional biodiversity.
21

22 Although basalt and sand and gravel quarries are unlikely to have cumulative impacts
23 because they would disturb relatively small areas, large-scale soil mining to support
24 governmental purposes could result in large habitat losses. If permitted by DOE, the potential |
25 for cumulative effects from mining are greatest under the No-Action Alternative and Alternative
26 Three, which would allow development of quarry sites at the McGee Ranch. Losses of
27 shrub-steppe habitat in this area could eliminate the remaining segments of the wildlife
28 movement corridor between the Hanford Site and the Yakima Training Center, which are among
29 the last remaining large tracts of shrub-steppe habitat in the region. Mining in the McGee Ranch
30 area would add to habitat fragmentation that has previously taken place in the region as a result
31 of agricultural, residential, and industrial development; and could further reduce regional
32 biodiversity.
33

34 Increased recreational use associated with the Wild and Scenic River designation and
35 High- or Low-Intensity Recreation land-use designations under the Preferred Alternative and
36 Alternatives One, Three, and Four could result in cumulative impacts to wildlife and habitats that
37 are not currently accessible by the public under the No-Action Alternative. Recreation
38 designations would increase impacts from boating as well as foot traffic on sensitive plant
39 communities and habitats.
40

41 The potential for cumulative impacts to biological resources may best be evaluated by
42 determining the amount of BRMaP Level III and IV resources that could be affected. The BRMaP
43 III and IV designations identify the resources that could be most adversely affected by further
44 habitat losses. Alternative Three has the greatest potential to impact Level III and IV resources,
45 primarily because it would allow conversion of native plant communities on the Wahluke Slope
46 to cultivated agriculture. The Preferred Alternative and the No-Action Alternative would have less
47 potential for impacts to BRMaP Level III and IV resources, but are more likely to impact those
48 resources than Alternatives One, Two, or Four. Alternative Two is least likely to have cumulative
49 effects on biological resources, based on the amounts of BRMaP Level III and IV resources that
50 could be impacted by development.
51

52 **S5.6.2.4 Cultural Resources.** Regionally, agricultural, industrial, and residential development
53 have damaged or destroyed cultural resources. In addition, construction of dams along the
54 Columbia River has inundated many cultural resources and sites of significance to American |

1 Indian tribes. Cultural resources on the Hanford Site have been preserved by access
2 restrictions for the past 55 years. Preservation of the Hanford Reach as the last free-flowing
3 stretch of Columbia River would also preserve cultural resources associated with the river.
4 Loss of these sites through development of Hanford Site lands could lead to potentially
5 significant impacts on the remaining cultural resources in the region.

6

7 The biological resources on the Hanford Site are also important to American Indian tribes |
8 for traditional subsistence uses. In addition, the Hanford Site includes religious sites important to
9 American Indians. American Indian tribes with ties to the Hanford Site have long advocated the
10 protection of these resources in their efforts to maintain their cultures and traditional life ways.
11 Further losses of these resources could impact American Indian cultures associated with the
12 Hanford Site.

13

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

21

22 Industrial development under any of the alternatives has the potential to disturb
23 archaeological and historic sites. Alternatives One and Two are least likely to result in
24 cumulative impacts because these alternatives would minimize the amount of land designated
25 for Industrial, Research and Development, and Industrial-Exclusive land uses. Ongoing
26 remediation activities and some of the proposed projects listed in Table S-8 could also have |
27 cumulative effects on cultural resources.

28

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

34

35 **S5.6.2.5 Aesthetic Resources.** The large, undeveloped portions of the Hanford Site and
36 features such as the basalt outcrops, Rattlesnake Mountain, the White Bluffs, and the Columbia
37 River Corridor have aesthetic values that are unique to the region. Industrial development
38 associated with past Hanford operations has altered some viewsheds. Future development of
39 Hanford Site lands could further alter viewsheds and reduce the aesthetic value by increasing
40 airborne particulate, odors, or other pollutants.

41

42 The potential for cumulative impacts to viewsheds would be greatest under the No-Action
43 Alternative, which would allow development of Hanford Site lands on a project-by-project basis.
44 This alternative is more likely to result in the siting and construction of industrial developments in
45 previously undisturbed viewsheds. Alternative Three could also have cumulative impacts to
46 viewsheds by allowing, if permitted by DOE, quarrying on basalt outcrops, the conversion of
47 native plant communities on the Wahluke Slope to crop land and orchards, and development of
48 High-Intensity Recreational facilities adjacent to the Columbia River Corridor. Future industrial
49 development under the Industrial-Exclusive land-use designation, along with proposed and
50 planned actions listed in Table S-7, would have cumulative effects on viewsheds that would be |
51 similar under the alternatives being considered.

52

53 Alternative Three also has the greatest potential for cumulative impacts on visibility
54 associated with air quality. The conversion of much of the Wahluke Slope to agriculture would
55 create a significant new source of fugitive dust from cultivated fields. Industrial development

1 under this alternative as well as all other alternatives being considered could also result in new
2 sources of industrial pollutants, which could further diminish visibility.

3
4 Future development could also increase ambient noise levels, which would detract from
5 the recreational experience associated with the Columbia River Corridor and other natural areas
6 on the Hanford Site. Cumulative increases in noise are most likely occur under the No-Action
7 Alternative, which could allow industrial development along the Columbia River. Mining along the
8 river corridor, which could occur under the No-Action Alternative, could also increase noise
9 impacts. Increases in High-Intensity Recreational land-use activities such as Alternative Three's
10 proposed destination resort and RV camps or the DOE Preferred Alternative's and Alternative
11 Four's proposed Tribal fishing camps, could also increase the noise along the river and distract
12 from the aesthetic experience.

13

14 S5.6.3 Cumulative Socioeconomic Impacts

15

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

23

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

31

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

38

39 S5.6.4 Cumulative Human Health Risk

40

41 Risks due to exposure to residual contamination remaining after completion of CERCLA
42 activities would be dependent on the level of access to any particular area where residual
43 contamination remained. New wastes could be imported for disposal consistent with the RODs
44 for the *Waste Management Programmatic Environmental Impact Statement* (DOE/EIS-0200,
45 May 1997). Health risks from the new wastes would be principally to workers and could include
46 physical hazards and latent cancer fatalities from waste management activities over the 20-year
47 period of waste movements analyzed. Collective worker health risk estimates for the potential
48 new wastes are one fatality for Low-Level Mixed Waste, three fatalities for High-Level Waste,
49 and up to four fatalities for Low-Level Waste, depending on whether Hanford is selected as a
50 treatment or Low-Level Waste disposal site. Less than one latent cancer fatality is estimated
51 among the offsite population. These proposed waste management activities could greatly
52 increase waste shipments entering or leaving the site.

53

54 Consequently, the cumulative health risk to humans would be expected to be greatest
55 under Alternative Three because it would provide greater access to more areas and would

1 provide more opportunities for development of Hanford Site lands than would the other
2 alternatives. Conversely, Alternative Two would have the least potential for cumulative human
3 health risks, because it would provide the least access to Hanford Site lands.

4

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

13

14 **S5.7 Other NEPA Considerations**

15

16 **S5.7.1 Unavoidable Adverse Impacts**

17

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

23

24 **S5.7.2 Irreversible and Irretrievable Commitments of Resources**

25

26 Irreversible and irretrievable (I&I) commitments of resources are related to use of
27 nonrenewable resources and the effects that consumption of those resources could have on
28 future generations. Irreversible effects occur as a result of use or destruction of a resource
29 (e.g., energy and minerals) that cannot be replaced within a reasonable time. Irretrievable
30 resources commitments involve the loss in value of an affected resource that cannot be
31 restored (e.g., extinction of a species or disturbance of a cultural site). This land-use plan would
32 establish programmatic land-use policies and implementing procedures that would influence
33 how natural resources are consumed by specific projects in the future. After incorporating by
34 reference the previous 1975 ERDA 1538 irreversible and irretrievable (I&I) commitments and
35 other documented commitments into this EIS (see Section 1.2), future individual project land-
36 use requirements would be I&I committed through the appropriate NEPA and
37 CERCLA/RCRA/NEPA integrated processes.

38

39

40 **S6.0 Implementation of the Comprehensive Land-Use 41 Plan**

42

43 This section provides an overview of the policies and implementing procedures that
44 would be used by DOE to implement the CLUP following the Record of Decision for the *Hanford*
45 *Comprehensive Land-Use Plan Environmental Impact Statement* (HCP EIS).

46

1
2 The DOE is expected to use this land-use plan in its decision-making process to
3 establish what is the "highest and best use"³ of the land (41 CFR 101-47, Federal Property
4 Management Regulations). The final selection of a land-use map, land-use policies and
5 implementing procedures, would create the working CLUP when they are adopted through the
6 ROD for this EIS.

7
8 Once adopted, the CLUP would provide the framework within which future use of the
9 Hanford Site's lands and resources occurs. In developing the CLUP DOE will have considered |
10 the visions, goals, and objectives articulated by participants in the land-use planning process.
11 This framework consists of four basic elements:

12
13 1. A final **Hanford CLUP Land-Use Map**, depicting land uses for the Site. The ROD
14 for this EIS will select one of the alternative land-use maps presented in Chapter S3
15 or will select a land-use map such as the new Preferred Alternative that combines |
16 features of several alternatives.

17
18 2. **Hanford CLUP Land-Use Definitions**, describing the purpose, intent, and principal
19 use(s) of each of the land-use designations on the adopted CLUP map (see Table S-
20 1).

21
22 3. **Hanford CLUP Policies**, directing land-use actions. These policies will help to
23 ensure that individual actions of successive managers collectively advance the
24 adopted CLUP map, goals, and objectives over time.

25
26 4. **Hanford CLUP Implementing Procedures**, including:

27
28 C Administrative procedures for reviewing and approving Use Requests for
29 consistency with the CLUP

30
31 C A Site Planning Advisory Board (SPAB) consisting of representatives from DOE, |
32 the cooperating agencies and the affected Tribal governments

33
34 C Actions which, after plan adoption, shall be undertaken to align and coordinate
35 existing and new "area" and "resource" management plans for the Site (e.g., the
36 CCP for the ALE Reserve; fire; cultural and historical resources; and species
37 management), with the policies and land-use designations of the CLUP.

38
39 For all proposals and projects, the above procedures and actions would be integrated
40 with existing DOE land-use review procedures (e.g., biological, cultural, and the NEPA), while
41 DOE maintains control of the land. The DOE has the final determination and approval of all
42 land-use decisions taking place on the Hanford-site land under DOE authority.

43
3 Section 101-47.4909 of the Federal Property Management Regulations defines the "highest and
best use" as that use to which a property can be put that produces the highest monetary return
from the property, promotes its maximum value, or serves a public or institutional purpose. The
"highest and best use" determination must be based upon the property's economic potential,
qualitative values inherent in the property, and utilization factors affecting land use such as
zoning, physical characteristics, other private and public uses in the vicinity, neighboring
improvements, utility services, access, roads, location, and environmental and historical
considerations.

1 **S6.1 Definitions and Descriptions of Land-Use Map Designations**

2
3 The land-use designations of each alternative land-use map depict land uses that could
4 occur on the Site. The definitions of the various land-use designations are provided in
5 Table S-1. These land-use designations and their definitions and descriptions were co-
6 developed by the cooperating agencies and consulting Tribal governments.

7
8 **S6.2 Definitions for Terms Relating to Plan Implementation**

9
10 The following three definitions – Allowable Use, Special Use, and Amendments – relate
11 the land-use policies to the land-use maps:

- 12 • **Allowable Use** – Any reservation of land for a physical development or land-use
13 activity that is consistent with the land-use designation and policies of the land-use
14 map and CLUP, or a specifically identified part of an approved area management
15 plan (AMP), except for “Amendments” or uses that are identified as “Special Use.”
16 Any new remediation project or support activity that is Categorically Excluded under
17 DOE’s NEPA Regulations (10 CFR 1021) is an allowable use, except projects
18 proposed in the Preservation designation.
- 19
20 • **Special Use** – Activities requiring further review and approval prior to being allowed.
21 The following are special uses.
- 22 1. Any physical development or land-use activity in the Preservation designation.
- 23 2. Any physical development or land-use activity in the Conservation designation
24 that is not Categorically Excluded under DOE’s NEPA Regulations (10 CFR
25 1021)
- 26 3. AMPs outside of the 200, 300, and 400 Areas
- 27 4. Any proposed new development that is inconsistent with the land-use designation
28 of the adopted local counties’ or cities’ comprehensive plans for the Hanford Site
- 29 5. Mining or grazing activities within areas designated for Conservation
- 30 6. Any proposed new project that is located within an area that has a deed or
31 covenant restriction as a result of the remediation process (e.g., institutional
32 controls)
- 33 7. Additions to or enlargements of pre-existing, nonconforming uses
- 34 8. Any proposed new project that establishes an exclusive use zone (EUZ) over
35 lands not currently under an EUZ.

- 36
37 C **Amendments** – Amendments are required for the following:

- 38 1. Any change to the map land-use designation of an area
- 39 2. Any change to CLUP policy
- 40 3. Any change in the use of land or an existing facility to a use that is inconsistent
41 with the land-use designation.

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

- 3
- 4 C **Area Management Plans (AMPs)** – Management plans for specific geographic
5 areas, which may include specific resource management plans, mitigation
6 strategies, and various uses and facilities. An AMP shall be consistent with the
7 CLUP's land-use designations and policies.
- 8
- 9 C **Use Request** – A Use Request is a proposal to use land or a facility for an activity
10 different from what is currently occurring. Use Requests can include site
11 preparations, leasing, granting right-of-ways, or any other land-use related activities.
- 12
- 13 C **Policy** – Policies are statements of intent which direct decisions toward the
14 accomplishment of adopted goals and objectives. Policies are applied on a
15 continuous basis and applied consistently over time.
- 16
- 17 C **Pre-existing, Nonconforming Use** – Any existing lawfully established use that is
18 neither allowed nor conditionally permitted within a land-use designation, but exists
19 therein, having been established prior to the CLUP land-use designation.
- 20
- 21 C **Resource Management Plan (RMP)** – An RMP contains adopted management
22 standards and strategies for a specific resource. Generally, resources subject to
23 RMPs are not confined to geographically discrete areas and they are not static
24 (i.e., their characteristics and conditions often vary in time and/or location across the
25 Site). Examples of resources which have RMPs are biological resources (BRMaP),
26 cultural resources (CRMP), and the *Bald Eagle Management Plan*. The provisions of
27 each RMP apply wherever its subject resource occurs on the Site, except for areas
28 specifically exempted within the RMP itself.

29

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

- 34
- 35 C **RL Manager** – The RL Manager is the Manager of DOE's Richland Operations
36 Office (RL).

- 37
- 38 C **RL Site Management Board (SMB)** – The SMB is chaired by the Site Deputy
39 Manager and comprises selected members of RL senior management staff.

- 40
- 41 C **Real Estate Officer (REO)** – The REO, from the RL Site Services Division (SSD), is |
42 the single point of contact for reviewing, processing, and coordinating land-use
43 activities on the Hanford Site.

- 44
- 45 C **Shall** – For the purpose of Chapter 6 of the Final HCP EIS, “shall” refers to activities |
46 that would be mandatory if adopted by the ROD.

- 47
- 48 C **Should** – For the purpose of Chapter 6 of the Final HCP EIS, “should” refers to |
49 activities that would be discretionary if adopted by the ROD.

- 50
- 51 C **Site Planning Advisory Board (SPAB)** – The SPAB is an advisory board to land-|
52 use matters on the Hanford Site. The SPAB consists of representatives from the
53 cooperating agencies with land-use authority, and affected Tribal governments. The |

1 SPAB reviews Use Requests that are not "allowable uses" and makes
2 recommendations to DOE.
3
4

|

5 **S6.3 Hanford CLUP Policies**

6

7 The Hanford CLUP policies connect all the CLUP elements. It is expected that the ROD
8 for this EIS would set forth the following policies:
9

- 10 C Establish land-use mitigation procedures
11
- 12 C Establish hierarchies, priorities, and standards relating to land use, resource use,
13 and values
14
- 15 C Integrate competing land and resource goals and objectives
16
- 17 C Provide reference points for addressing unanticipated circumstances and making
18 actual Amendments to the CLUP when necessary
19
- 20 C Identify which RMPs or AMPs shall be considered for development or revision as part
21 of the CLUP implementation.
22

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

27 The proposed Hanford CLUP policies are described below. They are a synthesis of
28 stated values and objectives from DOE, the Future Site Uses Working Group, the Hanford
29 Advisory Board, the August 1996 Draft HRA-EIS public hearing and public meetings, cooperating
30 agencies, consulting Tribal governments, and those associated with municipal and county land-
31 use planning principles.
32

33 **S6.3.1 Overall Policy**

34 The CLUP policy would accomplish the following for the Hanford Site:
35

- 36 1. Protect the Columbia River and associated natural and cultural resources and water
37 quality.
38
- 39 2. Wherever possible, locate new development, including clean-up and remediation-
40 related projects, in previously disturbed areas.
41
- 42 3. Protect and preserve the natural and cultural resources of the Hanford Site for the
43 enjoyment, education, study, and use of future generations.
44
- 45 4. Honor treaties with American Indian Tribes as they relate to land uses and resource
46 uses.
47
- 48 5. Reduce Exclusive Use Zone (EUZ) areas to maximize the amount of land available
49 for alternate uses while still protecting the public from inherently hazardous
50 operations.
51

- 1 6. Allow access for other uses (e.g., recreation) outside of active waste management
2 areas, consistent with the land-use designation.
3
4 7. Ensure that a public-involvement process is used for amending the CLUP and land-
5 use designations to respond to changing conditions.
6
7 8. As feasible and practical, remove pre-existing, nonconforming uses.
8
9 9. Facilitate cleanup and waste management.

10 **S6.3.2 Protection of Environmental Resources**

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

- 12 1. Implement DOE's Land- and Facility-Use Policy (DOE P 430.1) which is to protect
13 and sustain native species and their habitats on the Site. The Conservation and
14 Preservation land-use designations are the primary land-use controls to accomplish
15 this policy. Within the Conservation and Preservation designations, land uses shall
16 be consistent with the purpose of the designation and significant impacts shall be
17 mitigated. Implementation mechanisms such as the *Draft Hanford Site Biological*
18 *Resources Management Plan* (BRMaP), the *Draft Hanford Site Biological Resources*
19 *Mitigation Strategy Plan* (BRMiS), the *Hanford Site Ground-Water Protection*
20 *Management Plan*, and cultural management plans augment these designations for
21 development review and approval sitewide. Developments for public access and
22 recreation should be according to adopted AMPs depicting management of use, and
23 siting of support facilities.
- 24 2. Within land-use designations other than Conservation and Preservation, mitigate
25 significant unavoidable (residual) impacts at locations by enhancing habitats within
26 the Conservation or Preservation designations. To accomplish this, undertake the
27 following actions:
28
29 a. Modify the BRMaP and BRMiS to be consistent with this policy and with
30 implementing procedures.
31
32 b. Review habitat management plans to redirect their mitigation actions and
33 strategies, where necessary and possible, to the established Conservation and
34 Preservation areas.
35
36 c. Consider provisions for the protection of "vulnerable aggregations," as defined by
37 the WDFW, for nongame species wherever they occur on the Site.
38
39 3. Require that projects have reasonable setbacks from the Preservation and
40 Conservation features of importance.
41
42 a. Within all land-use designations, require that land not be cleared until a specific
43 project has been approved consistent with DOE's NEPA Regulations (10 CFR
44 1021).

45 **S6.3.3 Protection of Cultural Resources**

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

- 47 1. Implement DOE's Land- and Facility-Use Policy (DOE P 430.1) which is to protect
48 and sustain cultural resources on the Site. The Conservation and Preservation land-

use designations are the primary land-use controls to accomplish this policy. The CRMP addresses those actions where land-use controls are not the appropriate mitigation (i.e., if a cultural resource is found in an Industrial designation, provisions of the CRMP would be applied to mitigate impacts to the resource). Within the Conservation and Preservation designations, land uses shall be consistent with the purpose of the designation and significant impacts mitigated. Implementation mechanisms such as the CRMP, and habitat management plans augment these designations for site-wide reviewing and approving proposed development. Developments for public access and recreation should be according to adopted AMPs depicting management of use, and siting of support facilities.

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

S6.3.4 Siting New Development

The CLUP policy would accomplish the following for the Site:

1. Locate and approve new developments in areas consistent with the adopted Hanford CLUP.
2. Locate proposed projects, as feasible and practical, in those areas of the Hanford Site where the adopted CLUP and the local cities' and counties' land-use maps are consistent.
3. Within all land-use designations, previously disturbed areas (as identified by the BRMaP and CRMP) should be developed first, followed by the acreages with the least sensitive biological and cultural resources. Within the site plan of any proposed new development, the acreages with the most sensitive biological and cultural resources should be worked into natural open space for landscaping, buffers, natural drainage areas, etc.
4. Focus on using existing infrastructure and developed areas for new projects within a land-use designation.
 - a. Locate new development in close proximity to existing infrastructure unless a project requires an isolated site away from incompatible uses.
 - b. Concentrate development on or adjacent to existing infrastructure. Where extensions of infrastructure are necessary, minimize the extension of infrastructure into undeveloped areas.
 - c. Site, plan, and design development to avoid significant impacts on resources. Mitigate unavoidable impacts through design to minimize impacts and mitigation costs associated with biological, cultural, air and groundwater resources.

S6.3.5 Utility and Transportation Corridors

The CLUP policy would accomplish the following for the Site:

1. With to-be-identified exception(s), existing utility and transportation corridor right-of-ways are the preferred routes for expanded capacity and new infrastructure.
2. Existing utility corridors that are in actual service, clearly delineated, and of defined width, are not considered "nonconforming" uses in any land-use designation.

3. Utility corridors and systems without the characteristics of number two (above) are considered to be nonconforming uses and shall be identified in the applicable RMP or AMP.
4. Avoid the establishment of new utility corridors within the Conservation and Preservation designations unless the use of an existing corridor(s) is infeasible or impractical.
5. Avoid the location of new above-ground utility corridors and systems in the immediate viewshed of an American Indian sacred site. Prioritize for removal, as funding is available, existing nonconforming utility corridors and systems in such areas.

S6.3.6 Economic Development and Diversification

- The CLUP policy would promote the following for the Site:
1. Multiple land uses for both the private and public sector.
 2. Protection and maintenance of existing functional infrastructure and utilities for use in economic development and Site transition.
 3. Future Federal missions and programs, consistent with the provisions of the CLUP.
 4. Protection of natural, historic, and cultural resources to assure continued biodiversity and cultural values as essential elements of a recreation and tourism economy.
 5. Reduction or elimination of existing conditions which are impediments to the realization of the land-use designations (e.g., scattered withdrawn Public Domain land, contamination, and nonconforming and abandoned developments).

S6.4 Organizational Structure and Procedure for Review and Approval of Use Requests

The existing organizational structure within DOE would implement the Hanford CLUP, augmented with a SPAB consisting of representatives from the cooperating agencies and affected Tribal governments (Figure S-31).

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

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

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

- 1 C To make decisions on the use of lands and resources on the Site within the frame-
2 work of existing DOE legal and administrative procedures, with an implementation
3 process that parallels, and efficiently coordinates with local land-use regulatory
4 processes, and provides similar accountability and tracking.
5
- 6 C To make adjustments in existing DOE administrative structures as necessary to
7 efficiently implement the CLUP.

8

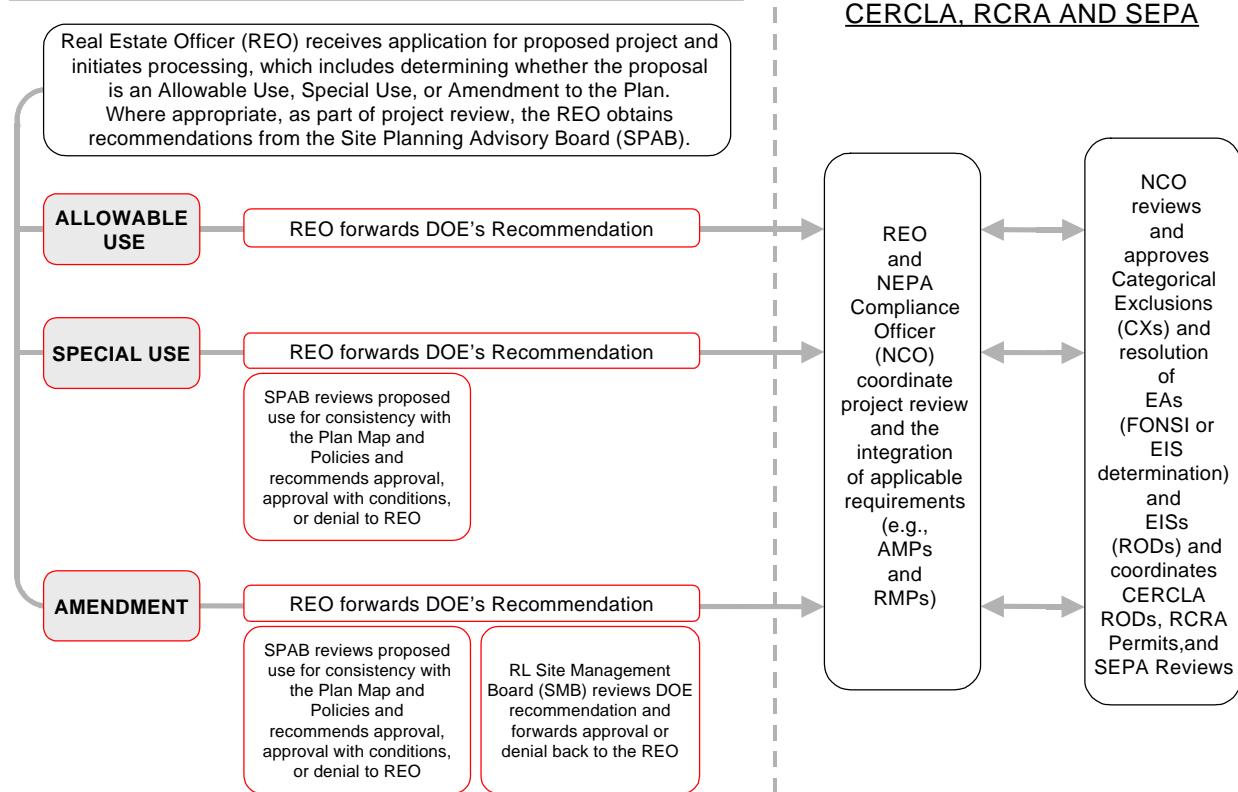
9 Achieving these objectives is essential to accomplishing DOE missions and working with
10 Federal agencies, Tribes, and local cities and counties to jointly accomplish planning goals,
11 economic transition, institutional controls, long-term site stewardship, and multiple uses of
12 the Site.

13

1 **Figure S-31. Organizational Structure for CLUP**
 2 **Implementation.**

3
 4

REVIEW OF PROPOSED PROJECT AS A USE REQUEST¹



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

5	AMP	= Area Management Plan
6	CERCLA	= <i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
7	CX	= Categorical Exclusion
8	EA	= Environmental Assessment
9	FONSI	= Finding of No Significant Impact
10	EIS	= Environmental Impact Statement
11	NEPA	= <i>National Environmental Policy Act of 1969</i>
12	RCRA	= <i>Resource Conservation and Recovery Act of 1976</i>
13	ROD	= Record of Decision
14	SEPA	= <i>State Environmental Policy Act of 1971</i>
15		
16		