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

Volume 4 of 4



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Appendix M

Summary

Introduction

The U.S. Department of Energy's (DOE) is preparing this "Hanford Site Comprehensive Land Use Plan" (Comprehensive Plan), Appendix M, of the *Hanford Remedial Action Environmental Impact Statement and Comprehensive Land Use Plan* (HRA-EIS) to address future land uses for the Hanford Site. The DOE has integrated this land-use planning initiative with the development of the HRA-EIS to facilitate and expedite land-use and remediation decision making, reduce time and cost of remediation, and optimize the usefulness of the planning process. The HRA-EIS is being developed to evaluate the potential environmental impacts associated with remediation, create a remedial baseline for the Environmental Restoration Program, and provide a framework for future uses at the Hanford Site. This Comprehensive Plan identifies current assets and resources related to land-use planning, and provides the analysis and recommendations for future land uses and accompanying restrictions at the Hanford Site over a 50-year period. This Comprehensive Plan relies on the analysis of environmental impacts in the HRA-EIS. The *National Environmental Policy Act of 1969* (NEPA) Record of Decision (ROD) issued for the HRA-EIS will be the decision process for finalization and adoption of this Comprehensive Plan. The HRA-EIS and this Comprehensive Plan will provide a basis for remediation decisions to be identified and contained in site- and area- specific *Comprehensive Environmental Response, Compensation and Liability Act of 1980* ROD.

Background. The Notice of Intent to prepare HRA-EIS was published in the Federal Register on August 21, 1992. The Notice stated:

"The HRA-EIS will evaluate a range of reasonable remedial action alternatives to accomplish the scope of the TPA [*Hanford Federal Facility Agreement and Consent Order*] within the framework of potential future site use/cleanup strategies."

The function of the EIS is to obtain input from the public and stakeholders, document the process of developing future land-use objectives, and determine the costs and benefits associated with remediating the Site to achieve the land-use objectives. Ultimately, the HRA-EIS makes irreversible and irretrievable commitments of public resources to the DOE's congressionally mandated missions.

Additional guidance regarding land-use planning was received, when on December 21, 1994, the Secretary of Energy issued a land- and facility-use policy for the DOE, which contains the following statement:

"It is Department of Energy policy to manage all of its land and facilities as valuable national resources. Our stewardship will be based on the principles of ecosystem management and sustainable development. We will integrate mission, economic, ecologic, social, and cultural factors in a comprehensive plan for each site that will guide land and facility use decisions. Each comprehensive plan will consider the site's larger regional context and be developed with stakeholder participation. This policy will result in land and facility uses which support the Department's critical missions, stimulate the economy, and protect the environment."

1 In 1995, this policy was incorporated into DOE Order 430.1, *Life-Cycle Asset Management*,
2 which requires DOE elements to undertake a comprehensive land-use planning process with stakeholder
3 involvement. In response to this mandate, the DOE has established a land-use planning process to
4 prepare and adopt this Comprehensive Plan.
5

6 The integration of NEPA analyses with land-use planning is consistent with, and encouraged
7 by, the Council on Environmental Quality's National Environmental Policy Act Regulations (CEQ)
8 guidelines.
9

10 ***Purpose of this Comprehensive Plan.*** The purpose of this Comprehensive Plan is to:

- 11 • Guide onsite land- and facility-use decisions through the integration of natural, cultural,
12 and socioeconomic factors.
- 13 • Designate existing and future land uses that are appropriate for the Hanford Site based
14 on an analysis of land use suitability, with appropriate consideration of the following:
 - 15 - The DOE's responsibilities, authorities, and constraints dictated by legislation and
16 applicable laws
 - 17 - Land use values expressed by other federal agencies, state, Tribal and local
18 governments, and the public
 - 19 - Business, labor, environmental, and other groups and organizations concerned with or
20 affected by the Hanford Site and participating in the future land-use planning process
 - 21 - Specific characteristics of the
22 natural and built landscape within
23 the Hanford Site.

31 ***P***lanning Process

32 The DOE initiated land-use planning at
33 Hanford and appointed an RL Land Use
34 Planning Project Manager in May 1995, and
35 directed the RL contractors to form an integrated
36 land-use planning team. The team consisted of
37 DOE personnel and contractor managers, land-use
38 planners, and technical program representatives.
39 The team was directed to develop a comprehensive
40 land-use plan that would identify existing and
41 planned land uses and their accompanying
42 restrictions. The team also was directed to
43 integrate and assure consistency between this
44 Comprehensive Plan and the HRA-EIS. The team
45 was directed to coordinate internal organizational
46 and external involvement activities.
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Key Steps in the Planning Process

- Step 1--identify and analyze site characteristics
- Step 2--identify and analyze mission needs
- Step 3--identify and analyze regional development characteristics
- Step 4--perform analysis of constraints
- Step 5--analyze the Future Site Uses Working Group's plausible future use options
- Step 6--identify existing land use (Year 1996) and proposed land use (Year 1997)
- Step 7--evaluate projected changes to the natural and built environment over the next 50 years
- Step 8--identify projected future land use a 50 years (year 2046)
- Step 9--evaluate projected future land use against the values important to land-use planning

1 **Coordination.** RL is working to fully coordinate this Comprehensive Plan and the HRA-EIS with the
2 *Baseline Environmental Management Report* and *Hanford Strategic Plan*. Coordination of these DOE
3 initiatives is the first step to assure consistency in identifying assumptions or broad goals for
4 remediation and future land uses.

5
6 External coordination and public involvement is an important element in developing this
7 Comprehensive Plan. RL is committed to ensure the land-use planning process engages in a wide
8 spectrum of participation. In addition to the NEPA process for public involvement, the DOE requested
9 active participation, discussion, and early input from several government entities. External
10 involvement is being integrated through the following:

- 11 • A series of voluntary and cooperative land use meetings with key governmental bodies
12 and interested parties.
- 13 • Public involvement through Benton County and City of Richland independent planning
14 processes that are underway, which address portions of the Hanford Site.
- 15 • Participation and interaction with the Hanford Advisory Board (HAB).
- 16 • Meetings and consultation sessions with Tribal governments.
- 17 • NEPA formal public involvement activity.

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24 Ensuring early community involvement in the development of the HRA-EIS and this
25 Comprehensive Plan is anticipated to result in a more participatory and better-informed decisionmaking
26 process; greater community support for cleanup remedies selected as a result of this process; and more
27 expedited cleanups. The DOE, U.S. Environmental Protection Agency (EPA) and the Washington
28 State Department of Ecology (Ecology) will be able to rely on planned land uses during development of
29 remedial alternatives, which should generally reflect the reasonably anticipated future land uses
30 identified in the HRA-EIS and this Comprehensive Plan.

31
32 **Values Important to Land Use Planning and Remediation.** This Comprehensive Plan strives to
33 overlay the values of interested participants onto the constraints posed by the DOE missions to reach an
34 acceptable state of affairs for the Hanford Site. A variety of stakeholder groups have communicated to
35 DOE their strong feelings about values important to land use planning and remediation. Extensive
36 correspondence and a variety of reports and documents show that the Hanford Site is very important to
37 several different parties. These values have been formally communicated to the DOE through the
38 following:

- 39 • The set of values that were formulated by the Working Group in 1992.
- 40 • The values that were reinforced by the Tank Waste Task Force in 1993.
- 41 • The HAB's endorsement and adoption of the Working Group's and Tank Waste Task
42 Force's values, along with additional values in 1994.
- 43 • The HAB's recommendations from the 2-day Strategic Planning Workshop as a part of
44 the HAB's regular May 1996 meeting.

1 **Methods for Evaluating Land Use Suitability.** The method used to perform the land use suitability
2 evaluation was adapted from a graphical analytical method originally developed by Professor Ian
3 McHarg at the University of Pennsylvania (McHarg 1969). The McHarg method uses a graphic
4 representation to organize a large amount of information, on a diverse range of features, into a
5 manageable form. The method depicts land use opportunities and constraints according to their ability
6 to accommodate each other.

7
8 The DOE's land-use team gathered data from the DOE and it's contractors. As a result of the
9 land use meetings with participating agencies and interested parties, the DOE also received and
10 incorporated input and information from a wide range of other sources. The information was compiled
11 and incorporated into a single, integrated land-use planning database in the Hanford Geographical
12 Information System (HGIS). The integrated HGIS database information is shared with Tribal
13 governments, Benton County, the City of Richland, and other interested government agencies and
14 parties.

15 16 17 **Future Land Use Assumptions**

18 **F** The DOE's land-use team developed a list of
19 land-use assumptions to scope and bound the
20 considerations of plausible future-use options.
21 Planning assumptions were defined to reduce
22 uncertainties regarding future land use. The future
23 land-use assumptions were defined by evaluating
24 information regarding the Hanford Site's Mission, the
25 Strategic Plan, the Working Group's Report, the
26 HAB's advisory opinions, the evaluation of constraints
27 and opportunities, the HRA-EIS and its
28 Implementation Plan, and other planning documents
29 and reports.

Environmental Management Planning Assumptions

- Land use and access controls to assure public protection.
- Onsite safe, stable materials and waste storage required for at least 50 years.
- Restoring groundwater to unrestricted use not technically feasible for at least 50 years.

30
31
32 **Integration with Hanford Strategic Planning and Hanford Advisory Board.** A renewed, focused
33 effort to revise and update the Strategic Plan was initiated in response to a May 23, 1994 request from
34 the U.S. DOE Assistant Secretary for Environmental Management, which required that each DOE site
35 prepare a Strategic Plan.

36
37 The HAB held a 2-day Strategic Planning Workshop as part of the agenda for a May 2 through
38 3, 1996 HAB meeting. The HAB wanted to work in partnership with the agencies to review the
39 strategic planning and major remediation assumptions at the Hanford Site and to provide advice to DOE
40 and the regulators in the following three areas:

- The strategic planning process
- Public participation in the strategic planning process
- Certain key planning assumptions related to Hanford's remediation.

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46 The results are intended to establish a tool for strengthening accountability to broad stakeholder
47 principles and agency commitments. This Comprehensive Plan and the HRA-EIS will seek to
48 incorporate and reflect the HAB's recommendations that are developing through the HAB workshop
49 and ongoing public involvement processes.

Key Recommendations From the HAB's May 2 through 3, 1996 Meeting

Institutional Control – Recommendation: The HAB is opposed to the way the strategic planning documentation assumes institutional controls are the preferable long-term cleanup option for the majority of areas of the site. Those strategic planning documents need to be changed. The HAB should work with DOE, EPA, and Ecology on a better description of the circumstances and time period in which some form of controls or restrictions might be necessary.

Tri-Party Agreement – Recommendation: The Tri-Party Agreement is the blueprint and schedule for Hanford cleanup. The DOE's planning documents must acknowledge and support the schedules in the Tri-Party Agreement.

Groundwater – Recommendation: With the emphasis placed on tanks and groundwater, it is essential not to lose sight of removal or isolation of contaminants in the vadose zone to ensure there is no future contamination of groundwater. The strategy should identify the future risk from the potential contamination of groundwater from sources like leaking and existing vadose zone contamination in the 200 Areas. **Recommendation:** Groundwater movement can redistribute contaminants currently above as well as already below the water table throughout the site as well as off the site. Strategic planning must emphasize source reduction and when that is not practical, surface and subsurface barriers should be used to prevent further groundwater contamination.

Vadose Zone – Recommendation: The HAB is concerned by the uncertainties in current vadose zone [the area between the surface and the groundwater] contamination and migration. The Agencies must work to resolve these uncertainties in order to have a credible Strategic Plan. **Recommendation:** An integrated vadose zone and groundwater management plan is needed statewide.

Reactors on the River (100 Area) – Recommendation: In this geographic area, there are cleanup goals for soils, the reactors, and the groundwater. For soils, the cleanup goal is unrestricted surface use except for the reactor blocks. The Strategic Plan should ensure the cleanup proceeds so institutional controls can be minimized. For reactors, reaffirm the Working Group's cleanup scenario which did not make a priority of moving the reactor cores. For groundwater reaffirm unrestricted use in this area with the recognition that "in some cases, due to existing conditions and lack of current capabilities, it may be a low priority until aggressive research develops new capabilities." **Recommendation:** Use a definition for this area that describes the geographic band -- "River Corridor/100 Area" that includes the reactors, outfalls and pipes, spent nuclear fuel, soil and burial grounds, liquid discharge sites, and groundwater. **Recommendation:** Continue addressing the most urgent risks first. **Recommendation:** Ensure there are safety controls for workers and the public in the area, into the future, despite changing contractors and administrations (local, state, and federal).

Columbia River – Recommendation: Strategic planning should ensure that access, and duration of access, to the Columbia River and its corridor (nominally 1/4 mile wide on either side of the river) are not limited because of surface contamination. Because the 1301 crib is within a 1/4 mile, it must be remediated to unrestricted surface access. **Recommendation:** "Do no harm" still applies.

Central Plateau (200 Area) – Recommendation: Waste in the 200 Area must not migrate from the Central Plateau. The DOE's Strategic Plan must ensure that near term activities minimize exposure. This may include suitable long-term engineered controls and barriers.

Process Recommendations -- Consistency: Data and assumptions consistency are critical to a defensible Strategic Plan. DOE must develop consistency in assumptions, data and modeling. **Common Terminology:** Common terminology must be developed and defined for discussions of cleanup and technology development. **Institutional Control:** The HAB should work with the DOE, EPA, and Ecology on a better description of the circumstances and time period in which some form of controls or restrictions might be necessary.

1 **E***xisting Conditions*

2
3 The affected environment (natural and manmade attributes) of the Hanford Site describes and
4 represents a set of opportunities and constraints that could affect future land uses. These
5 existing conditions were evaluated in the land-use suitability analysis for the Hanford Site. The
6 attributes that were identified and evaluated are biological resources, surface water, groundwater
7 contamination, waste sites, protective safety buffer zones, geology, cultural resources, current
8 infrastructure and facility use, and potential economic development opportunities.

9
10 This Comprehensive Plan contains 38 maps that describe the existing conditions at the Hanford
11 Site. The detailed descriptions of each resource or attribute are contained in Chapter 4.0 and the
12 appendices of the HRA-EIS.

13
14 **L***and use Suitability Analysis*

15
16 A “constraint” is defined as a feature, attribute, or issue associated with the natural or built
17 environment that must be addressed if a proposed land-use activity is to occur. Conversely, an
18 “opportunity” is defined as a feature, attribute, or issue associated with the natural or built environment
19 that presents some benefit if utilized. Constraint maps are useful for regional planning because they
20 identify the type and relative severity of the problems that need to be addressed if the land-use activity
21 is to be allowed.

22
23
24 A series of seven constraint tables and seven geographic information system (GIS) maps were
25 prepared over a base map of the Hanford Site; these tables and maps identify existing DOE facilities
26 and operating areas. The GIS maps graphically depict the relevant site characteristics that are known to
27 pose issues to land-use activities--the constraints. The constraint tables identify a specific
28 environmental feature or attribute and evaluate the legal drivers (e.g., the statutes, laws, regulations,
29 Executive Orders, treaties, and DOE orders) associated with management of the particular factor at
30 issue. The tables also identify and describe the existing DOE programs, management initiatives, and
31 the institutional capabilities in place to address the identified constraints. Professional judgement was
32 exercised by the DOE’s land-use team in deciding the magnitude of the constraint by considering the
33 relationship between the particular constraint issue, its legal drivers, and the capability of the DOE to
34 address the particular factor or issue.

35
36 *Analysis of Future Site Uses Working Group's*
37 *Plausible Future Use Options.* The DOE’s land-use
38 team prepared a GIS map identifying the geographic
39 study areas of the Hanford Site. The GIS map was
40 created using the Working Group's six geographic
41 areas as an initial base map. The GIS then was used
42 to overlay the potential economic development zone
43 and create a final geographic study area map that
44 identifies a “South 600 Area” and “Central Core.”

45 Although technically part of the 600 Area, the ALE Reserve, the North Slope, the South 600 Areas, and
46 Central Core were evaluated individually during the analysis. To the extent appropriate, the land-use
47 team also identified and described the location of relevant sub areas, when the analysis of constraints
48 indicated such an identification was appropriate to distinguish the area from surrounding lands. A

Analysis of Plausible Future-Use Options

- Agriculture
- Industrial and commercial
- Wildlife and habitat management
- Environmental restoration
- Waste management
- Public access and recreation.

1 series of six tables were prepared that evaluate the recommended range of "Plausible Future Use
2 Options" identified by the Working Group. The Working Group did not select a preferred option or
3 use.
4

5 For each plausible future use option, the DOE's
6 land-use team identified the presence (or absence) of
7 identified constraints in the key geographic areas (or
8 sub areas, as appropriate) of the Hanford Site. This
9 was accomplished by a visual evaluation of the GIS
10 constraint maps and documentation of the identified
11 constraints for each geographic area in the tables.
12

13 *Analysis of Anticipated Changes in Existing*
14 *Environment Over 50 Years.* The DOE's land-use
15 team reviewed the original GIS data to identify the
16 reasonably predicted changes to natural resources and
17 attributes of the natural or built environment that are
18 likely to occur over the next 50 years. These changes
19 were identified and documented in the constraint
20 tables. GIS maps were then prepared to depict the
21 characteristics of those factors which would change
22 significantly over the next 50 years, and have
23 implications to future land use.
24
25

26 **C**omprehensive Land Use Plan

27 The DOE's land-use team reviewed and
28 evaluated the GIS maps along with the
29 constraint tables in Chapter 7.0 and the tables
30 evaluating plausible future-use options in Appendix A
31 of this Comprehensive Plan to develop existing
32 (Figure S-1), proposed (Figure S-2), and projected (Figure S-3) land-use maps for the Hanford Site. The
33 development of the proposed and projected land-use maps included the evaluation of the identified
34 values important to land-use planning. The land-use team developed nine land-use designations for the
35 Hanford Site. These designations were used in the existing, proposed, and projected land-use maps.
36 The proposed land-use map and designations serve as the basis for the land-use decisions to be made in
37 accordance with the Final HRA-EIS and in the NEPA ROD.
38

Anticipated Changes to the Existing Environment Over the Next 50 Years

Biological Resources: In the absence of a major wildfire, no changes of significance identified--post burn shrub-steppe continues to mature.

Surface Water: No changes of significance identified.

Groundwater Contamination: Major shift in location of groundwater contamination plumes as a result of groundwater migration and remediation actions taken.

Waste Sites: Waste sites will be remediated pursuant to the Tri-Party Agreement.

Protective Safety Buffer Zones: Some facilities will be decommissioned, and certain safety analysis report requirements will be reduced or eliminated. Certain new nuclear materials storage facilities will be put into service and some existing facilities will continue. The buffer zones will continue to be based upon SAR requirements for those facilities that require protective safety buffer zones.

Geological Resources: No changes of significance identified.

Cultural Resources: No major changes identified. Additional surveys will result in the identification of new sites that need to be protected and preserved. Documentation of historic structures will proceed.

Proposed Land-Use Designations and Definitions

Waste Management (WM): Areas used primarily for treatment, storage, and disposal of hazardous, radioactive, and nonradioactive wastes. Includes environmental restoration, industrial and commercial, and business land-use activities.

Environmental Restoration (ER): Areas used primarily for characterization and remediation of reactor operation sites, land, facilities, and groundwater. Includes required industrial and commercial land-use activities.

Industrial and Commercial (IC): Areas used primarily for a wide range of industrial and commercial activities. Includes required environmental restoration and business land-use activities.

Business (B): Areas used for a wide range of administration and office activities.

Wildlife and Habitat Management (WHM): Areas used primarily for protection and management of diverse biological resources, including both plant and animal communities. May include areas for special use or controlled access and recreation land-use activities, and environmental restoration activities.

Open Space Restricted (OSR): Areas restricted from access, based on constraints and implementation requirements, to support existing missions. Includes areas identified for potential compatible development to meet future projects and mission needs. Includes use of an area for environmental restoration activities, wildlife and habitat management, and approved Tribal activities.

Special Use Areas (SUA): Areas identified as unique and limited resources that require protection for a specific use or uses.

Potential Economic Development Zone (PEDZ): Identifies a geographic zone north and west of the 300 Area where a significant number of potentially compatible economic development activities or proposals have been identified. This is not an industrial or commercial land-use designation, but rather an identification of a contiguous geographic area in which the majority of potentially viable economic development proposals received, by the DOE to date, tend to be located.

Controlled Access and Recreation (CAR): Potential range of uses to areas identified for tourism, visitor, fishing, boating, hiking, wildlife viewing, and biking activities, based on constraints and implementation requirements. Controlled access, at a minimum, entails approved Tribal usage, and escorted day trips.

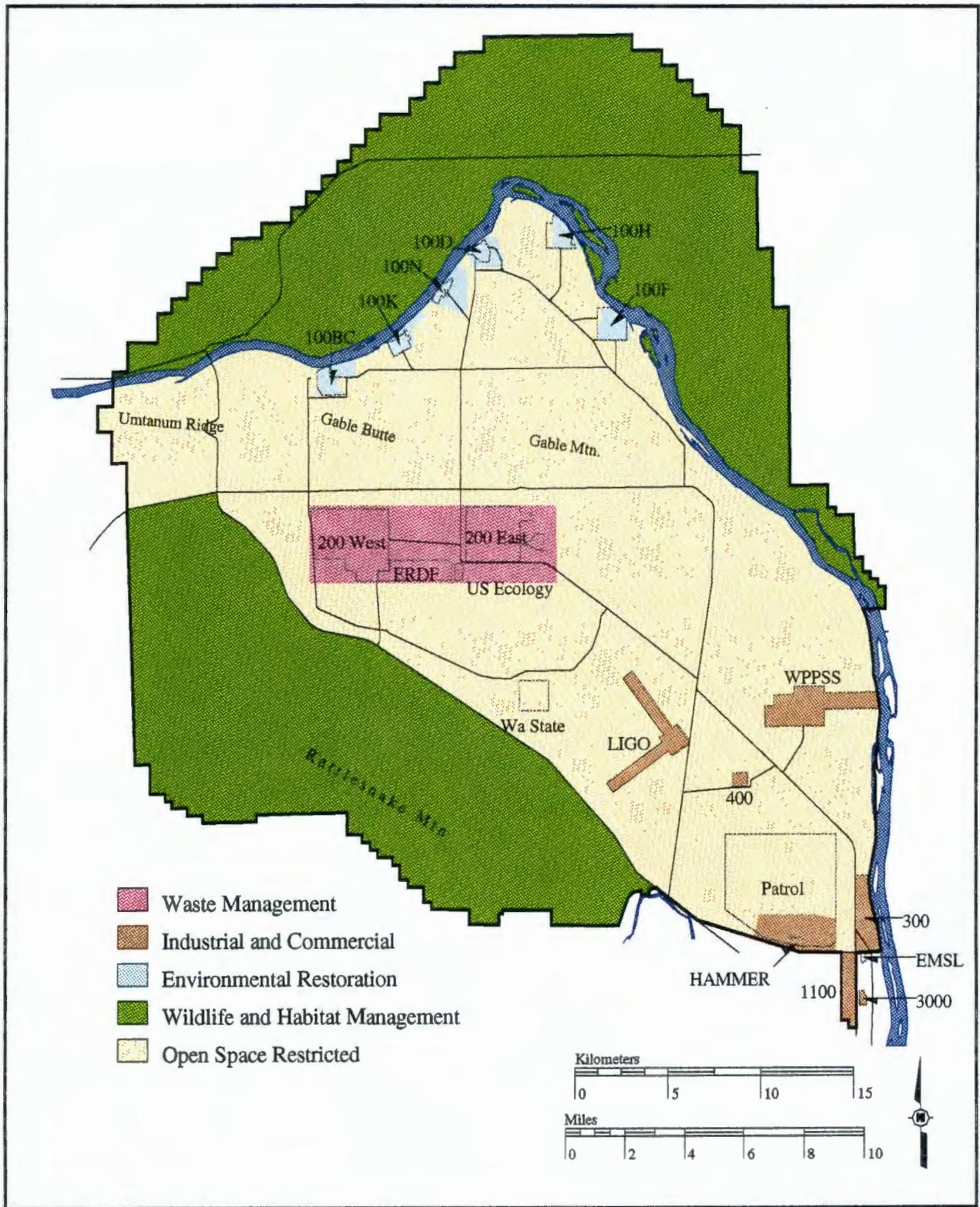
Comprehensive Plan Implementation and Revision

Future land-use management at the Hanford Site will be accomplished through an implementation strategy that tiers off the hierarchy of policies, management directives, and integrated program documents. These documents include the Strategic Plan, the HRA-EIS and this Comprehensive Plan.

After the NEPA ROD is issued for the HRA-EIS and this Comprehensive Plan, the implementation phase of the land-use planning process will entail the development of an Implementation Plan for this Comprehensive Plan. The Implementation Plan will define the land-use planning and management process in which this Comprehensive Plan is implemented, managed, and maintained. It will assist in the management and oversight of land and facility uses on the Hanford Site under the jurisdiction of RL. It will document the Hanford Site's land-use planning process and its relationship and integration with the Hanford strategic planning, and the NEPA process. The Implementation Plan allows for a professional and accurate interpretation of management goals and objectives, which are required to (1) maintain site integrity and environmental quality, and (2) sustain multiple-land uses.

1 It is anticipated that this Comprehensive Plan will be revised and updated every five years with
2 ongoing stakeholder involvement. Proposals that require a redesignation of the land use on the
3 Hanford Site will be reviewed and discussed with stakeholders, as appropriate, prior to redesignation.

Figure S-1. Hanford Site Existing Land Use Map - 1996.



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Figure S-2. Hanford Site Proposed Comprehensive Land Use Plan Map - 1997.

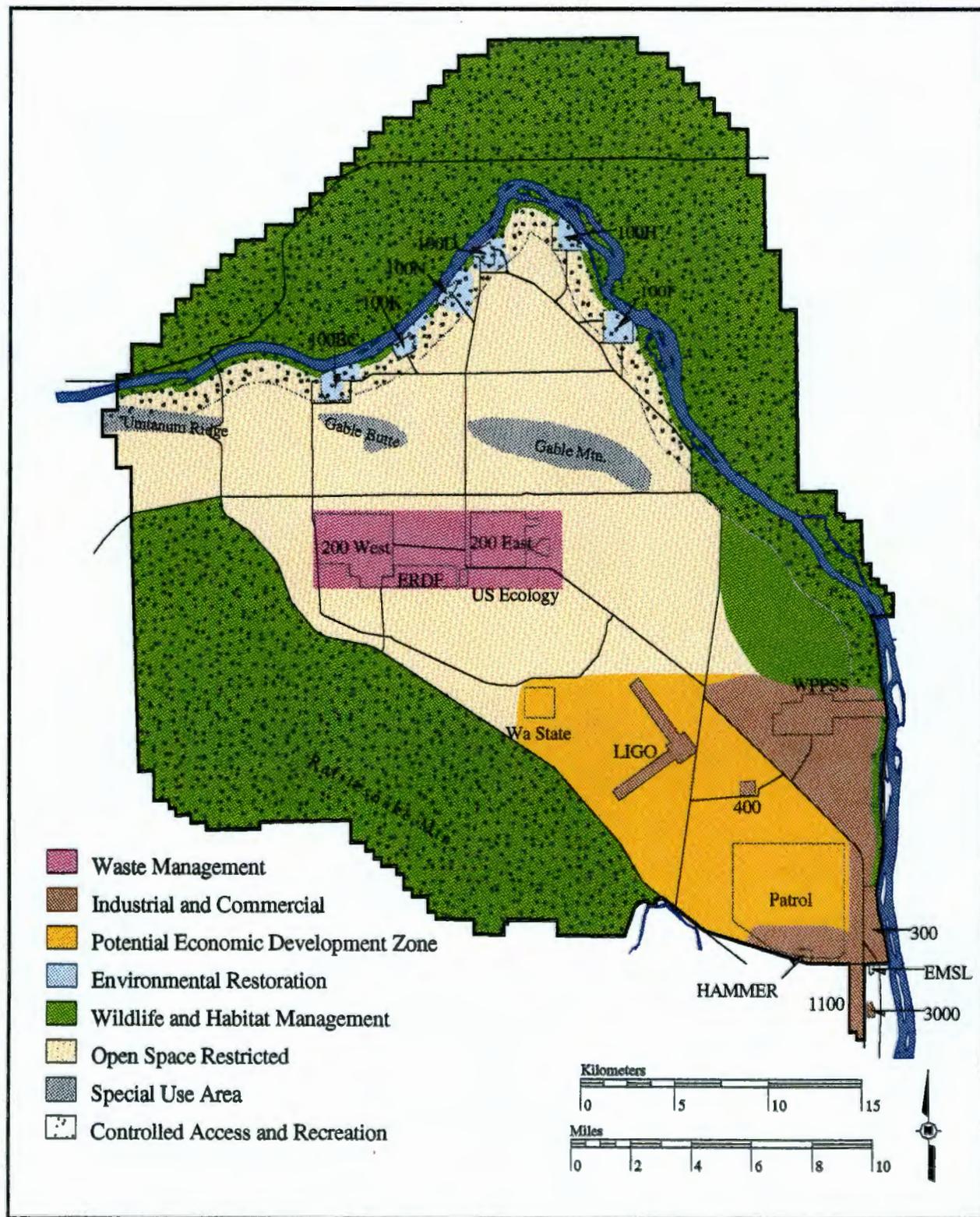
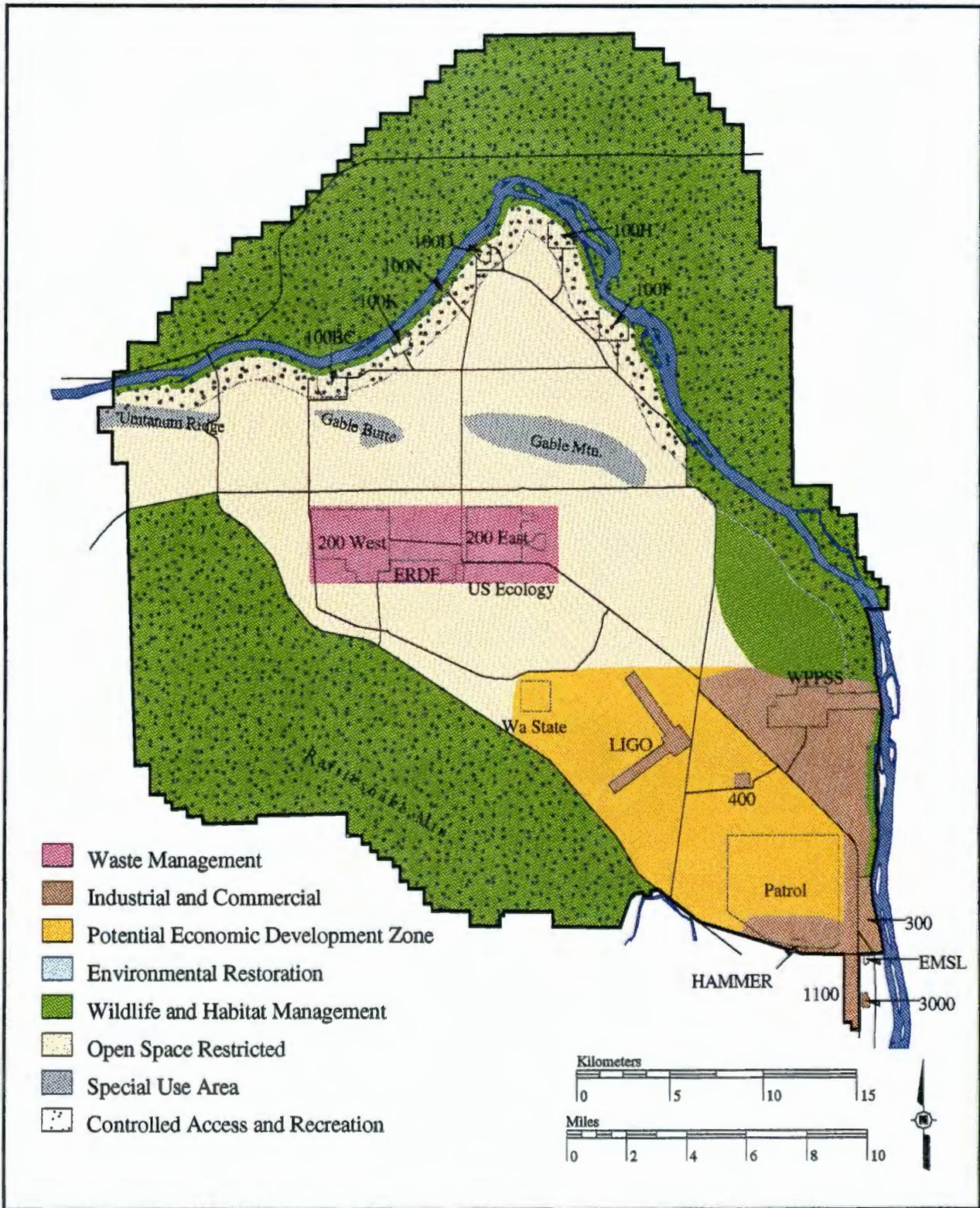


Figure S-3. Hanford Site Projected Land Use Map - 2046.



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Acronyms and Initialisms

Acronyms and Initialisms

1		
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3		
4	AEC	U.S. Atomic Energy Commission
5	ALE	Fitzner/Eberhardt Arid Lands Ecology (Reserve)
6	BEMR	<i>Baseline Environmental Management Report</i>
7	BLM	U.S. Bureau of Land Management
8	BoR	Bureau of Reclamation
9	BPA	Bonneville Power Administration
10	CEQ	Council on Environmental Quality
11	CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
12		
13	Comprehensive Plan	<i>Hanford Site Comprehensive Land Use Plan</i>
14	CAR	Controlled Access and Recreation
15	DOE	U.S. Department of Energy
16	DOI	U.S. Department of Interior
17	Ecology	Washington State Department of Ecology
18	EMSL	Environmental Molecular Science Laboratory
19	EPA	U.S. Environmental Protection Agency
20	EPZ	Emergency Planning Zone
21	ER	Environmental Restoration
22	EUZ	Exclusive Use Zone
23	GIS	geographic information system
24	GMA	<i>Growth Management Act of 1990 (State of Washington)</i>
25	HAB	Hanford Advisory Board
26	Hanford Reach	Hanford Reach of the Columbia River
27	HGIS	Hanford Geographic Information System
28	HRA-EIS	<i>Hanford Remedial Action Environmental Impact Statement and Comprehensive Land Use Plan</i>
29		
30	IC	Industrial and Commercial
31	MOA	Memorandum of Agreement
32	N Reactor	105-N Reactor
33	NEPA	<i>National Environmental Policy Act of 1969</i>
34	NHPA	<i>National Historic Preservation Act of 1966</i>
35	North Slope	North of the River
36	OSR	Open Space Restricted
37	PEDZ	Potential Economic Development Zone
38	PUREX	Plutonium-Uranium Extraction (Plant)
39	R&D	research and development
40	RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
41	RL	U.S. Department of Energy, Richland Operations Office
42	ROD	Record of Decision
43	SEPA	<i>State Environmental Policy Act of 1971 (State of Washington)</i>
44	Strategic Plan	<i>Hanford Strategic Plan</i>
45	Tri-Cities	The cities of Richland, Kennewick, and Pasco
46	TRIDEC	Tri-Cities Industrial Development Council
47	TRU	transuranic
48	Tri-Party Agreement	<i>Hanford Federal Facility Agreement and Consent Order</i>
49	USACE	U.S. Army Corps of Engineers

- 1 **USFWS** U.S. Fish and Wildlife Service
- 2 **WHM** Wildlife and Habitat Management
- 3 **WM** Waste Management
- 4 **Working Group** Hanford Future Site Uses Working Group
- 5 **WSRA** *Wild and Scenic Rivers Act of 1988*

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Introduction

1.0 Introduction

1
2
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4 The Hanford Site is a large geographic area (1,450 square kilometers, 560 square miles) located in
5 the southeastern portion of the State of Washington that is owned by the Federal Government and
6 operated by the U.S. Department of Energy, Richland Operations Office (RL) (Figure 1-1). Developed
7 by the Federal Government in 1943, Hanford's primary mission for 45 years was to produce plutonium
8 for National defense.
9

10 Events of the past several years have had a profound effect on the U.S. Department of Energy
11 (DOE) and the region. Land use development at the Hanford Site is the result of more than 50 years of
12 nuclear production, chemical processing, waste management, and research and development (R&D)
13 activities. The DOE developed infrastructure and facility complexes to accomplish this work along
14 with large tracts of land as protective buffer zones for safety and security purposes. These buffer zones
15 preserved a biological and cultural setting unique in the Columbia Basin region.
16

17 Today, the Hanford Site has a diverse set of mission elements associated with Site remediation,
18 waste management, and science and technology. The mission elements include activities, such as
19 preservation of the unique biological and cultural setting of the site, increasing public awareness and
20 involvement, adhering to regulatory requirements, and integrating recommendations given by public
21 advisory boards and task teams. These diverse set of mission elements have resulted in the growing
22 need for a comprehensive, long-term approach to Site planning and development. In response to these
23 developments, RL established a comprehensive land-use planning program. The comprehensive
24 land-use planning process considers the role of the Hanford Site within the regional context, and
25 integrates mission requirements and other factors as directed by the Secretary of Energy.
26
27

1.1 Mandate

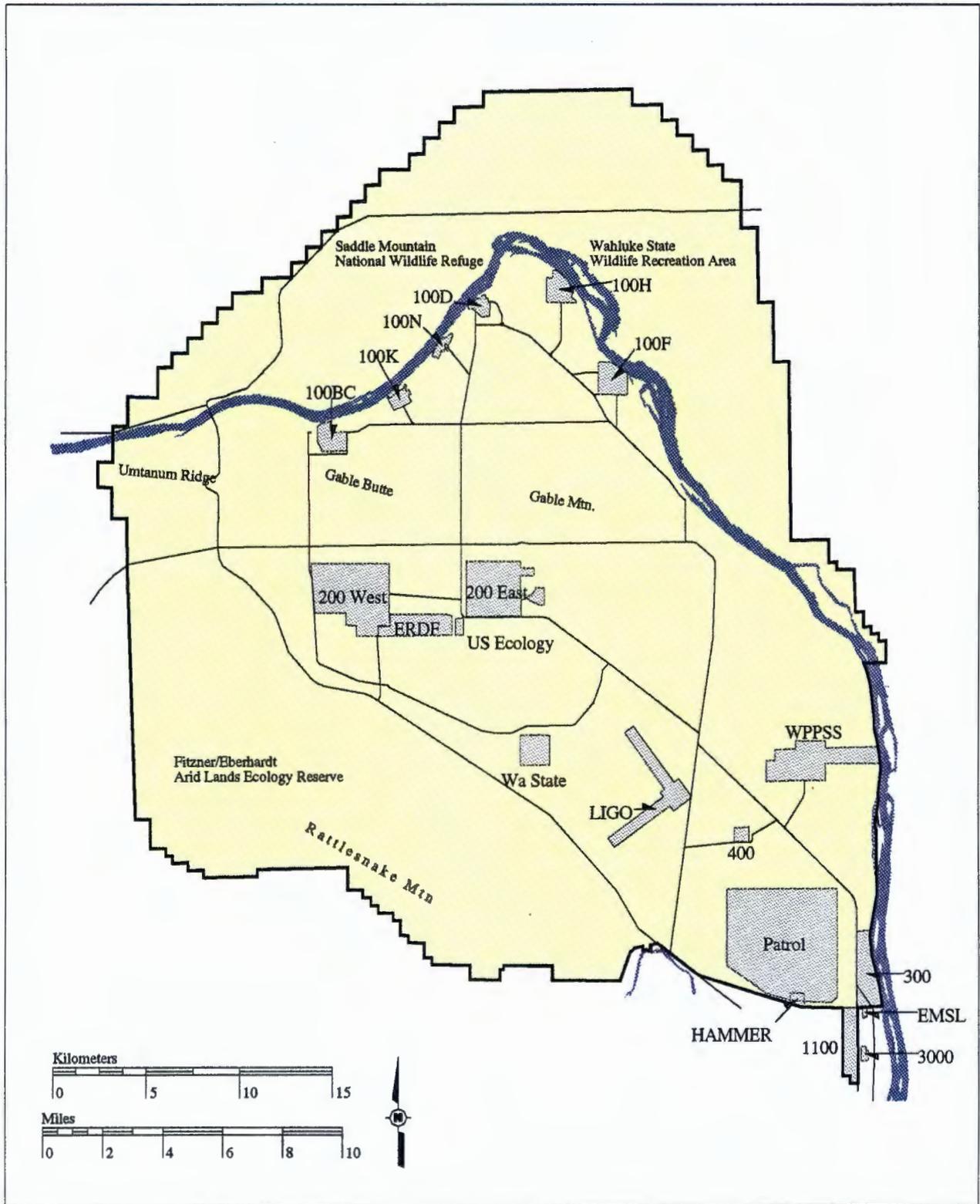
28
29
30 On December 21, 1994, the Secretary of Energy issued a new land- and facility-use policy for the
31 DOE, which contains the following statement:
32

33 "It is Department of Energy policy to manage all of its land and facilities as valuable national
34 resources. Our stewardship will be based on the principles of ecosystem management and
35 sustainable development. We will integrate mission, economic, ecologic, social, and cultural
36 factors in a comprehensive plan for each site that will guide land and facility use decisions. Each
37 comprehensive plan will consider the site's larger regional context and be developed with
38 stakeholder participation. This policy will result in land and facility uses which support the
39 Department's critical missions, stimulate the economy, and protect the environment."
40

41 In 1995, this policy was incorporated into DOE Order 430.1, *Life-Cycle Asset Management*
42 (DOE 1995), which requires DOE elements to undertake a comprehensive land-use planning process
43 with stakeholder involvement. This land-use planning process is used in asset management and the
44 acquisition of assets. In response to these mandates, the DOE is involving regional stakeholders in the
45 preparation of this "Hanford Site Comprehensive Land Use Plan" (Comprehensive Plan).
46
47

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Figure 1-1. Map of the Hanford Site.



1.2 Purpose of the Comprehensive Land Use Plan

The purpose of this Comprehensive Plan is to achieve the following:

- Guide onsite land- and facility-use decisions through the integration of natural, cultural, and socioeconomic factors.
- Designate existing and future land uses that are appropriate for the Hanford Site based on an analysis of land use suitability, with appropriate consideration of the following:
 - The DOE's responsibilities, authorities, and constraints dictated by legislation and applicable laws
 - Land use values expressed by other federal agencies; state, Tribal and local governments; and the public
 - Business, labor, environmental, and other groups and organizations concerned with or affected by the Hanford Site and participating in the future land-use planning process
 - Specific characteristics of the natural and built landscape within the Hanford Site.

1.3 Organization of the Comprehensive Land Use Plan

This Comprehensive Plan is integrated with the *Hanford Remedial Action Environmental Impact Statement and Comprehensive Land Use Plan* (HRA-EIS) (DOE 1996b), as Appendix M, to guide land- and facility-use decisions through an analysis of potential land-use opportunities and constraints. In a manner consistent with CEQ guidance (46 FR 18026), this Comprehensive Plan relies on the analysis of environmental impacts in the HRA-EIS. *The National Environmental Policy Act of 1969* (NEPA) Record of Decision (ROD) for the HRA-EIS will be the decision process for finalization and adoption of this Comprehensive Plan. In accordance with DOE Order 430.1, *Life-Cycle Asset Management* (DOE 1995), the DOE will coordinate with Tribal and local governments to capture the shared long-term goals and objectives of Hanford Site stakeholders during development of this Comprehensive Plan.

Ensuring early community involvement in the evaluations in the HRA-EIS and this Comprehensive Plan is anticipated to result in a more participatory and better-informed decisionmaking process; greater community support for cleanup remedies selected as a result of this process; and more expedited cleanups. The DOE, U.S. Environmental Protection Agency (EPA) and the Washington State Department of Ecology (Ecology) will be able to rely on planned land uses during development of remedial alternatives, which should generally reflect the reasonably anticipated future land uses identified in the HRA-EIS and this Comprehensive Plan.

This Comprehensive Plan incorporates information primarily from the HRA-EIS, the supporting databases, and the associated references. These include several reports and studies, including the *Hanford Site Development Plan* (DOE-RL 1993), *The Future For Hanford: Uses and Cleanup*, *The Final Report of the Hanford Future Site Uses Working Group* (HFSUWG 1992), and the *Hanford Site National Environmental Policy Act (NEPA) Characterization* (Cushing 1995), and the *Draft Biological*

1 *Resource Management Plan* (DOE-RL 1996). This Comprehensive Plan discusses the current assets
2 and resources related to land-use planning, and provides the analysis and recommendations for future
3 land uses at the Hanford Site over a 50-year period. This Comprehensive Plan will undergo revisions,
4 as necessary, to incorporate new information, consistent with the NEPA process.
5

6 This Comprehensive Plan is divided into nine chapters with supporting figures and tables, and one
7 appendix. This chapter provides an introduction and overview of this plan and the planning process.
8 Chapter 2.0 provides background information about the Hanford Site and regional setting. Chapter 3.0
9 describes the planning process. Chapter 4.0 provides information about the DOE's mission, strategic
10 planning, responsibility, and relationships with other government entities. Chapter 5.0 describes future
11 land-use assumptions. Chapter 6.0 provides an overview of existing conditions in the affected
12 environment. A detailed description of the affected environment is found in Chapter 4.0 and
13 appendices of the HRA-EIS. Chapter 7.0 contains the Land Use Suitability Analysis. This includes
14 identification and analysis of the constraints and opportunities for existing and future land use. Chapter
15 8.0 presents the Comprehensive Land Use Plan for the Hanford Site, and Chapter 9.0 describes the
16 implementation of this plan, Chapter 10 presents the preparers involved in developing this
17 Comprehensive Plan, and Chapter 11 provides a list of references used in this Comprehensive Plan.
18 Appendix A provides an analysis of the Future Site Uses Group's plausible future use options.
19

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Background and Regional Information

2.0 Background and Regional Information

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3
4 The Hanford Site lies within the semiarid Pasco Basin of the Columbia Plateau in the southeastern
5 portion of the State of Washington (Figure 2-1 and Figure 2-2). The Hanford Site lies within Benton,
6 Franklin, Adams, and Grant Counties with the primary portion in Benton County. The Hanford Site
7 occupies an area of approximately 1,450 square kilometers (560 square miles), located north of the
8 confluence of the Yakima River with the Columbia River. This land, with restricted access, provided a
9 safety and security buffer around the smaller areas previously used for production of nuclear materials,
10 and currently is used for research, waste management and disposal, and environmental restoration.
11 While approximately 6 percent of the land area on the Hanford Site has been disturbed or is actively
12 used, the DOE retains authority over the entire Site, since much of the Site provides a protective safety
13 buffer zone area around active facilities.
14

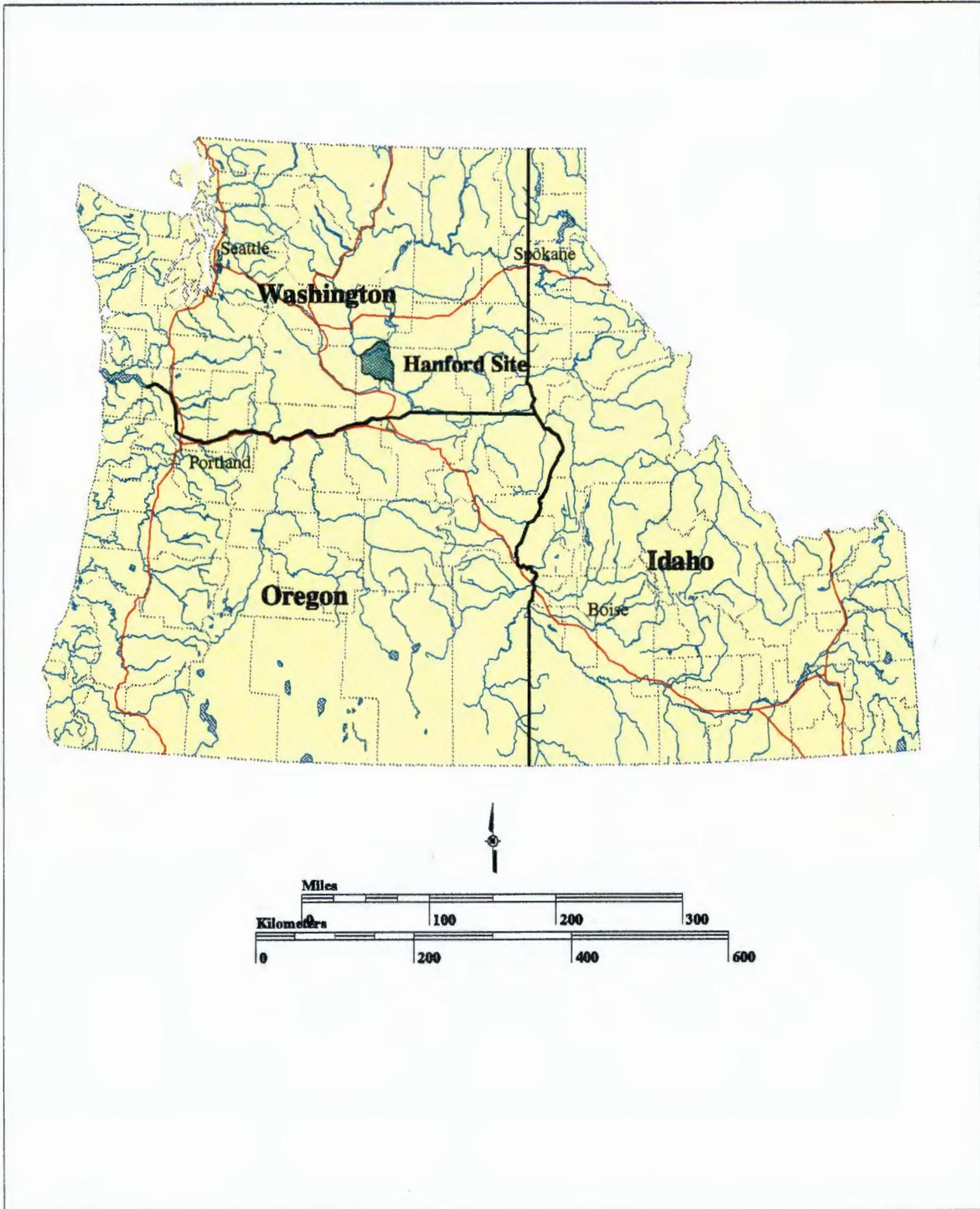
15 The Columbia River flows through the northern portion of the Hanford Site and, turning south,
16 forms part of the eastern boundary. The Yakima River runs near the southern boundary and joins the
17 Columbia River south of the City of Richland, which bounds the Hanford Site on the southeast.
18 Rattlesnake Mountain, the Yakima Ridge, and the Umtanum Ridge form the southwestern and western
19 boundary of the Site, while the Saddle Mountains form the northern boundary. Two small ridges
20 running east-west, Gable Butte and Gable Mountain, rise above the central portion of the Hanford Site.
21 Adjoining lands to the west, north, and east are used principally as rangeland or for agriculture. The
22 cities of Richland, Kennewick, and Pasco (Tri-Cities) constitute the nearest population center, and are
23 located southeast of the Hanford Site. The Tri-Cities support a population of approximately 105,000
24 (Cushing 1995).
25
26

2.1 Early History of the Region and The Hanford Site

27
28
29 Before the arrival of non-Native explorers, traders, and settlers, the Columbia River shoreline was
30 inhabited for centuries by Native peoples. The Wanapum People and the Chamnapum band dwelt in
31 villages scattered from south of present-day Richland upstream to present-day Vantage. Other tribes
32 and bands, including the Nez Perce, Walla Walla, and Umatilla peoples, traveled to the Hanford Reach
33 of the Columbia River (Hanford Reach) to fish, trade, and exchange news (Cushing 1995). In 1855,
34 Isaac Stevens, territorial Governor of Washington, conducted a number of treaty-negotiating sessions
35 with tribes along the Columbia River in an effort to open lands for non-Native settlement. Through a
36 series of treaties, the Indian Nations ceded their lands to the Federal Government, and were assigned to
37 reservations. The Governor's negotiating tactics and the terms of the treaties angered some tribal
38 leaders, who resisted relocation to reservations. Skirmishes with government troops continued for 3
39 years until September 1858, when the Native forces were defeated in the Battle of the Spokane Plains.
40 Although the land now known as the Hanford Site was ceded to the United States in the Treaties of
41 1855, and tribal members have not lived along the Hanford Reach since 1943, the Hanford Reach
42 remains an important resource to the Yakama Indian Nation, the Confederated Tribes of the Umatilla
43 Indian Reservation, the Nez Perce Tribe, and the Wanapum People.

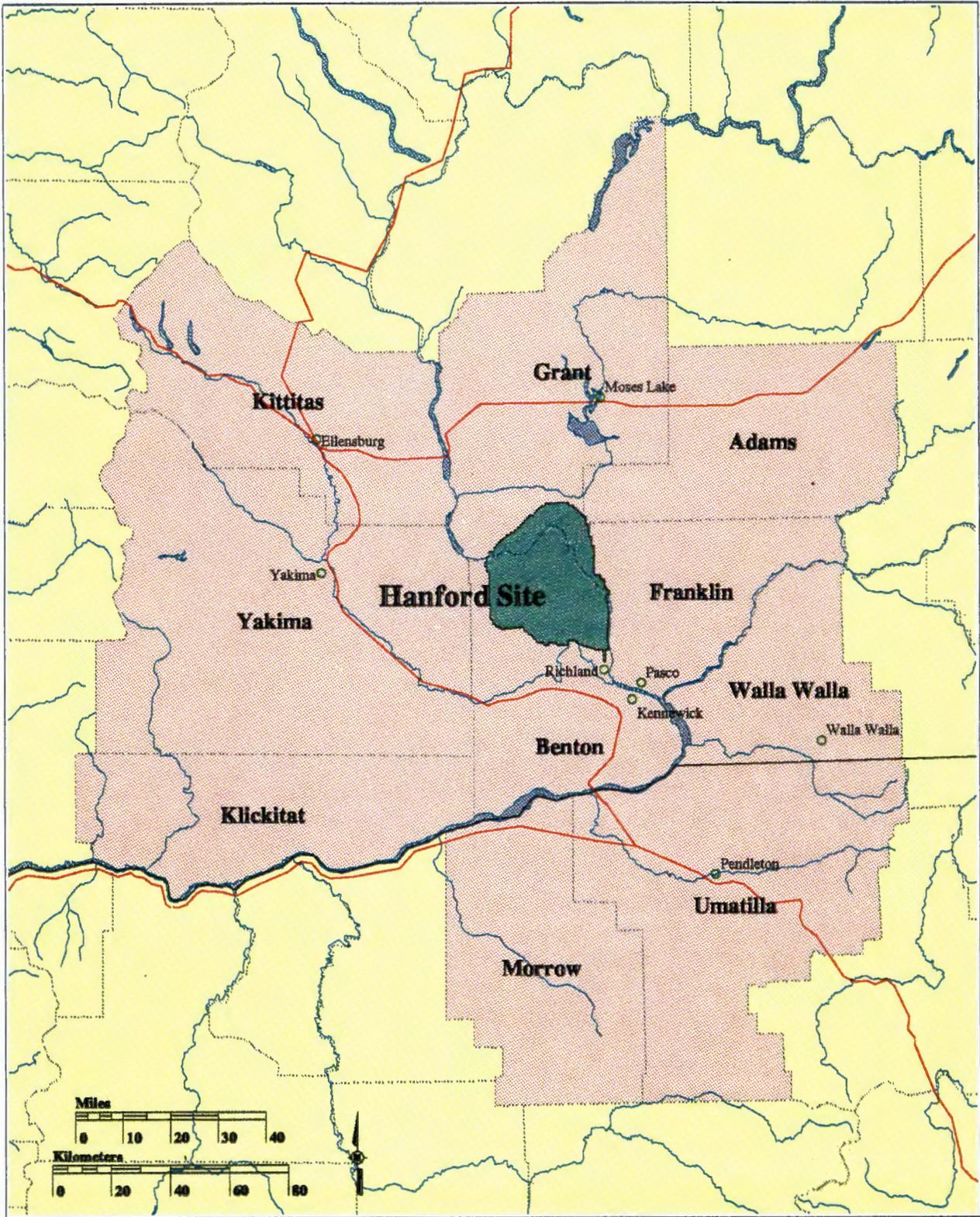
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Figure 2-1. Hanford Site and the Regional Setting.



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Figure 2-2. Hanford Site and the Vicinity.



1 In 1888, small irrigation companies and farmer cooperatives began to develop irrigation systems in
2 the Columbia Basin. The *Newlands Reclamation Act of 1902* brought the long-term financial support of
3 the Federal Government into the development of irrigation. The agricultural economy of the region
4 saw upswings and downswings from agricultural prices increases during World Wars I and II, drought
5 during the 1920s, and the Great Depression of the 1930s. By the end of 1942, a total of about
6 19,000 people lived in Benton and Franklin Counties. Pasco was the largest population center with
7 about 3,900 people (Gerber 1992).

8 9 10 **2.1.1 Establishment of the Hanford Site**

11
12 The entry of the United States into World War II, and the push to develop the atomic bomb, led to
13 a search for a suitable place to locate plutonium production and purification facilities. The U.S. Army
14 Corps of Engineers (USACE) selected the site near the towns of White Bluffs and Hanford because of
15 its remote location, its good climate, and, most importantly, its abundant supply of hydroelectric power
16 and clean water from the Columbia River. The selection was made in early 1943, and land acquisition
17 proceedings began. The War Department began with condemnation proceedings on private lands,
18 followed by appraisals, negotiations, and payments to landowners. Some property owners protested the
19 offered purchase prices and won larger settlements through the courts. Other lands initially were
20 leased, then were purchased after the war. Originally, 1,605 square kilometers (620 square miles)
21 were blocked together for the Site through a combination of withdrawal of lands from the public
22 domain and the acquisition of state- and privately-owned lands. The towns of Hanford and White
23 Bluffs were vacated, and Richland was transformed into a government town. The U.S. Atomic Energy
24 Commission (AEC) leased an additional 70,000 hectares (173,000 acres) as secondary control zones;
25 these secondary zones were released in 1953 and 1958 (Ecology 1993).

26
27 Ground breaking on the first production facilities began in March 1943. By the end of the war, a
28 total of 554 buildings, including three nuclear reactors (105-B, 105-D, and 105-F), three chemical
29 processing facilities, and 64 underground storage tanks had been constructed. After a postwar lull, the
30 beginnings of the Cold War resulted in a second building boom, which involved two new production
31 reactors (105-DR and 105-H) and their associated processing facilities. The first Soviet atomic bomb
32 test in 1949 spurred further construction, including the Reduction-Oxidation Plant, the 105-C Reactor,
33 and 18 waste storage tanks. During the Korean War, the 105-KE and 105-KW Reactors, the
34 Plutonium-Uranium Extraction (PUREX) Plant, and 21 more waste storage tanks were built.

35
36 The ninth and final production reactor, the 105-N Reactor (N Reactor), was built between 1959
37 and 1963. Unlike the preceding eight reactors, which had the sole mission of producing plutonium, the
38 N Reactor also produced steam to generate electricity. During the early years of operation, the
39 N Reactor was the largest nuclear electric power producer in the nation, generating over 65 billion
40 kilowatts in 24 years (Gerber 1992).

41
42 In 1943, the USACE designated the Site as the Hanford Engineering Works. The Site later
43 became the Hanford Works under the AEC in 1947, the Hanford Reservation under the Energy
44 Research and Development Administration in 1975, and finally, the Hanford Site under the DOE in
45 1977 (Gerber 1992).

2.1.2 Change in Mission From Defense Production to Environmental Restoration

In 1964, activities at the Hanford Site underwent a series of dramatic changes. Plutonium production was sharply curtailed in response to changing defense needs. By 1971, eight of the nine production reactors had been shut down. The PUREX Plant continued to operate through most of the 1980s. The N Reactor continued to operate until 1987, producing both electric power and plutonium. By 1992, all related fuel separation facilities, including the PUREX Plant, had ceased operation.

The reduction of fuel production activities at the Hanford Site refocused its resources and capabilities toward development of nonmilitary applications of nuclear energy. New laboratory facilities were constructed to support programs in areas such as nuclear waste management, and biological and environmental sciences. In the 1970s, the emphasis on energy research continued to grow, including programs in solar, geothermal, and advanced reactor systems, fossil energy, national security, conservation, energy policy analysis, and resource assessment. Also during the 1970s, the radioactive waste management program at the Hanford Site was upgraded (DOE-RL 1990). A primary objective of this upgrade was to transfer liquids from single-shell tanks to more secure double-shell tanks. Both types of tanks continue to provide interim waste storage today.

The DOE has phased out defense production at the Hanford Site, and has focused its activities on environmental restoration and waste management. In 1989, the DOE entered into the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) with the EPA and Ecology. This agreement is intended to ensure a coordinated effort for environmental restoration at the Hanford Site. The Tri-Party Agreement obligates the DOE to pursue remediation activities at each contaminated site or area at Hanford according to specific enforceable schedules or milestones.

The Hanford Site's environmental restoration and waste management programs have expanded significantly as the DOE complies with the remediation schedules agreed to under the Tri-Party Agreement. Currently, four CERCLA sites, which consists of 71 operable units with over 2,000 hazardous, radioactive, mixed, and sanitary waste sites, are identified. The level and types of contamination vary among the operable units.

In April 1992, the EPA, Ecology, and the DOE initiated a process to involve interested stakeholders in developing a range of potential visions for the future of the Hanford Site as part of the scoping activities for the analyses to be conducted under the HRA-EIS. A group of individuals comprised of representatives from labor, environmental, governmental, tribal, agricultural, economic development, and citizen-interest groups was established, and became known as the Hanford Future Site Uses Working Group (Working Group). The Working Group was charged with the following three tasks:

- Examine the Hanford Site and identify a range of potential future uses.
- Select the appropriate cleanup scenarios needed to make these future uses possible in light of potential exposure to contaminants, if any, after cleanup.
- Probe for convergences among the Working Group's cleanup scenarios for any priorities or criteria that could prove useful in focusing or conducting cleanup of the Hanford Site.

1 The Working Group members divided the Hanford Site into six distinct geographic areas to
2 facilitate their tasks. They developed future-use options, cleanup scenarios, and other
3 recommendations for each of the six geographic areas. Their efforts were based on the assumption that
4 cleanup activities at the Hanford Site could (1) benefit greatly from having a better understanding of the
5 range of potential future uses of the Hanford Site, and (2) focus the efforts of the DOE and all involved
6 government agencies and interested parties on the types of remedial action activities needed to achieve
7 the recommended future-use objectives. The DOE, Ecology, and the EPA have committed to using the
8 Working Group's report to inform and guide the agencies in all relevant aspects of their cleanup
9 decisions (HFSUWG 1992). The Working Group was utilized as the scoping effort for the HRA-EIS.

10
11 The HRA-EIS incorporates the levels of access (i.e., restricted use, unrestricted use, and exclusive
12 use) and the geographic areas concept developed by the Working Group into the development of future
13 land-use alternatives for four geographic area concepts of the Hanford Site: Columbia River, Reactors
14 on the River, Central Plateau, and All Other Areas. The remaining two geographic areas, the
15 Fitzner/Eberhardt Arid Lands Ecology (ALE) Reserve and the North of the River (North Slope), have
16 been remediated, and are not within the scope of the HRA-EIS, however these areas are discussed.

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Planning Process

3.0 Planning Process

This chapter describes the process, values, and methods used in developing this Comprehensive Plan. To initiate land-use planning at Hanford, the RL appointed a Land Use Planning Project Manager in May 1995, and directed the RL contractors to form an integrated land-use planning team (see Chapter 10). The team consisted of DOE personnel and contractor managers, land-use planners, and technical program representatives. The team was directed to develop a comprehensive land-use plan that would identify existing and planned land uses and their accompanying restrictions. The team also was directed to integrate this Comprehensive Plan with the Strategic Plan and the HRA-EIS NEPA process in a manner consistent with the analysis of environmental impacts in the HRA-EIS. The team was directed to coordinate internal organizational and external involvement activities.

3.1 Integration of the Baseline Environmental Management Report, Hanford Strategic Plan, Hanford Remedial Action Environmental Impact Statement and the Comprehensive Land Use Plan

RL is working to fully integrate this Comprehensive Plan with the *Baseline Environmental Management Report* (DOE 1996a), *Hanford Strategic Plan* (DOE-RL 1994a), and the HRA-EIS. Table 3-1 presents a comparison of the potential land-use assumption or goals of each effort.

The *Baseline Environmental Management Report* (BEMR) is the first annual report on the activities and potential costs required to address the waste, contamination, and surplus nuclear facilities across the country that are the responsibility of the DOE Office of Environmental Management. The BEMR provides life-cycle cost estimates, tentative schedules, and projected activities necessary to remediate DOE sites. Many broad assumptions were required to estimate the long-range costs and schedules, including assumptions regarding future land uses, cleanup levels, and priority rankings. The BEMR should not be interpreted as final DOE policy or long-term plans; instead, it is a tool to help guide overall policy development for the DOE complex.

The *Hanford Strategic Plan* (Strategic Plan) establishes the top level operational direction for the Hanford Site, and provides a measurable path to achieve Hanford Site missions. It addresses and accommodates broad over-arching values, and provides a long-range view of approaches for fulfilling Hanford Site missions. The Strategic Plan and its associated *Draft Hanford Mission Direction Document* (DOE-RL 1995b) define the guidance and requirements needed to develop the detailed project plans and performance measures in the Multi-Year Work Plans that are necessary for fulfillment of Hanford Site missions. The Strategic Plan is being revised; it is expected to be completed during the fall of 1996.

Hanford Strategic Plan

To meet the DOE's commitments, it is vital that the expectations of the DOE, regulators, Native American Tribes, and stakeholders be reflected in a comprehensive Strategic Plan that defines the desired end-state of the site over the next 50 years, and the necessary steps to get there. Central direction and new, innovative techniques become imperative as continuing emphasis is placed on greater efficiency and reduced budgets. Our current Strategic Plan addresses these issues, but needs to be thoroughly reviewed due to changing budgetary, regulatory, and political condition (DOE-RL 1995a).

1 **Figure 3-1. Comparison of U.S. Department of Energy Planning Efforts for Future Land Uses at the Hanford Site.**

2 3	Geographic Areas	Baseline Environmental Management Report Future Use Assumptions	Strategic Thinking Preliminary Goals	EIS Future Land-Use Alternatives	Comprehensive Plan Land-Use Designations
4	Columbia River	Recreational	Pending Congressional action on the Wild and Scenic River designation, use would continue to be restricted; sensitive ecological, cultural, and Native American resources would be protected.	Unrestricted Use Restricted Use No Action	Wildlife Habitat and Management Controlled Access and Recreation Special Use Areas
5 6	Reactors on the River	Open Space Wildlife Management	Remove and/or stabilize spent fuel, surplus facilities, and waste sites to eliminate the potential for future contamination of groundwater and the Columbia River and to ensure protection of people, the environment, and natural/cultural resources. The DOE would retain control of this land throughout the remediation mission and would protect archaeological, cultural, and environmental resources.	Unrestricted Use Restricted Use No Action	Environmental Restoration Open Space Restricted Controlled Access and Recreation Special Use Areas
7	Central Plateau	Industrial Commercial	The 200 Area and the Central Plateau would be used for management of nuclear materials, collection and disposal of waste materials that remain onsite, and other related and compatible uses. Remediation levels and disposal standards that are consistent with these long-term uses would be established.	Exclusive Use No Action	Waste Management
8 9	All Other Areas - Central Core	Open Space Wildlife Management	This area would remain in federal ownership, which is consistent with safety analysis boundaries and continued waste management operations in the 200 Area. These areas would be available for other federal programs or leased for nonfederal uses, consistent with appropriate recognition of cultural and ecosystem values.	Restricted Use No Action	Open Space Restricted Special Use Zone
10 11 12	All Other Areas - South 600 Area	Industrial Commercial	The 300 Area waste sites, materials, and facilities would be remediated to allow industrial and economic transition opportunities. The Federal Government would retain ownership of land in and adjacent to the 300 Area, but would lease land for private and public uses to support regional industrial and economic development. Excess land within the 1100 and 3000 Areas would be targeted for transition to nonfederal ownership.		Potential Economic Development Zone Industrial

13
14

1 The HRA-EIS presents information on potential future land uses for the Hanford Site and provides
2 an assessment of the impacts (primarily from remediation activities) associated with achieving the
3 future land use objectives. The function of the HRA-EIS is to obtain input from the public and
4 stakeholders, document the process of developing future land-use objectives, and determine the costs
5 and benefits associated with remediating the Site to achieve the land-use objectives. The HRA-EIS
6 serves as the NEPA vehicle for sitewide land use management and remediation. The specific level of
7 remediation will be determined through appropriate *Comprehensive Environmental Response,*
8 *Compensation, and Liability Act of 1980* (CERCLA) and the *Resource Conservation and Recovery Act*
9 *of 1976* (RCRA) decision processes.

10
11 This Comprehensive Plan relies on the analysis of environmental impacts in the HRA-EIS.
12 Preparation, review, and approval of this Comprehensive Plan are being done in conjunction with the
13 HRA-EIS. The NEPA ROD for the HRA-EIS will be the decision process for finalizing and adoption
14 of this Comprehensive Plan. This Comprehensive Plan designates site-specific land uses required to
15 support all the missions identified in the Strategic Plan through the evaluation of land use opportunities
16 and constraints posed by natural, cultural, and socioeconomic factors. Together, the HRA-EIS and this
17 Comprehensive Plan will provide an evaluation of the environmental tradeoffs associated with the
18 designation of future land uses at the Hanford Site. These documents will provide a basis for
19 remediation decisions to be identified and contained in site- and area-specific EPA CERCLA RODs.
20
21

22 **3.2 National Environmental Policy Act Integration**

23
24 The RL recognizes the importance and usefulness of this Comprehensive Plan to the DOE, Tribal
25 governments, state and local governments, and the many people interested in the Hanford Site. The
26 integration of NEPA analyses with land-use planning is consistent with and encouraged by the Council
27 on Environmental Quality's (CEQ) National Environmental Policy Act Regulations guidelines
28 (46 FR 18026). To address this requirement, RL developed an integrated land-use planning and HRA-
29 EIS initiative to facilitate and expedite land-use and remediation decisionmaking, reduce time and cost
30 of remediation, and optimize the usefulness of the planning process. The HRA-EIS is being developed
31 to evaluate the potential environmental impacts associated with remediation, create a remedial baseline
32 for the Environmental Restoration Program, and provide a framework for future uses at the Hanford
33 Site. This Comprehensive Plan identifies existing and planned future land use with accompanying
34 restrictions, covers a specific time frame, and will be updated when major NEPA decisions are
35 required for new projects, consistent with the Strategic Plan.
36

37 This Comprehensive Plan addresses lands being evaluated by the U.S. Department of Interior
38 (DOI) in the *Hanford Reach of the Columbia River, Comprehensive River Conservation Study and Final*
39 *Environmental Impact Statement* (NPS 1994), but would reflect federal direction if congressional action
40 is taken.

1 **3.2.1 Need For External Coordination and Public Involvement**

2
3 RL recognized that integration includes
4 coordinating internal and external public
5 involvement activities, and is committed to
6 ensuring that the planning process engages a
7 wide spectrum of participants. Benton County
8 and the City of Richland had independent
9 planning processes underway, which addressed
10 portions of the Hanford Site. To be responsive
11 to requests for cooperation, and to reduce
12 overlap, duplication, and the possibility of public confusion as to how they relate to each other, RL
13 sought to cooperate with the county and the city on the development of their land use plans. As the
14 county and city developed their land use plans, a need developed to understand how the DOE was
15 going to manage federal lands at the Hanford Site. RL has sought Tribal cultural interests in DOE's
16 planning efforts through meeting and consultation processes.
17

"Public involvement considerations need to be a part of each committee's agenda. We need to find ways to integrate public involvement issues and questions earlier in the process."

Betty Tabutt, Chair, Public Involvement Committee.

(HAB 1996a)

18 The DOE set a goal to conduct the planning process voluntarily and in cooperation with key
19 governmental bodies that have an interest in the Hanford Site. Therefore, RL requested active
20 participation, discussion, and early input from several government entities. These included the DOE,
21 the U.S. Bureau of Land Management (BLM), the Yakama Indian Nation, the Confederated Tribes of
22 the Umatilla Indian Reservation, the Nez Perce Tribe, Wanapum People, Benton County, and the City
23 of Richland. Consistent with a belief that the planning process be as all encompassing as possible, RL
24 also invited participation and input from other agencies of the DOI, the EPA, Ecology, and the
25 Washington State Department of Fish and Wildlife, and from Grant, Franklin, and Adams Counties, to
26 the extent they wished to participate. A detailed listing of organizations and participants is provided in
27 Table 3-2. This listing and participation in the DOE planning process should not be interpreted in any
28 manner as endorsement or approval of the planning process or its results.
29
30

31 **3.2.2 Development of the Comprehensive Land-Use Planning Database and the**
32 **Discussion of Site Environmental and Development Characteristics**

33
34 A series of meetings, at which RL and the participating agencies and interested parties reviewed
35 and discussed the data to be included and evaluated in this Comprehensive Plan, were held
36 October 3, 1995, through Summer 1996 (Table 3-3). Information was prepared and presented by
37 numerous RL, Tribal, contractor, State of Washington, county, city, and stakeholder technical,
38 program, and management representatives on a wide range of resource attributes and subjects important
39 to land use planning and remedial action. Extensive use was made of a geographical information
40 system (GIS) and computer graphics presentations. The GIS database for this Comprehensive Plan and
41 the HRA-EIS planning process is the same.

Table 3-2. Participants and Government Agencies Invited to Meetings on Comprehensive Land Use Planning October 1995 through Summer 1996.

Organization	Name
Confederated Tribes and Bands of Yakama Nation	Augustine Howard, Russell Jim, Rory Snowarrow Flint Knife, Debra Borrero, and Lewis W. Malatare
Wanapum Tribe	Richard Buck, Rex Buck, and Lenore Buck
Nez Perce Tribe	Charles H. Hayes, Donna Powauke, J. Herman Reuben, Stan Sobzyck, and Paul Danielson
Confederated Tribes of the Umatilla Indian Reservation	Donald Sampson, J. R. Wilkinson, Christopher Burford, Jeff Van Pelt, Thomas E. Bailor, and Michael S. Burney
U.S. Department of Interior, Bureau of Land Management	Ann B. Aldrich and Gary Yeager
U.S. Department of Interior, Fish and Wildlife Service	David C. Kaumheimer, Liz Block, and Dave Goecke
U.S. Department of Interior, Bureau of Indian Affairs	Stanley M. Speaks and Larry Berkompas
U.S. National Marine Fishery Service	Bill Steele
U.S. Environmental Protection Agency, Region 10	Chuck Clarke, Doug Sherwood, and Paul Beaver
State of Washington Department of Ecology	Mary Riveland, David Holland, and Tom Tebb
State of Washington Department of Fish and Wildlife Service	Ted Clausing, Julie Atwood, and Lisa Fitzner
Benton County Commissioners Office	Raymond E. Isaacson and Ben Floyd
Benton County Planning Department	Phil Mees, Darin Arrasmith, and Adam Fyall
City of Richland Planning Department	Ben Rea, Herb Everett, and Dennis Rhodes
Hanford Advisory Board	Marilyn Reeves, Greg DeBruler, and Ralph Pat
Adams County Commissioners Office	William L. Schlager
Franklin County Commissioners Office	Neva Corkrum
Grant County Commissioners Office	Tim Snead and Larry Angel
U.S. Representative Doc Hastings	Joyce DeFelice
Washington State Senator	Patricia S. Hale
U.S. Senator Slade Gorton	Suzanne Heaston
Washington State Senator Valoria Loveland	Mike Sando
U.S. Senator Patty Murray	Dan Evans
Washington State Representative	Shirley Hankins and Jerome Delvin
City of Benton City, Mayor	J. D. Fluckiger
City of Richland, Manager	Joe King
City of West Richland, City Administrator	Paul Chasco
City of Pasco, City Manager	Gary Crutchfield
City of Kennewick, City Manager	Bob Kelly
Benton-Franklin Regional Council	Donald P. Morton
Tri-Cities Industrial Development Council (TRIDEC)	Sam Volpentest
Port of Benton, Director	Ben Bennett
Port of Benton Commissioner	Robert D. Larson

1 **Table 3-3. Comprehensive Land-Use Planning Discussion Meetings,**
 2 **October 1995 through Summer 1996.**

Date	Subject Covered
October 3	Kickoff meeting. Review of GIS data on water, ownership, infrastructure, and waste sites.
October 10	Review of GIS data on soils, geology, seismology, groundwater recharge, groundwater contamination, and initial discussion of values important to land use planning.
October 17	Review of GIS data on biology--land cover, element occurrences, rare habitats, chinook salmon, eagles, wetlands, hawks, sage sparrow habitat, habitats of concern, red zone, habitat improvement areas, and State of Washington, Department of Fish and Wildlife - priority habitats and species
October 24	Discussion of values important to land use planning, protective safety buffer zones, and follow-up discussion on biology.
October 31	Discussion of values important to land use planning.
November 7	Discussion of values important to land use planning, review of GIS data and presentations on potential economic development by DOE, (with TRIDEC input incorporated), Benton County, City of Richland, Grant County, and the Port of Benton
December 12	Discussion of Land Use Suitability Analysis Methodology. Modified McHarg analysis of opportunities and constraints using GIS maps. Review of GIS maps for biology, surface water, groundwater, geology, waste sites, protective safety buffer zones, and archaeology
January 9	Discussion of Land Use Suitability Analysis Methodology and modified McHarg analysis of opportunities and constraints using GIS maps.
January 16	Discussion of vadose zone contamination. Projects presenting: Single-Shell Tank Characterization Program, Liquid Waste Disposal Facilities Vadose Monitoring Project, Environmental Restoration Monitoring Project, and Hanford Environmental Information System.
March 16	Discussion of land-use planning opportunities and constraints. Review of GIS data and presentation of land-use constraint maps for biology, surface water, groundwater, geology, waste sites, protective safety buffer zones, and cultural.

14
15
16 **3.3 Values Important to Land Use Planning and Remediation**

17
18 Values are defined as "broad and relatively enduring preferences for some state of affairs"
 19 (Hambrick 1988). "State of affairs" encompasses two concepts: an end-state or result, and the means
 20 for achieving the end-state. Using these principles as a guide, this Comprehensive Plan strives to
 21 overlay the values of interested participants onto the constraints posed by the DOE missions to reach an
 22 acceptable state of affairs for the Hanford Site.
 23

1 A variety of stakeholder groups have communicated to DOE their strong feelings about values
 2 important to land use planning and remediation. Extensive correspondence and various reports and
 3 documents show that the Hanford Site is, indeed, very important to many different parties for various
 4 reasons.

5
 6 Generally, these diverse
 7 groups share a common concern
 8 about Hanford Site issues. But
 9 each stakeholder group has a
 10 specific and distinct interest that
 11 reflects the policies or goals of
 12 the constituency. The interests
 13 of one group of stakeholders
 14 may sometimes conflict with the
 15 interests of other groups.

"Consensus from this board [Hanford Advisory Board] means something. It has political clout because it has such a broad and diverse constituent base. Decisionmakers like to work with clear expressions of opinion from a broad cross-section of constituents. That's what we deliver."

Ralph Patt, Chair, Environmental Restoration Committee.

(HAB 1996a)

16 17 18 **3.3.1 Future Site Uses Working Group and the Hanford Advisory Board**

19
 20 Section 5 in *Tracking The Hanford Cleanup, FY 1995, A Progress Report by the Hanford Advisory*
 21 *Board*, entitled "The Public Speaks: Adopting Values to Guide Cleanup," contains a detailed
 22 description of the recent history and development of a set of values that the Hanford Advisory Board
 23 (HAB) feels is important to guide cleanup (HAB 1996a).

24
 25 Workers, the general public, and the environment are at potential risk from Hanford Site waste.
 26 Eliminating or reducing those risks are the drivers behind remediation. Many groups are interested in
 27 various aspects of Hanford Site waste management and remediation; local, regional, tribal, state and
 28 federal governments, business interests, workers, environmental organizations, health agencies, public
 29 interest groups, and the public-at-large are stakeholders.

30
 31 Through intensive and innovative consensus-building during the past three years, the diverse
 32 interest groups have agreed on a common set of values that provide clear guidance to Congress, the
 33 State of Washington, the DOE, Ecology, and the EPA.

34
 35 The first set of values were formulated in 1992 by the Working Group (HFSUWG 1992):

- 36 ● Protect the River
- 37 ● Deal realistically and forcefully with groundwater contamination
- 38 ● Use the Central Plateau wisely for waste management
- 39 ● Do no harm during cleanup or with new development
- 40 ● Cleanup of areas of high future use value is important
- 41 ● Cleanup to the level necessary to enable the future use options
- 42 ● Transport waste safely and be prepared for emergencies
- 43 ● Capture economic development opportunities locally
- 44 ● Involve the public in future decisions about the Hanford Site.
- 45
- 46

1 In 1993, the Tank Waste Task Force reinforced the first set of values by adding the following
2 (PNL 1994):
3

- 4 • Get on with cleanup!
- 5
- 6 • Protect the environment
- 7
- 8 • Protect public and worker health and safety
- 9
- 10 • Use a systems-design approach that keeps end points in mind while intermediate decisions are
11 made
- 12
- 13 • Establish management practices that ensure accountability, efficiency, and allocation of funds
14 to high priority issues.
- 15

16 The first major action taken by the HAB in early 1994 was to endorse and adopt both sets of
17 values. In September 1994, acting on a recommendation from its Cultural and Socioeconomic
18 Committee, the HAB adopted the following additional values:
19

- 20 • Historic and cultural resources have value; they should not be degraded or
21 destroyed. Appropriate access to those resources is a part of their value.
- 22
- 23 • Workforce stability, and reasonable stability in the demand for public services, are important
24 in the affected communities. In decisions on projects and contractors, consideration should
25 be given to affected workforce and population shifts.
- 26
- 27 • Cleanup and waste management decisions should be coordinated, with the efforts of the
28 affected communities, to shift toward more private business activity and away from
29 dependence on federal projects that have adverse environmental impact.
- 30
- 31 • The importance of ecological diversity and recreational opportunities should be recognized;
32 those resources should be enhanced as a result of cleanup and waste management decisions.
- 33
- 34 • These concerns should be considered while promoting the most effective and efficient means
35 that will protect environmental quality and public health and safety now and for future
36 generations.
- 37
- 38 • Cleanup activities should protect, to the maximum degree possible, the integrity of all
39 biological resources, with specific attention to rare, threatened, and endangered species and
40 their related habitat.
- 41

42 ***3.4 Methods for Evaluating Land Use Suitability***

43 The method utilized to perform the land use suitability evaluation was adapted from a graphical
44 analytical method originally developed by Professor Ian McHarg at the University of Pennsylvania
45 (McHarg 1969). The McHarg method uses a graphic representation to organize a large amount of
46 information, on a diverse range of features, into a manageable form. The method depicts land use
47 opportunities and constraints according to their ability to accommodate each other.
48
49

Land Use Suitability Analysis Using the McHarg Method

The graphical overlay method for analyzing land-use suitability, which was developed by Ian McHarg of the University of Pennsylvania, organizes a large amount and diverse range of information in a manageable form for evaluation. The analysis evaluated land-use activities and potential impacts to natural resources and site attributes. The method enables one to objectively consider the broad array of constraints and how they relate to future land-use options.

A constraint map for a given relevant feature of the environment (i.e., biological, surface water, groundwater, waste sites, protective buffer zones, geological, and archeological, is color coded by the magnitude (i.e., the relative severity) of the constraint to development that causes surficial disturbance. The designation of the severity is based upon an evaluation of several characteristics of the particular resource, including the relative sensitivity of the resource to disturbance, it's ability to recover, the statutorily authorities, laws, and regulations which pertain to the management of the resource, and the capability of the federal government to address the nature of the issues in terms of management and technological capability.

After careful evaluation of these factors, each type of feature of the environment was placed in one of three constraint severity categories; (1) minor to no constraints, (2) moderate constraints, and (3) major constraints.

A "minor or no constraint" [green] identifies areas which exhibit few, if any, difficulties to land use activities, particularly those which entail surface disturbance. In general, costs and/or controls for development would be minimal.

A "moderate constraint" [yellow] identifies areas that exhibit features or attributes that require a moderate amount of cost, engineering or technology to address, particularly because of impacts surface disturbance has on environmental resources that are protected under the law.

A "major constraints" [red] identifies those areas which are protected by laws and regulations to such a degree that incompatible land uses are extremely difficult to accommodate. In most cases, mitigation of the constraints would either be so costly or detrimental to the resources that another site for the proposed development would be considered. In those cases in which development is compatible with the resources and operation of the site, or is justified by the magnitude of a project, strict controls would be required to preserve the integrity of the resources. Proposed land use developments within areas with a "major constraint" are scrutinized through the RL site use approval process.

1 The DOE's land-use team primarily gathered data from the DOE and its contractors. As a result
2 of the land-use meetings with participating agencies and interested parties (Table 3-2), the DOE also
3 received and incorporated input and information from a wide range of other sources. The information
4 was compiled and incorporated into a single, integrated land-use planning database in the HGIS, which
5 is maintained by Bechtel Hanford, Inc. for the DOE. The integrated HGIS database information is
6 shared with Tribal governments, Benton County, the City of Richland, and other interested government
7 agencies and parties.
8
9

3.4.1 Step 1--Identify and Analyze Site Characteristics

10 The DOE's land-use team reviewed all RL program plans, environmental reports, and
11 documentation on a spectrum of natural resources characteristics and Hanford Site physical attributes.
12 Technical program representatives prepared and submitted data to the HGIS database manager.
13
14

1 The GIS maps were developed using ARC/INFO¹, a GIS database management program, while
2 ArcView² was used to query and display the HGIS data. The major subject areas addressed included
3 biology, surface water, groundwater, waste sites, safety buffer zones, geology, and archaeology. At
4 land-use planning discussion meetings held between October 3, 1995 and January 16, 1996, data and
5 information on natural resources and physical attributes were presented and discussed with the invited
6 participating government agencies and interested parties. Discussions focused on the quality of the data
7 and its suitability for inclusion in this Comprehensive Plan's database and process.

8
9 The GIS data was incorporated into the planning process for this Comprehensive Plan and the
10 HRA-EIS. Baseline GIS maps, and the associated supporting database information, are presented in
11 Chapter 4.0 of the HRA-EIS. The baseline GIS maps and database information then were evaluated to
12 determine the significance of the data to land use planning at the Hanford Site.

13 14 15 **3.4.2 Step 2--Identify and Analyze Mission Needs**

16
17 Information regarding site infrastructure, operating facilities, and potential economic development
18 activities also were discussed and addressed at the land-use meetings. GIS maps describing site
19 infrastructure (roads, rails, water, and electrical), operating site complexes, and facilities were
20 developed.

21
22 Current and projected development activities were assessed. The DOE's land-use team reviewed
23 all Site development plans, mission statements, strategic planning documents, and institutional plans.
24 The land-use team prepared a list of planning assumptions for inclusion into this Comprehensive Plan,
25 and reviewed and discussed these with RL program managers to ensure that this Comprehensive Plan is
26 appropriately integrated with current Hanford Site management initiatives.

27 28 29 **3.4.3 Step 3--Identify and Analyze Regional Development Characteristics**

30
31 A potential economic development GIS map was developed by compiling information from
32 various DOE, contractor, state, county, city, and local organizations including the Tri-Cities Industrial
33 and Economic Development Council, the Port of Benton, Benton and Grant counties, and the City of
34 Richland. The GIS map identifies the areas of interest for future economic development. The GIS map
35 reflects the data in the economic development information, and the proposals that were presented and
36 discussed with the participating government agencies and participants.

37
38
¹ARC/INFO is a registered trademark of Environmental Systems Research Institute, Inc.,
Redlands, CA USA.

² ArcView is a trademark of Environmental Systems Research Institute, Inc., Redlands, CA
USA.

3.4.4 Step 4--Perform Analysis of Constraints

A "constraint" is defined as a feature, attribute, or issue associated with the natural or built environment that must be addressed if a proposed land-use activity is to occur. Constraint maps are useful for regional planning because they identify the type and relative severity of the problems that might need to be addressed if the land-use activity is allowed.

A series of seven constraint tables and GIS maps, which show current DOE facilities and operating areas, were prepared over a base GIS map of the Hanford Site. These GIS maps present the relevant site characteristics that are known to pose issues to land-use activities. The classification of the severity of the constraint is based on an identification and evaluation of the legal drivers (e.g., the statutes, laws, regulations, Executive Orders, treaties, and DOE orders) associated with the management of the particular factor at issue. The DOE's land-use team also identified and described the existing programs and initiatives that are in place to evaluate the institutional capabilities, and deal with and address the identified constraints.

3.4.5 Step 5--Analyze the Future Site Uses Working Group's Plausible Future Use Options

The DOE's land-use team prepared a GIS map identifying the geographic study areas of the Hanford Site (Figure 3-1). The GIS map was created using the Working Group's six geographic areas as an initial base map. The GIS then was used to overlay the potential economic development zone (Figure 6-40) as a baseline to create a final geographic study area map that identifies a "South 600 Area" and "Central Core." While officially part of the 600 Area, the ALE Reserve, the North Slope, the South 600 Areas, and Central Core were identified and evaluated individually during the analysis. To the extent appropriate, the land-use team also identified and described the location of relevant sub areas, when the analysis of constraints indicated such an identification was appropriate to distinguish it from surrounding lands.

A series of six tables, which evaluate the recommended range of "Plausible Future Use Options" identified by the Working Group, were prepared (HFSUWG 1992). These options include the following:

- Agricultural
- Waste management
- Industrial and commercial development
- Environmental restoration
- Wildlife and habitat management
- Public access and recreation.

Cultural resources were not evaluated as an independent land-use option, but rather were evaluated as a factor, which must be deemed consistent and acceptable to all land-use designations adopted in the final land-use plan, through the formal consultation process with the Tribal governments.

For each plausible future-use option, the DOE's land-use team identified the presence (or absence) of identified constraints in the key geographic areas (or sub areas, as appropriate) of the Hanford Site. This was accomplished by evaluation of the original data on which the constraint is based, the GIS constraint maps, and documentation of the identified constraints for each geographic study area in the tables.

1 **3.4.6 Step 6--Identify Existing Land Use (Year 1996) and Proposed Land Use (Year 1997)**

2
3 The DOE's land-use team reviewed and evaluated the GIS maps, along with the constraints and
4 options tables, and prepared a GIS map depicting the existing land uses (Figure 8-1). The map was
5 created by identifying current land use. This GIS map serves as the baseline for the evaluation of
6 plausible future-use options. The land-use team also evaluated the existing land uses and developed a
7 proposed land-use designation and GIS map. This proposed land-use designation will be presented to
8 the public to provide opportunities of public review and comments. Approval of the HRA-EIS NEPA
9 ROD will result in the adoption of this Comprehensive Plan for the Hanford Site.

10
11
12 **3.4.7 Step 7--Evaluate Projected Changes to the Natural and Built Environment**
13 **Over the Next 50 Years**

14
15 The DOE's land-use team reviewed the original GIS data to identify the reasonably predicted
16 changes to natural resources and attributes of the built environment that are reasonably foreseeable over
17 the next 50 years. These changes were identified and documented in the constraint tables. GIS maps
18 then were prepared to depict the characteristics of those factors that would change significantly over the
19 next 50 years, and have implications to future land use.

20
21
22 **3.4.8 Step 8--Identify Projected Future Land Use at 50 Years (Year 2046)**

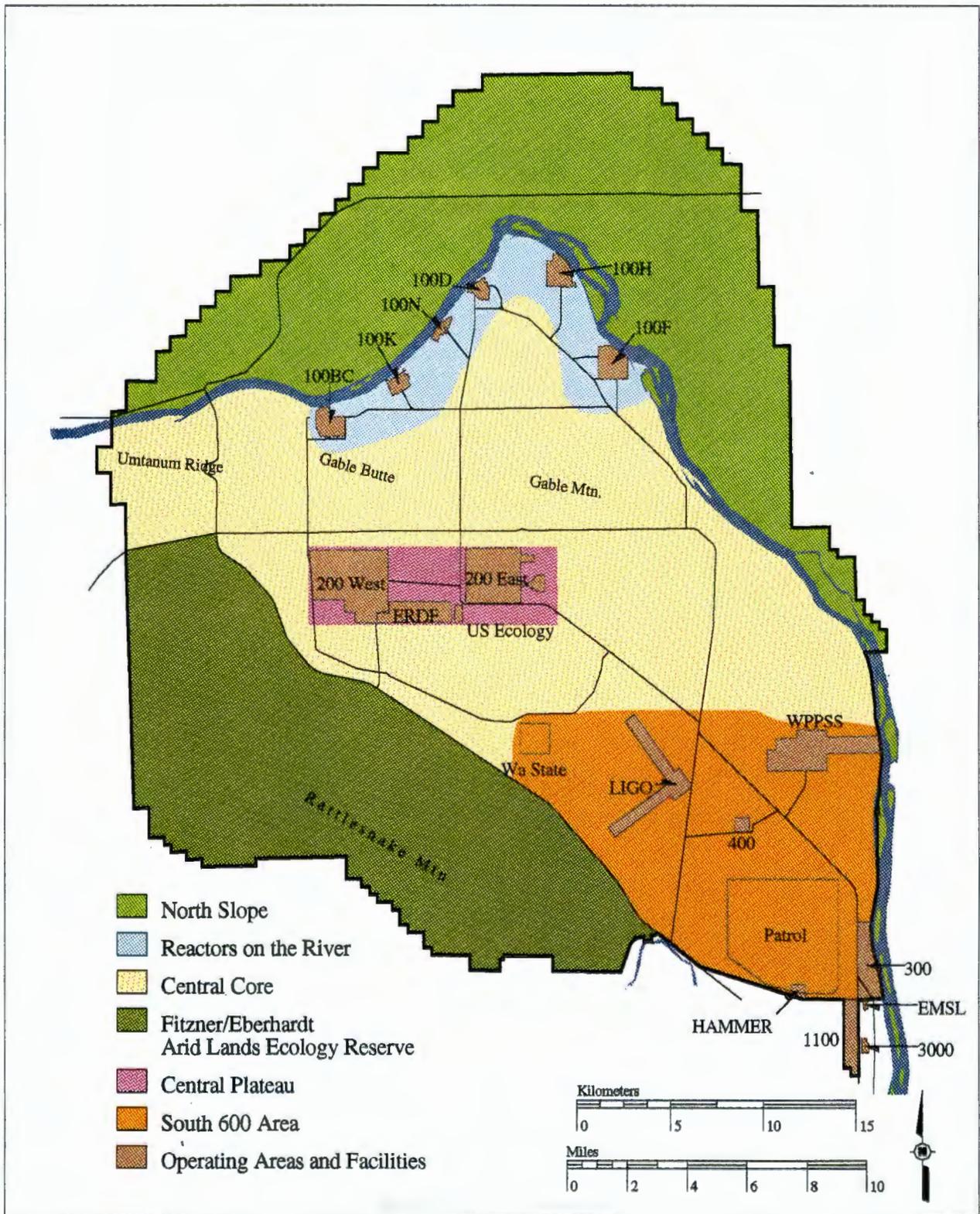
23
24 The DOE's land-use team evaluated existing land use, mission needs, and the nature of expected
25 changes to features and attributes of the natural and built environment over the next 50 years. The GIS
26 maps and tables associated with the changes over the next 50 years were reviewed and evaluated to
27 determine the reasonable changes in land use that could be supported. A GIS map of the projected
28 future land use at 50 years was developed.

29
30
31 **3.4.9 Step 9--Evaluate Proposed and Projected Future Land Use Against**
32 **the Values Important to Land Use Planning**

33
34 The DOE's land-use team reviewed the proposed and projected future land uses against the values
35 developed by the Working Group in 1992, the Tank Waste Task Force in 1993, and the HAB in 1994
36 through 1996.

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2
3

Figure 3-1. Geographical Study Areas.



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Mission, Responsibilities, & Relationships

4.0 *The U.S. Department of Energy's Mission, Responsibilities, and Relationships With Other Governmental Entities*

The continuing mission of the DOE at the Hanford Site includes three major mission elements and a variety of diverse mission components: Site remediation, waste management, and science and technology. These mission elements directly align with three of the five business areas defined in the Secretary of Energy's Strategic Plan: environmental quality, science and technology, and industrial competitiveness (DOE 1994).

The Hanford Site Vision

The Hanford Site has dealt with legacy wastes, and has become a national environmental and technological asset performing new missions (DOE-RL 1995a).

The responsibilities associated with implementing the DOE missions and complying with the related programmatic and legal requirements pose land-use constraints that the DOE must consider as a priority in the land-use planning process.

4.1 *U.S. Department of Energy Programs and Policies*

The following section presents a variety of programs and policies that the DOE is responsible for implementing at the Hanford Site.

4.1.1 *Defense-Related Programs*

The role of the Hanford Site in supporting national defense has been reduced significantly from the 1950s and 1960s, when the Site was the primary producer of weapons-grade plutonium in the Nation. Current defense-related activities at the Hanford Site are associated with management of special nuclear materials and disposal of low-level wastes generated by the U.S. Navy. These activities occur in the 200 Areas.

Hanford Missions

Hanford's missions are to safely clean up and manage the site's legacy wastes and develop and deploy science and technology. Through these missions we contribute to economic diversification of the region (DOE-RL 1995a).

4.1.2 *Decommissioning*

Decommissioning activities at the Hanford Site include the transition of existing facilities in an operating status to a lower-cost, lower-risk surveillance and maintenance condition. After some period of time, consistent with a periodic re-evaluation of sitewide risks and environmental restoration priorities, final disposition actions are scheduled and implemented. These final decisions are important because the time frames and disposition activities will have an important effect on the possible future

1 uses of the land. The decommissioning process, and the activities and schedules associated with the
2 decommissioning of facilities on the Hanford Site, are addressed in Section 8 of the Tri-Party
3 Agreement (Ecology et al. 1989). Decommissioning of facilities at the Hanford Site occur within the
4 operating areas.
5
6

7 **4.1.3 Environmental Restoration**

8
9 Environmental restoration of the Hanford Site is
10 a major mission of the DOE and its contractors. The
11 *Richland Environmental Restoration Project Plan*
12 (DOE-RL 1994b) provides guidance and contains a
13 strategy for management, remediation, and disposal of
14 environmental contamination at the Hanford Site. The
15 project is directed at minimizing environmental risks
16 from contaminated soils, contaminated groundwater,
17 and solid wastes in past-practice waste sites. More
18 than 2,000 inactive radioactive, hazardous, and mixed-waste sites may need to be remediated to levels
19 that support future land-use activities at the Hanford Site. In addition to these sites, a number of
20 surplus facilities may need to be decommissioned. Environmental remediation is performed in
21 accordance with the enforceable milestones identified in the Tri-Party Agreement. These milestones
22 help establish priorities for the *Richland Environmental Restoration Project Plan* (DOE-RL 1994b).
23

Environmental Management Mission

We protect health and safety of the public, workers
and the environment; control hazardous materials;
and utilize the assets (people, infrastructure, site) for
other missions (DOE-RL 1995a).

24 Progress in meeting the milestones is affected by the issues associated with future use of Hanford Site
25 lands. The HRA-EIS (DOE 1996b) has been prepared by the DOE to evaluate potential environmental
26 impacts associated with future land-use objectives for the Hanford Site. Table 4-1 presents the relationship
27 between the future land-use alternatives presented in the HRA-EIS, and the Working Group's land-use
28 options and cleanup scenarios.
29
30

31 **4.1.4 Waste Management**

32
33 Management of stored wastes and treatment, storage, and disposal of radioactive, hazardous, or mixed
34 wastes is another major mission for the Hanford Site. Wastes that are stored at the Hanford Site include
35 low-level radioactive wastes, high-level radioactive wastes, transuranic (TRU) wastes, hazardous wastes,
36 and mixed wastes. These materials have been stored or disposed of in various burial grounds, tanks, and
37 storage facilities. Although disposal areas are found outside of the operating areas at the Hanford Site, the
38 majority of the disposal facilities are located in the 200 Areas. Waste disposal facilities require ongoing
39 management and monitoring, which pose constraints on land uses.
40

Table 4-1. Relationship Between the Hanford Future Site Uses Working Group Land-Use Options, Cleanup Scenarios, and Environmental Impact Statement Future Land-Use Alternatives.

WORKING GROUP LAND-USE OPTIONS	WORKING GROUP CLEANUP SCENARIOS	ENVIRONMENTAL IMPACT STATEMENT FUTURE LAND-USE ALTERNATIVES
COLUMBIA RIVER		
Wildlife and Recreation Recreational and Related Commercial, Scenic and Economic Uses Native American Uses	Unrestricted (All Options)	Unrestricted (Agricultural)*
		Restricted (Recreational, Industrial, or Residential)*
REACTORS ON THE RIVER		
Native American Uses Wildlife and Recreation Limited Recreation, Recreation-Related Commercial Uses, and Wildlife B Reactor as a Museum/Visitor Center	All Unrestricted	Unrestricted (Agricultural)*
	Clean Enough for Land Use Option 3 (Option 3) Unrestricted; B Reactor Restricted (Option 4)	Restricted (Residential, Industrial, or Recreational)*
CENTRAL PLATEAU		
Onsite Waste and Existing Obligations for Disposal Option 1 plus Offsite DOE Waste for Treatment Only Option 2 plus Offsite Commercial Waste for Treatment Only Option 3 plus Offsite DOE Waste: long-term storage of TRU and HLW, and Disposal of LLW Option 4 plus Commercial SNF for long-term MRS Option 5 plus Compatible Commercial or Industrial Activity	Exclusive Use with Buffer (All Options)	Exclusive (Industrial)* (within the squared-off area between and including the 200 West and East Areas and the industrial region located east of the 200 East Area)
ALL OTHER AREAS		
Focus on Economic Development Focus on Wildlife Native American Uses Agricultural Use	Cleanup for Economic Development Wildlife (Options 1, 2, and 3) Cleanup for Agricultural and Native American uses outside the 300 Area (Options 3 and 4)	Restricted (Recreational, Residential, or Industrial)*

* Exposure scenarios from the Hanford Site's Risk Assessment Methodology associated with the HRA-EIS future land-use alternatives

- HLW = high-level waste
- LLW = low-level waste
- MRS = monitored retrievable storage
- SNF = spent nuclear fuel
- TRU = transuranic

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1 **4.1.5 Science and Technology**

2
3 Science and technology development at
4 the Hanford Site focuses on responding to the
5 needs of the environmental restoration and
6 waste management activities, including
7 developing and testing new technologies for
8 characterizing, retrieving, treating, and
9 disposing of radioactive and hazardous wastes.
10 A focus of these research activities is to develop
11 and improve technologies for application to
12 waste management, environmental protection,
13 and Site restoration in a cost-effective manner.
14 The Pacific Northwest National Laboratory
15 (PNNL), a multi-program energy research
16 laboratory, is the lead organization for science
17 and technology development at the
18 Hanford Site. Science and technology R&D
19 activities occur throughout the Hanford Site.
20
21

<p><i>Science and Technology Mission</i></p> <p>We develop and deploy science and technology in the service of the nation, including stewardship of the Hanford Site.</p> <p>Goal No. 1 - Establish Environmental Molecular Science Laboratory (EMSL) Collaboratory</p> <p>Goal No. 2 - Deploy Environmental Management Technologies</p> <p>Goal No. 3 - Contribute High Value to Core Missions</p> <p>Goal No. 4 - Demonstrate Excellence in Laboratory Management</p> <p>Goal No. 5 - Apply Assets to New Science-Based Missions</p> <p>(DOE-RL 1995a)</p>

22 **4.1.6 Economic Diversification**

23
24 Accomplishing the missions of Site remediation, and providing scientific and technical
25 excellence to meet global needs, is anticipated to result in economic diversification of the region.
26 Diversification will assist the community in reducing dependence on federal spending. The
27 diversification transition is expected to culminate in a community with a broad base of scientific and
28 technical businesses competing in the global marketplace. Executive Order 12893, issued by President
29 Clinton, requires that federal agencies include the private sector in investing in and managing
30 infrastructure.
31

32
33 **4.1.7 Biological Resource Management**

34
35 The Hanford Site is a large and relatively undisturbed area, that consists mainly of shrub-steppe
36 habitat (containing numerous plant and animal species) adapted to the semiarid environment. Although
37 industrial facilities are interspersed throughout the Site, developed areas account for only a small
38 portion of the total land area. Because most of the land surrounding the Site has been converted to
39 agricultural use, the Hanford Site represents one of the last and best examples of large area
40 shrub-steppe habitat that was once prevalent throughout the region. Consequently, the Site serves as a
41 refuge for many plant and animal species. Preservation of this habitat and the associated species,
42 including threatened and endangered species and newly described plants and animals, is of value to
43 many stakeholders and, in the case of threatened or endangered species, is mandated by law. Future
44 land uses potentially could disrupt these resources. The DOE is required to evaluate and mitigate
45 impacts to biological resources, including threatened and endangered species or critical habitats.
46

1 The RL *Draft Biological Resources Management Plan* (DOE-RL 1996), currently in
2 preparation, addresses the management of shrub-steppe habitat on the Hanford Site, as well as the
3 riparian, wetland, and aquatic habitats associated with the Hanford Reach. The Management Plan
4 evaluates the biological resources in a regional context (i.e., the importance of the protected,
5 undisturbed ecosystems within the Columbia Basin region). The management approach under
6 development classifies the biological resources of the Hanford Site into different levels of concern.
7 This approach enables resource managers to identify the level of impact assessment and mitigation
8 required for each resource and to prioritize monitoring and habitat protection needs.

9 10 11 **4.1.8 Cultural Resource Management**

12
13 The Hanford Site is rich in cultural, historic, and archaeological resources, buildings, and
14 traditional cultural properties. Cultural resource protection is provided through the *Hanford Cultural*
15 *Resources Management Plan* (Chatters 1989), and implemented by the Hanford Cultural Resources
16 Laboratory of the PNNL and specialists with other contractors. In compliance with the *National*
17 *Historic Preservation Act of 1966* (NHPA), federal agencies are required to identify, evaluate, and
18 nominate districts, sites, buildings, structures, and objects with significant national historic value
19 (NHPA 1966). Many land-use activities that potentially could occur at the Hanford Site probably will
20 have significant effects on known and as-yet undiscovered cultural resources that have been preserved
21 largely as a result of restricted access. Management of cultural or heritage resources has been a
22 primary concern in developing this Comprehensive Plan. Before the development of a project, the
23 DOE is required to identify and evaluate cultural resources associated with that project location and, if
24 adverse impacts cannot be avoided, to mitigate any damages to those resources. Buildings are cultural
25 resources or "historic properties" that must be identified, evaluated, and managed by all federal
26 agencies under the NHPA.

27
28 The 105-B Reactor Building (B Reactor), located in the 100-B Area, is on the *National Register*
29 *of Historic Places*. A complete preliminary study of alternatives to demolishing the reactor was
30 released in 1995 (BHI 1995). The study recommended conversion of the B Reactor to a permanent,
31 publicly accessible museum and the establishment of facilities allowing public access and unrestricted
32 tours. The museum is proposed to be within the 105-B reactor building itself, near the east end of a
33 proposed State park. This new park would encompass the south shore of the Columbia River extending
34 from the Vernita rest area on State Highway 240 eastward to the 100-B Area a distance of about four
35 miles. This park area, the road providing access from Highway 240, and the museum area would be
36 fenced off from the adjacent Hanford area.

37 38 39 **4.2 Legal Responsibilities**

40 41 42 **4.2.1 Treaty Obligations**

43
44 Under separate treaties signed in 1855, the Confederated Tribes and Bands of the Yakama
45 Indian Nation and the Confederated Tribes of the Umatilla Indian Reservation ceded lands to the United
46 States that include the present Hanford Site. Under the treaties, the tribes reserved the right to fish at
47 usual and accustomed places in common with the citizens of the territory, and retained the privilege of
48 hunting, gathering roots and berries, and pasturing horses and cattle on open unclaimed land.

1 The Treaty of 1855 with the Nez Perce Tribe includes similar reservations of rights and the Nez Perce
2 have identified the Hanford Reach as the location of usual and accustomed places for taking fish. The
3 Wanapum People are not signatory to any treaty with the United States and are not a federally
4 recognized tribe, however, the Wanapum People were historical residents of the Hanford Site, and
5 their interests in the area have been acknowledged. The DOE, as a federal agency, has a trust
6 responsibility to avoid actions that would detrimentally affect tribal rights.
7
8

9 **4.2.2 Laws, Regulations, and Executive Orders**

10
11 Operations at the Hanford Site are governed by numerous federal and state statutes and
12 regulations. Chapter 6.0 of the HRA-EIS provides a detailed discussion of the laws and regulations
13 that are important to the discussion and evaluation of land-use decisions on the Hanford Site. Table 4-2
14 provides a summary of the principal federal laws of importance to land-use planning at the Hanford
15 Site.
16
17

18
19 **Table 4-2. Federal Laws of Importance to Land Use Planning at**
20 **the Hanford Site.**

21	<i>National Environmental Policy Act of 1969</i>
22	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
23	<i>Resource Conservation and Recovery Act of 1976</i>
24	<i>Federal Property and Administrative Services Act of 1949</i>
25	<i>Federal Land Policy and Management Act of 1976</i>
26	<i>National Defense Authorization Act of 1994</i>
27	<i>Atomic Energy Act of 1954</i>
28	<i>National Historic Preservation Act of 1966, as amended</i>
29	<i>American Indian Religious Freedom Act of 1978</i>
30	<i>Native American Graves Protection and Repatriation Act of 1990</i>
31	<i>Endangered Species Act of 1973</i>
32	<i>Wild and Scenic Rivers Act of 1968</i>
33	<i>Columbia Basin Project Act of 1943</i>
34	<i>Safe Drinking Water Act of 1974, as amended</i>
35	<i>Clean Water Act of 1977, as amended</i>
36	<i>Executive Order 11593, National Historic Preservation</i>
37	<i>Executive Order 11988, Floodplain Management</i>
38	<i>Executive Order 11990, Protection of Wetlands</i>

4.3 U.S. Department of Energy Relationships with Other Governments, Agencies, and Interested Parties

The DOE has relationships with other government entities and organizations that can directly affect land-use decisionmaking on the Hanford Site.

4.3.1 Tribal Governments

On May 18, 1994, the Secretary of Energy issued a memorandum that outlines the principles that define the DOE's responsibility to ensure that the agency operates within a government-to-government relationship with all federally recognized tribal governments. These principles are consistent with guidance received from President Clinton on April 29, 1994. In keeping with the principle of Native American self-government, the DOE recognizes that certain Tribes have treaty-protected interests in resources on the Hanford Site.

4.3.2 Department of Interior

In 1988, Congress, in the *Wild and Scenic Rivers Act of 1988* (WSRA 1968), requested a comprehensive river conservation study of the Hanford Reach. The Hanford Reach is a free-flowing segment (82 kilometers [51 river miles]) of the Columbia River, stretching from 1.6 kilometers (1 mile) below the Priest Rapids Dam downstream to the McNary Pool at Richland, Washington, approximately 1.6 kilometers (1 mile) north of the 300 Area. This stretch of river never has been impounded, and possesses significant environmental, biological, and cultural resources. The purpose of *Hanford Reach of the Columbia River, Comprehensive River Conservation Study and Final Environmental Impact Statement* (NPS 1994) was to identify and evaluate the outstanding features of the Hanford Reach. This Hanford Reach EIS (NPS 1994) examined alternatives for preservation of the resources and features of the Hanford Reach, including addition of the Hanford Reach to the National Wild and Scenic Rivers System, and evaluated impacts that could result from various uses of the river. The Proposed Action recommends that the Congress designate federally-owned and privately-owned lands within 0.4 kilometers (0.25 miles) of the Columbia River, on both banks of the river from River Mile 396 to 346.5, a "Recreational River" under the Wild and Scenic Rivers System; and the portion of the Hanford Site that lies north and east of the river, as a "National Wildlife Refuge," to be managed by the U.S. Fish and Wildlife Service (USFWS). Responsibility for the remediation of lands contaminated by DOE operations would remain with the DOE. Congress must take action by November 1996, or the No-Action Alternative is assumed by default.

U.S. Senator Patty Murray, of the State of Washington, has proposed a bill to Congress to address the protection of the Hanford Reach (Congress 1995). The Bill implements the preferred alternative of the *Hanford Reach EIS* and contains some refinements and protections. For example, the bill explicitly allows current activities, such as agriculture, electrical power generation and transmission, and water withdrawals along the river corridor to continue. It excludes private property from the recreational river designation, and guarantees that Tribal governments, local governments, and other interests have a formal role in the management of the river corridor, which will come under the jurisdiction of the U.S. Fish and Wildlife Service. The legislature includes provisions that complement the Wild and Scenic River designation. The Secretary of Interior and relevant federal

1 agencies are directed to work with local and state sponsors in developing a program of education and
2 interpretation related to the Hanford Reach, and to coordinate with local sponsors on demonstration
3 projects to restore the river shore.
4

5 **4.3.2.1 U.S. Bureau of Land Management and U.S. Bureau of Reclamation.** The Hanford Site land
6 holdings consist of three different real property classifications: (1) lands acquired in fee by the DOE or
7 its predecessor agencies, (2) lands withdrawn from the public domain for use as part of the Hanford
8 Site; and (3) lands withdrawn from the public domain or acquired by the U.S. Bureau of Reclamation
9 (BoR) as part of the Columbia Basin Project. The withdrawn public lands are roughly arranged in
10 square checkerboard patterns on various portions of the Site (Figure 4-1). These lands are currently
11 administered by the DOE under a superseding public land withdrawal. These withdrawn lands are to
12 revert back to the U.S. Bureau of Land Management (BLM) when the DOE no longer needs them.
13

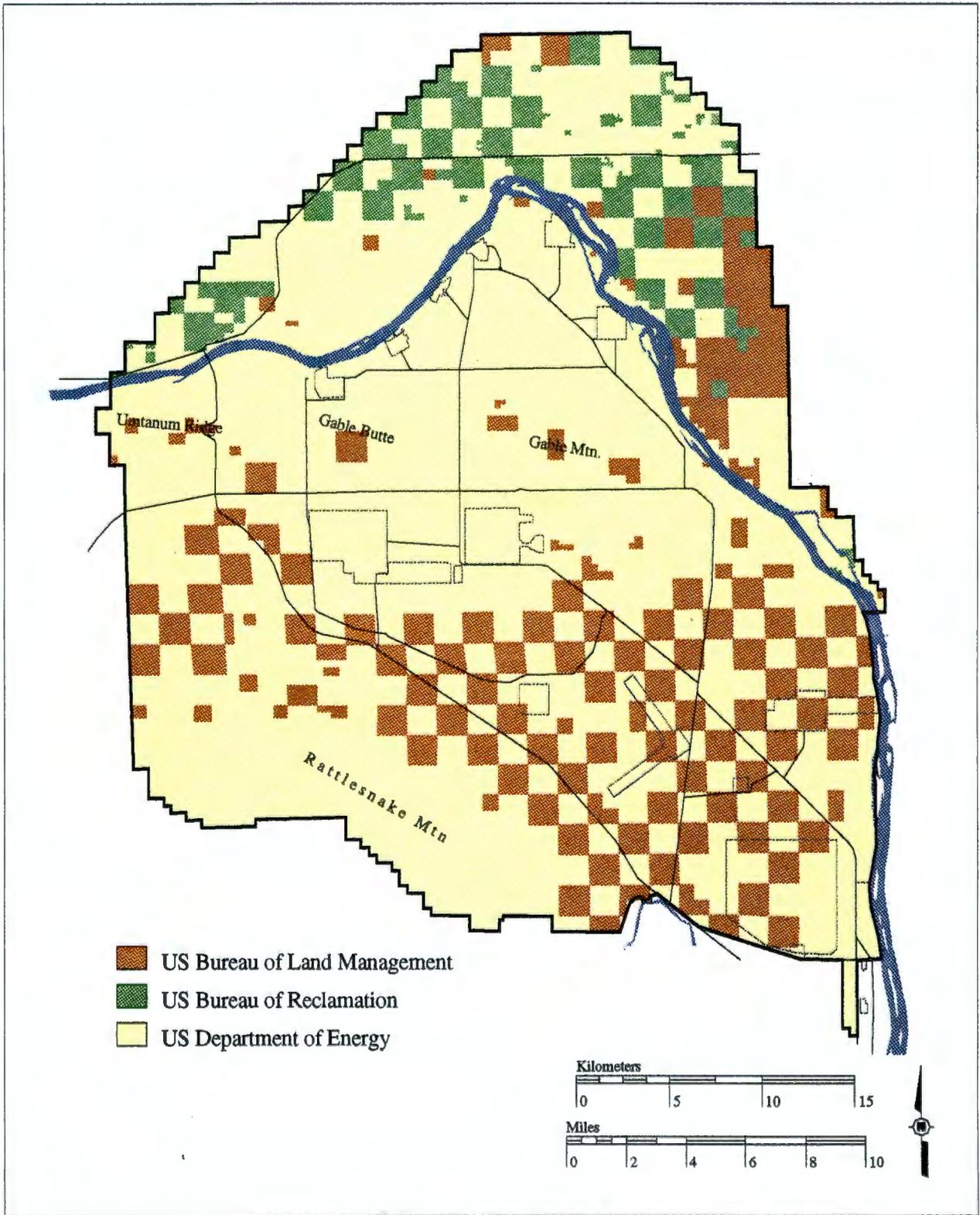
14 The BoR agreed in a Memorandum of Agreement (MOA) to transfer custody, possession, and
15 use of certain acquired and withdrawn lands situated within the Control Zone of the Hanford Works to
16 the AEC on February 27, 1957. These lands consisted of a checkerboard pattern of alternating
17 square-mile sections on the North Slope. The BoR retained the right to construct, operate, and
18 maintain the Wahluke Canal and related facilities, and any necessary waste ways and drainage ways
19 through the North Slope in connection with irrigation of lands outside of the Control Zone. These
20 lands were included in the South Columbia Basin Irrigation District and the East Columbia Irrigation
21 District at the time of formation of the districts. In the MOA, the BoR identified a continued interest in
22 development of irrigable lands on the North Slope as part of the Columbia Basin Project. The AEC
23 acknowledged the interest of the BoR, and reaffirmed a policy of keeping land ownership and
24 restrictions of land use on the North Slope to a minimum.
25

26 The BoR continues to retain an interest in the ultimate development of the irrigable lands within
27 the North Slope as part of the Columbia Basin Project. The interest of the BoR pertains not only to
28 irrigation development, but also to other project purposes, such as fish and wildlife protection, and to
29 resource management and environmental concerns. The BoR maintains that the agreement with the
30 AEC assures return of the lands at such a time as the lands are no longer necessary to support the DOE
31 mission for the Hanford Site. Furthermore, the BoR would not concur with any change in the present
32 use of the lands until technical and environmental studies were completed. The lands are managed in
33 part by the Washington Department of Wildlife as the Wahluke Slope Wildlife Recreation Area and by
34 the USFWS as the Saddle Mountain National Wildlife Refuge.
35

36 The alternating square-kilometer sections that would eventually revert to BLM or BoR are an
37 important consideration that will seriously complicate land-use planning. Because the lands are owned
38 by another government agency, the DOE cannot authorize uses of the property beyond the mission
39 needs of the DOE itself.

1
2
3

Figure 4-1. Hanford Site Land Ownership.



1 **4.3.3 Columbia River System Operation Review**
2

3 The *Columbia River System Operation Review Draft Environmental Impact Statement*
4 (DOE et al. 1994) is a comprehensive study of the operation of 14 federal hydroelectric power projects
5 on the Columbia River system, including the dams upstream and downstream of the Hanford Site. The
6 goal of this document is to achieve a coordinated system operation for the river that better meets the
7 needs of all river users. The project is being sponsored by the Bonneville Power Administration
8 (BPA), the BoR, and the USACE. The National Marine Fisheries Service and the National Park
9 Service are cooperating agencies in the process, and the USFWS has participated throughout the review
10 pursuant to the *Fish and Wildlife Coordination Act of 1934*.
11

12
13 **4.3.4 Northwest Power Planning Council's Fish and Wildlife Program**
14

15 The Northwest Power Act directs the Northwest Power Planning Council to develop a “program
16 to protect, mitigate, and enhance fish and wildlife, including related spawning grounds and habitat on
17 the Columbia River and its tributaries.” In 1988, the Council amended the Fish and Wildlife Program
18 to designate protected areas, which are areas that represented the region's most valuable fish and
19 wildlife habitat. The purpose of the protected area designation is to discourage hydroelectric power
20 development in these areas by prohibiting the BPA from acquiring power from such developments.
21 The Hanford Reach has been designated as a protected area; thus, hydroelectric power development is
22 discouraged on the Reach.
23

24
25 **4.3.5 State of Washington**
26

27 **4.3.5.1 Washington State Environmental Policy Act of 1971.** The State of Washington legislature
28 enacted the *State Environmental Policy Act of 1971* (SEPA). The statute was amended in 1983, and
29 new implementing regulations (the SEPA rules) were adopted and codified by Ecology in 1984. The
30 purpose and policy sections of the statute are extremely broad, including recognition by the legislature
31 that “each person has a fundamental and inalienable right to a healthful environment....” SEPA
32 contains a substantive mandate that “policies, regulations, and laws of the State of Washington shall be
33 interpreted and administered in accordance with the policies set forth in [SEPA].” SEPA applies to all
34 branches of state government, including state agencies, municipal and public corporations, and counties
35 and requires each agency to develop procedures implementing and supplementing the requirements of
36 SEPA and the SEPA rules. Although SEPA does not directly apply to federal actions, the term
37 “government action” with respect to state agencies is defined to include the issuance of licenses,
38 permits and approvals. Thus, as in NEPA, proposals (federal, state or private) are evaluated and may
39 be conditioned or denied through the permit process based on environmental considerations. SEPA
40 does not create an independent permit requirement, but overlays all existing agency permitting
41 activities. New land uses may be subject to the requirements of SEPA, particularly if new development
42 requires state-permitting activities.
43

44 **4.3.5.2 Growth Management Act of 1990.** In 1990, the State of Washington legislature enacted the
45 *Growth Management Act of 1990* (GMA), which is a broad strategy for managing problems associated
46 with rapid growth and development. The GMA creates new roles and responsibilities for planning at
47 the local, regional, and State level. Before passage of the GMA, local governments were responsible
48 for land-use planning, and the State played a limited role. Local governments had statutory authority to

1 engage in land-use planning, but were not required to plan. As a result, local governments largely
2 limited planning activities to traditional zoning, shorelines, environmental review, and transportation
3 planning (required to receive state transportation funds). The GMA significantly changed the system
4 by establishing a Statewide planning framework and requiring many local governments to plan.
5

6 The principal mechanism for implementing the growth management goals of the GMA is planning
7 at the local level by cities and counties. The GMA required the largest and fastest growing counties
8 (counties with more than 50,000 people or population growth of more than 20 percent in the past 10
9 years) and cities within those counties to develop new comprehensive plans. Failure to adopt a
10 comprehensive plan disqualifies local governments from loans or pledges to fund construction of public
11 works and from receipt of public funds to construct water pollution control facilities. Counties not
12 required to plan may elect to do so. Benton, Franklin, and Grant Counties have elected to plan under
13 the GMA requirements.
14

15 The requirements of SEPA must be met under the GMA. SEPA review is expected for
16 development of regional planning policies, interim regulations, comprehensive plans, and implementing
17 regulations.
18

19 **4.3.5.3 Dangerous Waste Regulations.** The State of Washington's "Dangerous Waste Regulations,"
20 *Washington Administrative Code (WAC) 173-303*, include siting criteria that may serve as an initial
21 screen in the consideration of sites for dangerous waste management facilities. The purpose of the
22 siting criteria is to immediately disqualify proposed dangerous waste facility sites in locations
23 considered unsuitable or inappropriate for the management of dangerous wastes. The siting criteria
24 establish locations from which facilities are excluded, and establish minimum setback distances to
25 protect resources such as air, surface water and groundwater, and protected areas (e.g., wildlife
26 refuges, wild and scenic rivers, wetlands, critical habitat). These criteria pose constraints on the siting
27 of waste treatment, storage, and/or disposal facilities that must be considered during the land use
28 suitability analysis.
29

30 **4.3.5.4 Hanford Federal Facility Agreement and Consent Order.** In addition to the State
31 requirements identified above, the DOE has another important relationship with the State and the EPA
32 through the Tri-Party Agreement. On May 15, 1989, in anticipation that the Hanford Site would be
33 listed on the National Priorities List, the DOE, the EPA, and Ecology entered into the Tri-Party
34 Agreement (Ecology et al. 1989). The purpose of the Tri-Party Agreement is to organize
35 responsibilities for remediation of the Hanford Site and to establish milestones by which the
36 remediation will be accomplished. The Tri-Party Agreement commits the three agencies to a long-term
37 cooperative program to remediate the contaminated areas at the Hanford Site. The main objectives are
38 to guide the investigation of hazardous and radioactive contamination at the Site, to develop and
39 implement appropriate response actions to remedy contamination problems, and to coordinate agency
40 actions under state and federal environmental laws and regulations. The Tri-Party Agreement contains
41 a blueprint for remediation, and uses enforceable milestones to keep the program on schedule.
42 Remedial activities undertaken in accordance with CERCLA and the Tri-Party Agreement are related
43 to future land-use objectives, as levels of residual contamination may preclude certain land uses at any
44 particular site. Remedial-action objectives will be determined on the basis of future land use, and will
45 establish remediation levels (and allowable residual risk) through the process established in the
46 Tri-Party Agreement.
47
48

1 **4.3.6 Local Governments**
2

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

9 **4.3.6.1 Benton County.** The relationship between the DOE and Benton County differs from that of
10 other counties with interest in Hanford because most of the Hanford Site is located within Benton
11 County. Benton County is preparing a comprehensive land-use plan that covers the entire county,
12 including the Hanford Site. The DOE is committed to cooperating with the County's planning effort.
13

14 **4.3.6.2 City of Richland.** The City of Richland is greatly influenced by activities at the Hanford Site,
15 and has gone through several boom and bust cycles in response to employment levels at Hanford.
16 Future land use at Hanford has the potential to affect the economic development or decline of Richland.
17 The city currently provides services such as water, electricity, and sanitary sewer to the southern
18 portion of the Hanford Site. The City of Richland has proposed annexing nearly 4 square miles,
19 including the 1100 and 300 Areas and adjacent lands.
20

21 **4.3.6.3 City of Kennewick, City of Pasco, City of West Richland, City of Benton City, and Other**
22 **Local Communities.** Other communities and local governments have interests in the management and
23 the future of the Hanford Site for several reasons, including the fact that Hanford employees reside in
24 these communities and the Site is an important contributor to the local economies.
25

26 **4.3.6.4 Grant, Franklin, and Adams Counties.** A group of citizens in the Mattawa area, supported
27 by the Board of Grant County Commissioners, supports the Wahluke 2000 Plan (Figure 6-38), under
28 which parts of the North Slope area would be made available for irrigated agriculture. The Wahluke
29 2000 Plan seeks to combine maximum economic benefits with protection of wildlife habitat and the last
30 free-flowing stretch of the Columbia River. The Wahluke 2000 Plan seeks to, after a cooperative study
31 of the entire North Slope by the local counties, local irrigation districts, and other interested groups,
32 designate parcels for agricultural development, wildlife habitat, and recreational uses. The counties
33 would administer the sale of land in the proposed irrigation blocks to private individuals using a
34 "drawing" process similar to that utilized during the early phases of the Columbia Basin Project.
35
36

37 **4.4 Hanford Advisory Board**
38

39 The HAB was created in 1994 to monitor progress and help Tri-Party Agreement agencies get on
40 with safe, credible, cost-effective, and environmentally sound remediation. Table 4-3 presents the
41 membership of the HAB. Values to which the HAB subscribes represent a broad cross-section of
42 interests in the states of Washington and Oregon. Consistent with those values, the HAB strives to be
43 independent and fair-minded in advising DOE on aspects of Hanford Site programs, activities, and
44 remediation. RL is committed to working with the HAB to provide timely responses and briefings
45 when requested.

Table 4-3. Hanford Advisory Board Membership 1996.

1	
2	
3	Ex Officio
4	Confederated Tribes and Bands of the Umatilla Indian Reservation
5	Nez Perce Tribe
6	Local Governments
7	City of Benton City
8	Benton County, Commissioner
9	Franklin County
10	Grant County, Commissioner
11	Kennewick City Council
12	Pasco City Council
13	City of Richland, Mayor
14	Regional and Local Interest Groups
15	Battelle
16	Central Washington Building Trades Council
17	Columbia Basin Minority Economic Development Association
18	Columbia River United
19	Government Accountability Project
20	Heart of America Northwest
21	Hanford Atomic Metal Trades Council
22	Hanford Environmental Action League
23	Hanford Watch
24	League of Women Voters
25	Lower Columbia Basin Audubon Society and Columbia River Conservation League
26	Oregon Hanford Waste Board
27	Oregon League of Women Voters
28	Physicians for Social Responsibility
29	Tri-Cities Technical Council
30	Tri-City Industrial Development Council
31	Washington State University
32	Westinghouse Hanford Company
33	Agencies
34	Oregon Department of Energy
35	Washington State Department of Health
36	

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5.0 *Future Land-Use Assumptions*

The DOE's land-use team developed a list of land-use assumptions to scope and bound the considerations of plausible future-use options. Planning assumptions were defined to reduce uncertainties regarding future land use. The future land-use assumptions were defined by evaluating information regarding the Hanford Site's Mission, the Strategic Plan (DOE-RL 1994a), the Working Group's Report (HFSUWG 1992), the HAB's advisory opinions (HAB 1996a), the evaluation of constraints and opportunities, the HRA-EIS's Implementation Plan (DOE-RL 1995c), and other planning documents and reports.

5.1 *Issues*

Identification of key land-use related issues is important because these factors represent a driving force behind much of the land-use decisionmaking that occurs at the Hanford Site. These issues are influential in guiding future land uses.

5.1.1 *Future Facility Needs*

It is necessary to identify and consider potential development criteria that may be required of facilities constructed on the Site in the future. Facilities and development criteria considered include new or expanded research operations; enhance public access to historical sites; technologies and facilities that require significant land area; waste generation, storage, and disposal requirements; waste site remediation; nuclear materials facilities; security requirements; decommissioning and remediation timetables; and discontinuation of specific processes or facility operations.

5.1.2 *Obsolete Facilities*

Continued advancements of R&D efforts will require the construction of new, state-of-the-art facilities at the Hanford Site, to replace existing, obsolete facilities. Such facility development will require significant new construction and possibly new facility areas. It will be necessary to identify appropriate locations to ensure that selected areas are reserved for future development.

5.1.3 *Contaminated Areas*

The remediation of contaminated areas will result in additional land eventually being available for potential future uses. However, long-term waste management and residual radioactive contamination of some of the areas will preclude or constrain certain uses. The extent of residual contamination will influence developmental potential in many areas of the Site.

1 **5.1.4 Institutional Controls**

2
3 Future development plans must consider the need for institutional controls, which are specific
4 measures intended to regulate future onsite land use (i.e., access restriction such as fencing, and other
5 security measures, deed restrictions, zoning, land use review and approval processes). As a result of
6 residual contamination, use of institutional controls may similarly be used to reserve appropriate areas
7 for future development and ensure that contaminated areas are not developed.
8

9
10 **5.1.5 Multiple Use of U.S. Department of Energy, Richland Operations Office Property**

11
12 There is a wide range of opinion regarding whether the non-DOE use of RL property for
13 multiple uses is appropriate. Grazing, ecological research, agricultural research, wildlife management,
14 recreation, mineral extraction, historic preservation uses, and typically non-DOE type uses may not be
15 appropriate, and it is not clear how such uses might be effectively integrated into long-term planning.
16 The land-use team did not evaluate the extent to which non-DOE uses should be encouraged, given the
17 existing and planned RL operational requirements.
18

19
20 **5.1.6 Future U.S. Department of Energy, Richland Operations Office Boundaries**

21
22 Transfer of "surplus" property from the DOE to other federal agencies, or to nonfederal
23 entities, could result in a long-term loss of land resources for federal missions. Such loss of lands is
24 counter to the present management of the land as a national asset and national resource. Such loss of
25 land also could hinder the DOE's ability to develop a new facility area or maintain suitable protective
26 safety buffer zones.
27

28
29 **5.1.7 Onsite Versus Offsite Disposal**

30
31 Long-term disposal of wastes at the Hanford Site will require that appropriate areas be
32 identified, and that future land uses and facilities be sited, so as not to impact or be impacted by waste
33 disposal. Onsite treatment, storage, and disposal of wastes (hazardous, radioactive low-level,
34 high-level, TRU, or mixed), or nuclear materials also will influence land use decisions.
35

36
37 **5.1.8 U.S. Department of Energy Budget Constraints**

38
39 Clearly, the DOE budget constraints will affect planned remediation and land-use development
40 of remediated lands, and future land-use activities and decisionmaking.
41
42
43

5.2 Future Land Use Assumptions

Because of the inherent uncertainty of developing long-term land use scenarios, assumptions must be made to provide a basis on which future development patterns can be formulated. Assumptions are thus used for defining intangible factors such as development pressures, advances in research, and ownership patterns. Over time, various assumptions may require changes based on unpredictable and unforeseen developments. As such, the following assumptions should be periodically reviewed and updated, as appropriate, to assure continued relevance and applicability:

Environmental Management Planning Assumptions

- Land use and access controls to assure public protection.
- Onsite safe, stable materials and waste storage required for at least 50 years.
- Restoring groundwater to unrestricted use not technically feasible for at least 50 years.

- Advances in DOE and private-sector research will result in the obsolescence of existing facilities. It is further assumed that it will be necessary to construct new facilities in response to the need to remediate the Site, support DOE missions, and provide state-of-the-art research facilities. Other programs, however, probably will be discontinued entirely after the facilities become obsolete, or the missions are completed. The DOE plans to continue the R&D mission after the remediation mission is completed.
- New construction may include structures in existing facility areas or require the development of new facility areas. New development should be restricted to core areas and facilities that are already developed.
- As contaminated facilities become obsolete, decommissioning will be required. The decommissioning will commence following official shutdown of a facility once it has been determined that the facility is no longer needed and sufficient funds are appropriated to safely accomplish the work.
- To the extent practical, new development will be encouraged in developed facility areas to take advantage of existing infrastructures. Such redevelopment will reduce environmental degradation associated with construction activities in previously undeveloped areas.
- The RL Site Infrastructure Division will remain the focal area for land use and infrastructure activities, assuming continuity of existing or similar DOE missions.
- Environmental restoration and waste management activities will continue. Remediation of hazardous, mixed, and low-level waste sites is expected to be completed sometime after completion of site- and area-specific Records of Decision for *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*-mandated remediation efforts.

- 1 • R&D facilities will be expanded to accommodate "new frontier research." To support
2 such efforts, cooperative partnerships between the public and private sectors may be
3 developed to achieve common goals. This could result in the reuse of Hanford Site
4 facilities by private-sector interests, supplemented with technology support by RL and
5 contractor personnel.
6
- 7 • The Hanford Site may be called on to support other departmental operations and other
8 federal defense-related missions.
9
- 10 • Regional development trends will continue to be closely related to activities at the
11 Hanford Site. The weight of RL influence on the region may increase or decrease over
12 time depending on the diversity and strength of the regional economy.
13
- 14 • No new major, private developments (residential or nonresidential) that would be a
15 change to the present uses of the land are expected in areas adjacent to the Site. The
16 applicability of this assumption to privately held land is uncertain, but at present, there
17 is no identified data indicating any potential for changes to this assumption. It is known
18 that industrial development on DOE land in the South 600 Area probably will occur.
19 Beyond 25 to 50 years, there is less certainty about this assumption.
20
- 21 • The 1,450-square-kilometers (560-square-miles) federally owned and managed Hanford
22 Site, dedicated to waste management, environmental restoration, research and
23 technology development and testing, energy research, and biological and cultural
24 resources protection, is an irreplaceable national asset and national resource. It was
25 assumed, therefore, that the siting of a similar DOE facility and land withdrawal
26 probably would not occur in the future at any other location in the contiguous 48 states.
27
- 28 • New locations for radioactive waste disposal might be needed. If new locations are
29 needed, they will be subject to applicable regulatory approval processes. It will be
30 exceedingly difficult to site disposal facilities on private lands or in locations other than
31 the Central Plateau.
32
- 33 • In accordance with DOE Order 1230.2, the DOE recognizes that a trust relationship
34 exists between federally recognized Tribes and the DOE. The DOE will consult with
35 Tribal governments to ensure that Tribal rights and concerns are considered before the
36 DOE takes actions, makes decisions, or implements programs that may affect the
37 Tribes.
38
39

40 ***5.3 Integration with Hanford Strategic Planning and Hanford Advisory Board***

41
42 A renewed, focused effort to revise and update the RL Strategic Plan was initiated in response
43 to a May 23, 1994, request from the U.S. DOE Assistant Secretary for Environmental Management,
44 which required that each DOE site prepare a Strategic Plan.
45

46 From July to September 1995, the Strategic Plan underwent a thorough review because of
47 changing budgeting, regulating, and political conditions. In January 1996, the *Draft Reassessment of*
48 *Hanford Strategic Thinking* presentation document (DOE-RL 1995a) was prepared and circulated for

1 review and comment to Hanford employees, Tribal governments, regulators, the HAB, and other
2 stakeholders.

3
4 The HAB held a 2-day Strategic Planning Workshop as part of the agenda for a May 2 through
5 May 3, 1996, HAB meeting. The HAB wanted to work in partnership with the agencies to review the
6 strategic planning and major cleanup assumptions at the Hanford Site and to provide advice to Ecology
7 and the regulators in the following three areas:

- 8
9
- The Strategic Planning Process
 - Public participation in the Strategic Planning process
 - Certain key planning assumptions related to Hanford Site cleanup.
- 10
11

12
13 It was the intent of this process to search for and articulate the common ground, to clarify
14 differences, and, where needed, to propose processes for reaching resolution.

15
16 The results of the workshop are intended to establish a tool for strengthening accountability to
17 broad stakeholder principles and agency commitments. This includes being able to track the budgetary
18 process, to set performance measures and monitor progress, and to ensure timely public participation in
19 decisionmaking, recognizing the cyclical nature of planning and budgeting.

20
21 This Comprehensive Plan and the HRA-EIS NEPA process will seek to incorporate and reflect
22 the HAB values that are developing through the HAB workshop and ongoing dialog and comments that
23 are developing through public involvement processes (Table 5-1). At the workshop, the HAB was
24 specifically requested by the DOE to focus on the *Draft Reassessment of Hanford Strategic Thinking*
25 mission statements, strategies, and goals, which are presented in the following sections.

26
27
28 **5.3.1 Environmental Management Goal - 100 Area (Reactors on the River)**

29
30 Remove and/or stabilize spent fuel, surplus facilities, and waste sites to eliminate the potential
31 for future contamination of groundwater and the Columbia River, and to ensure protection of people,
32 the environment, and natural/cultural resources. The DOE will retain control of this land throughout
33 the remediation mission and will protect archaeological, cultural, and environmental resources.

- 34
35
- **Nuclear Materials.** Remove and stabilize spent fuel and materials from the 105KE and 105KW fuel storage basins.
 - **Environmental Contamination--Groundwater.** Treat or contain, as necessary, to protect the Columbia River.
 - **Environmental Contamination--Soil Sites.** Remediate to allow "recreational" use.
 - **Facilities.** Provide safe interim storage of reactors pending future removal. Remove nonessential ancillary buildings.
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Key Recommendations From the HAB's May 2-3, 1996 Meeting

Institutional Control – Recommendation: The HAB is opposed to the way the strategic planning documentation assumes institutional controls are the preferable long-term cleanup option for the majority of areas of the site. Those strategic planning documents need to be changed. The HAB should work with DOE, EPA, and Ecology on a better description of the circumstances and time period in which some form of controls or restrictions might be necessary.

Tri-Party Agreement – Recommendation: The Tri-Party Agreement is the blueprint and schedule for Hanford cleanup. The DOE's planning documents must acknowledge and support the schedules in the Tri-Party Agreement.

Groundwater – Recommendation: With the emphasis placed on tanks and groundwater, it is essential not to lose sight of removal or isolation of contaminants in the vadose zone to ensure there is no future contamination of groundwater. The strategy should identify the future risk from the potential contamination of groundwater from sources like leaking and existing vadose zone contamination in the 200 Areas. **Recommendation:** Groundwater movement can redistribute contaminants currently above as well as already below the water table throughout the site as well as off the site. Strategic planning must emphasize source reduction and when that is not practical, surface and subsurface barriers should be used to prevent further groundwater contamination.

Vadose Zone – Recommendation: The HAB is concerned by the uncertainties in current vadose zone [the area between the surface and the groundwater] contamination and migration. The Agencies must work to resolve these uncertainties in order to have a credible Strategic Plan. **Recommendation:** An integrated vadose zone and groundwater management plan is needed statewide.

Reactors on the River (100 Area) – Recommendation: In this geographic area, there are cleanup goals for soils, the reactors, and the groundwater. For soils, the cleanup goal is unrestricted surface use except for the reactor blocks. The Strategic Plan should ensure the cleanup proceeds so institutional controls can be minimized. For reactors, reaffirm the Working Group's cleanup scenario which did not make a priority of moving the reactor cores. For groundwater reaffirm unrestricted use in this area with the recognition that in some cases, due to existing conditions and lack of current capabilities, it may be a low priority until aggressive research develops new capabilities." **Recommendation:** Use a definition for this area that describes the geographic band -- "River Corridor/100 Area" that includes the reactors, outfalls and pipes, spent nuclear fuel, soil and burial grounds, liquid discharge sites, and groundwater. **Recommendation:** Continue addressing the most urgent risks first. **Recommendation:** Ensure there are safety controls for workers and the public in the area, into the future, despite changing contractors and administrations (local, state, and federal).

Columbia River – Recommendation: Strategic planning should ensure that access, and duration of access, to the Columbia River and its corridor (nominally 1/4 mile wide on either side of the river) are not limited because of surface contamination. Because the 1301 crib is within a 1/4 mile, it must be remediated to unrestricted surface access. **Recommendation:** "Do no harm" still applies.

Central Plateau (200 Area) – Recommendation: Waste in the 200 Area must not migrate from the Central Plateau. The DOE's Strategic Plan must ensure that near term activities minimize exposure. This may include suitable long-term engineered controls and barriers.

Process Recommendations – Consistency: Data and assumptions consistency are critical to a defensible Strategic Plan. DOE must develop consistency in assumptions, data and modeling. **Common Terminology:** Common terminology must be developed and defined for discussions of cleanup and technology development. **Institutional Control:** The HAB should work with the DOE, EPA, and Ecology on a better description of the circumstances and time period in which some form of controls or restrictions might be necessary.

(HAB 1996b)

1 **5.3.2 Environmental Management Goal - 200 Area and the Central Plateau**
2

3 The 200 Area and the Central Plateau will be used for management of nuclear materials,
4 collection and disposal of waste materials that remain onsite, and other related and compatible uses.
5 Remediation levels and disposal standards that are consistent with long-term uses will be established.
6

- 7
- 8 • **Nuclear materials.** Consolidate interim storage (pending ultimate disposal) in the
9 200 Area.
 - 10 • **Radioactive Tank Waste.** Retrieve and vitrify. Dispose of high-level waste offsite.
11 Onsite disposal of low-level waste. Tank farms closed.
 - 12 • **Solid Waste.** Unsegregated wastes (including pre-1970 TRU) remain in the 200 Area.
13 Retrievably stored TRU waste is processed, stored, and shipped offsite. Onsite and
14 offsite DOE and U.S. Navy nuclear low-level waste and low-level mixed waste is
15 disposed in the 200 Area.
 - 16 • **Environmental Contamination--Groundwater.** Intercepted or contained, as
17 necessary, to protect the Columbia River.
 - 18 • **Environmental Contamination--Soil Sites.** Closed in place with minimal retrieval.
19
 - 20 • **Facilities.** Transition production facilities to stable deactivated conditions. Entomb
21 process facilities in-place, with co-disposal of waste materials. Dismantle other
22 facilities.
23

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28 **5.3.3 Environmental Management Goal - North Richland**
29 **(300, 1100, and 3000 Areas and Adjacent Areas of the 600 Area)**
30

31 The 300 Area waste sites, materials, and facilities will be remediated to allow industrial and
32 economic transition opportunities. The Federal Government will retain ownership of land in and
33 adjacent to the 300 Area, but will lease land for private and public uses to support regional industrial
34 and economic development. Excess land within the 1100 and 3000 Areas will be targeted for transition
35 to nonfederal ownership.
36

- 37
- 38 • **Nuclear Materials.** Remove through disposition offsite or interim storage in the 200
39 Area.
 - 40 • **Environmental Contamination--Groundwater.** Intercepted or contained, as
41 necessary, to protect the Columbia River.
 - 42 • **Environmental Contamination--Soil Sites.** Remediate to meet "industrial"
43 remediation levels.
 - 44 • **Facilities.** Transition to a stable, deactivated condition. Remove unneeded buildings
45 and facilities.
46
47
48

1 **5.3.4 Environmental Management Goal - 400 Area**

2
3 The DOE will retain ownership of this land for future federal missions, but will lease land and
4 facilities for private and public uses that support regional industrial and economic development,
5 consistent with future site uses.

- 6
7
 - **Facilities.** Remove and stabilize nuclear and hazardous materials. Transition to a safe,
8 interim stable condition.

9
10
11 **5.3.5 Environmental Management Goal - 600 Area**
12 *(excluding the Arid Lands Ecology Reserve and the North Slope)*

13
14 This area will remain in federal ownership, which is consistent with safety analysis boundaries
15 and continued waste management operations in the 200 Area. These areas will be available for other
16 federal programs or leased for nonfederal uses, consistent with appropriate recognition of cultural and
17 ecosystem values.

- 18
19
 - **Solid Waste.** Pre-1970 TRU waste treated or disposed of in the 200 Area. Other sites
20 closed in-place.
 - **Environmental Contamination--Groundwater.** Intercepted or contained, as
21 necessary, to protect the Columbia River.

22
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25
26 **5.3.6 Environmental Management Goal - Columbia River Shoreline**
27 *(within the Hanford Site)*

28
29 Pending Congressional action on the Wild and Scenic River designation, use would continue to
30 be restricted; sensitive ecological, cultural, and Native American resources would be protected.

31
32
33 **5.3.7 Environmental Management Goal - Arid Lands Ecology Reserve**
34 *and the North Slope*

35
36 Federal ownership will continue, with uses established that protect scientific, ecological, and
37 cultural resources, and are consistent with safety buffer zones established for ongoing waste
38 management operations and future Site missions.

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Existing Conditions

6.0 Existing Conditions

This chapter provides an overview of the existing conditions in the affected environment (natural and manmade attributes) of the Hanford Site that were analyzed in Chapter 7.0 of this Comprehensive Plan. Primarily, Chapter 4.0 and the appendices of the HRA-EIS contain a detailed description of the affected environment. The existing conditions in the affected environment describe and represent a set of opportunities and constraints that could affect future land uses for the Hanford Site.

6.1 Biological

This section briefly addresses the Hanford Site's biological resources. Detailed descriptions of biological resources are provided in: Section 4.4 of the HRA-EIS and the *Draft Biological Resource Management Plan*. Table 6-1 identifies the biological maps (figures) used to develop the biological constraint map presented in Section 7.1.1 (Figure 7-1).

Table 6-1. Biological Maps.

Biological Maps	Description of Key Attributes
Figure 6-1.	Distribution and Extent of Land Covers Classes Across the Hanford Site
Figure 6-2.	Habitats of Concern for the Hanford Site
Figure 6-3.	Rare Habitats Present on the Hanford Site
Figure 6-4.	Wetlands and Deep Water Habitats of the Hanford Site
Figure 6-5.	100-Year Floodplain of the Columbia and Yakima Rivers
Figure 6-6.	High-Quality Late-Successional Sagebrush-Steppe Habitat Based on Potential Sage Sparrow Habitat Model
Figure 6-7.	Washington State Natural Heritage Program Terrestrial Element Occurrences
Figure 6-8.	Approximate Locations of Plant Species of Concern
Figure 6-9.	Historic Ferruginous Hawk Nest Locations and Bald Eagle Perch and Secondary Night Roost Locations
Figure 6-10.	Bald Eagle Potential Nest and Primary Roost Locations
Figure 6-11.	Fall Chinook Spawning Areas
Figure 6-12.	Administratively Designated Areas Within Which Protection of Biological Resource Values is a Priority Consideration
Figure 6-13.	Established and Potential Habitat Improvement Areas

1 **6.2 Surface Water**

2
3 This section briefly addresses the surface water on the Hanford Site. Detailed descriptions of
4 surface water are found in Section 4.2.1 and Appendix J of the HRA-EIS. Table 6-2 identifies the
5 surface water maps (figures) that were used to develop the surface water constraint map presented in
6 Section 7.1.2 (Figure 7-2).
7
8

9 **Table 6-2. Surface Water Maps.**

Surface Water Maps	Description of Key Attributes
Figure 6-14	Surface Water on the Hanford Site
Figure 6-5	100 Year Floodplain of the Columbia and Yakima Rivers
Figure 6-15	Probable Maximum Flood of the Columbia River and Cold Creek, and the Actual 1948 Flood of the Columbia River
Figure 6-16	Columbia River Flood Area of a 50 Percent Breach of the Grand Coulee Dam

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17 **6.3 Groundwater Contamination**

18
19 This section briefly addresses the groundwater contamination on the Hanford Site. Detailed
20 descriptions of groundwater contamination are found in Section 4.2.2 and Appendix D of the
21 HRA-EIS, the *Hanford Site Ground-Water Monitoring for 1994* (PNL 1995a), and the *Hanford Site*
22 *Environmental Report 1994* (PNL 1995b). Table 6-3 identifies the groundwater contamination maps
23 (figures) that were used to develop the groundwater constraint map presented in Section 7.1.3
24 (Figure 7-3).
25
26

27 **Table 6-3. Groundwater Contamination Maps.**

Groundwater Contamination Maps	Description of Key Attributes
Figure 6-17	Distribution of Hazardous Chemicals in Groundwater Within the Hanford Site
Figure 6-18	Distribution of Radionuclides in Groundwater Within the Hanford Site
Figure 6-19	Water Table Elevations for the Unconfined Aquifer of the Hanford Site
Figure 6-20	Hanford Site Monitoring Wells
Figure 6-21	Estimated Recharge From Infiltration of Precipitation and Irrigation on the Hanford Site

1 6.4 Waste Sites

2
3 This section briefly addresses the waste sites on the Hanford Site. Detailed descriptions of
4 waste sites are found in Sections 1.3.2 and 4.10 of the HRA-EIS. Table 6-4 identifies the waste site
5 map (figure) used to develop the waste site constraint map presented in Section 7.1.4 (Figure 7-4).
6
7

8 **Table 6-4. Waste Site Map.**

9 Waste Site Map	Description of Key Attributes
10 Figure 6-22	Hanford Site Waste Sites and Potential or Actual Vadose Zone Contamination

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12

13 6.5 Protective Safety Buffer Zones

14
15 This section briefly describes the protective safety buffer zones on the Hanford Site. Detailed
16 descriptions of the protective safety buffer zones are found in Section 4.11.3 of the HRA-EIS.
17 Table 6-5 identifies the protective safety buffer zone map (figure) used to develop the protective safety
18 buffer zone constraint map presented in Section 7.1.5 (Figure 7-5). The protective buffer zones for the
19 Hanford Site were established using boundaries calculated for individual limiting facilities (i.e.,
20 facilities with the potential for accidents of maximum potential public health impact). The boundaries
21 provide a conservative buffer-zone that is expected to be sufficient to address health and safety needs
22 for the multiple facilities present in each area on the Hanford Site. Buffer zones necessary to protect
23 human health and safety are divided into two main components: an inner Exclusive Use Zone (EUZ)
24 and an outer Emergency Planning Zone (EPZ). The EUZ is an area designated for activities associated
25 with waste sites and facilities that severely restrict public access. This zone extends from the facility
26 fence line to a distance at which threat to the public from routine and accidental releases diminish to the
27 point where public access can be routinely allowed. The EPZ is an area surrounding a facility for
28 which planning and preparedness efforts are carried out to ensure that prompt and effective actions can
29 be taken to minimize the impact to onsite personnel, public health and safety, and the environment in
30 the event of an operational emergency. The EPZ begins at the boundary of the facility and ends at a
31 distance for which special planning and preparedness efforts are no longer required.
32
33

34

35 **Table 6-5. Safety Buffer Zone Map.**

36 Safety Buffer Zone Map	Description of Key Attributes
37 Figure 6-23	Ingestion Exposure Pathway Emergency Planning Zone for the Hanford Site and the Supply System WNP-2
38 Figure 6-24	Protective Safety Buffer Zones

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1 **6.6 Geological**

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This section briefly addresses the geological features on the Hanford Site. Detailed descriptions of the geological features are found in Section 4.1 of the HRA-EIS. Table 6-6 identifies the geological maps (figures) that were used to develop the geological constraint map presented in Section 7.1.6 (Figure 7-6).

Table 6-6. Geological Maps.

Geological Maps	Description of Key Attributes
Figure 6-25	Hanford Site Topography
Figure 6-26	Hanford Site Surficial Geology
Figure 6-27	Hanford Site Geologic Faults
Figure 6-28	Hanford Site Soil Map

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17 **6.7 Cultural**

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This section briefly addresses the cultural resources on the Hanford Site. Detailed descriptions of cultural resources are found in Section 4.5 of the HRA-EIS. Table 6-7 identifies the cultural map that was used to develop the cultural constraint map presented in Section 7.1.7 (Figure 7-7).

Table 6-7. Cultural Map.

Cultural Map	Description of Key Attributes
Figure 6-29	Hanford Site Historic Areas

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29 **6.8 Infrastructure and Facility Use**

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This section briefly addresses infrastructure and facility use on the Hanford Site. Detailed descriptions of the infrastructure and facility use are found in Section 4.6.10 of the HRA-EIS. Table 6-8 identifies the infrastructure and facility use maps that were used in the Chapter 7.0 analysis.

Table 6-8. Infrastructure and Facility-Use Maps.

Infrastructure and Facility Use Maps	Description of Key Attributes
Figure 6-30	Hanford Site Infrastructure
Figure 6-31	Hanford Site Approved and Proposed Facility and Use

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1 **6.9 Potential Economic Development**

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3 This section briefly addresses the potential economic development information presented at the
4 RL weekly land-use meetings with the participating government agencies and interested parties.

5 Table 6-9 identifies the potential economic development maps that were used in Chapter 7.0 analysis.

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Table 6-9. Potential Economic Development Maps.

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Surface Water Maps	Description of Key Attributes
Figure 6-32	Benton County Critical Areas Map
Figure 6-33	City of Richland Interim Urban Growth Area Map
Figure 6-34	Tri-Cities Science and Technology Park Map
Figure 6-35	Port of Benton Proposed Economic Development Plan Map
Figure 6-36	Wahluke 2000 Plan Map
Figure 6-37	B Reactor Museum Association Proposal
Figure 6-38	Potential Economic Development Map

1 *Figure 6-1. Distribution and Extent of Land Cover Classes Across*
2 *the Hanford Site.*

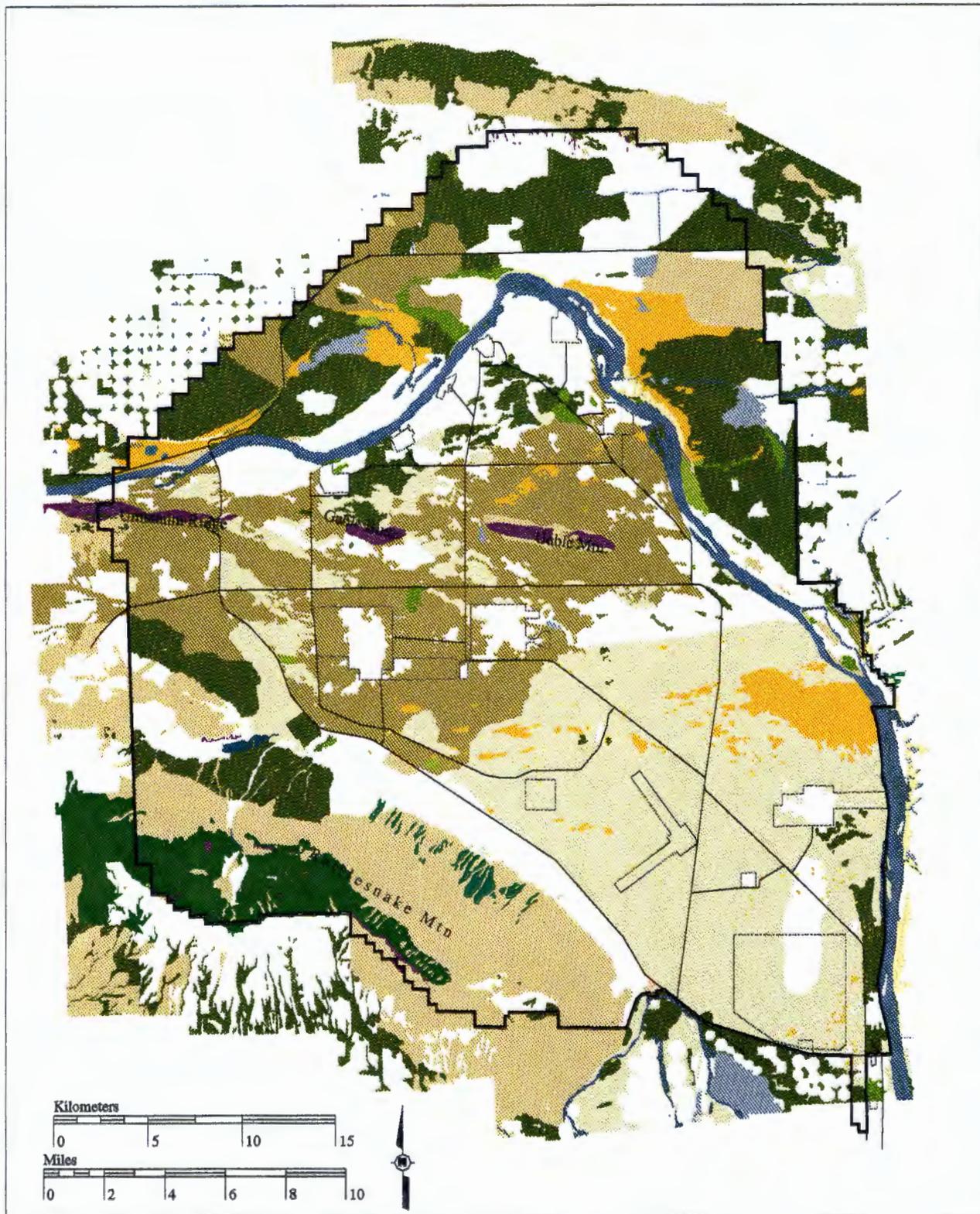
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1 **Figure 6-1. Distribution and Extent of Land Cover Classes Across**
 3 **the Hanford Site (Legend).**
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1/2 **Figure 6-2. Habitats of Concern for the Hanford Site.**

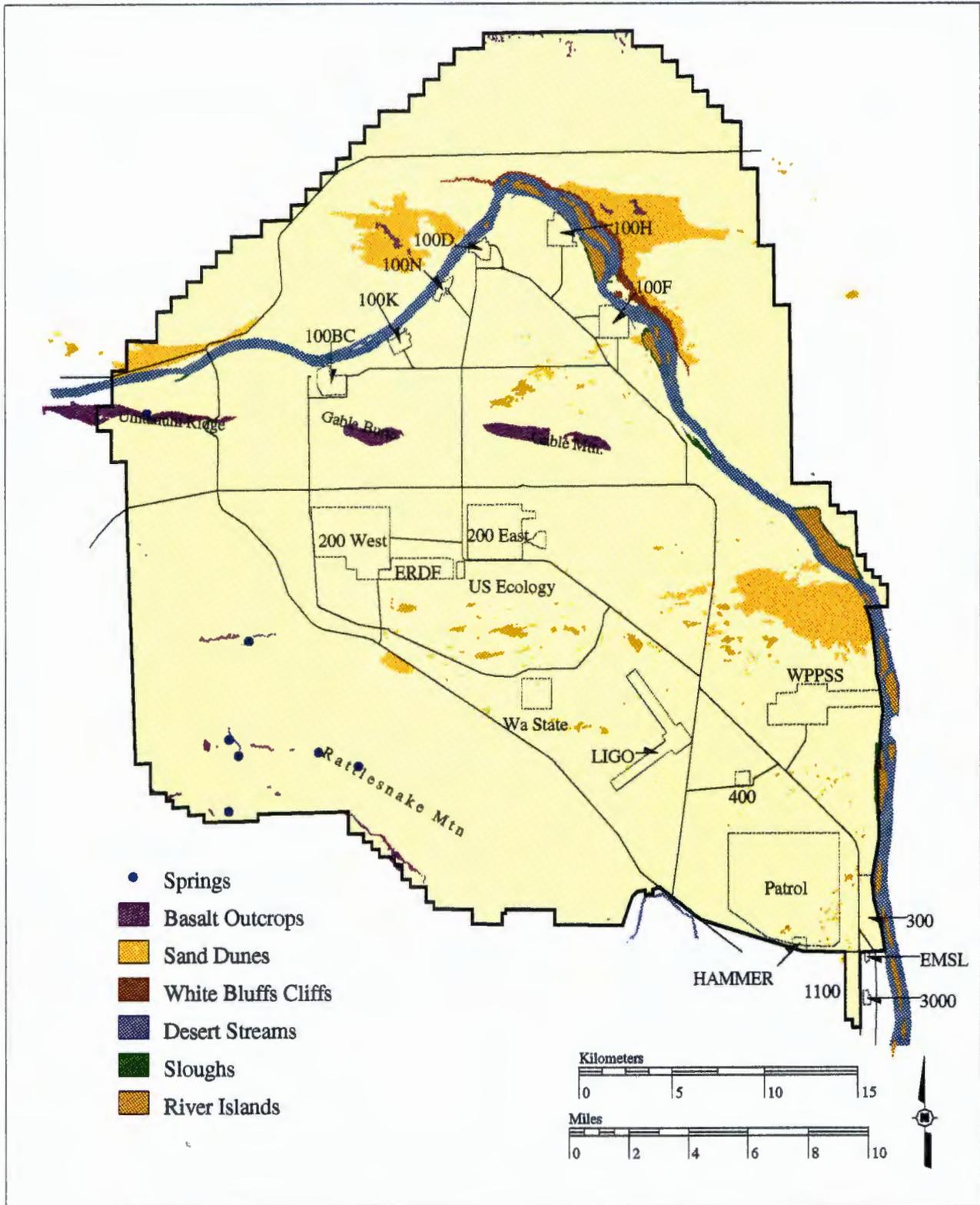


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Figure 6-2. Habitats of Concern for the Hanford Site (Legend).

-  Post-Fire Shrub-Steppe on the Columbia River Plain
-  Rabbitbrush / Bunchgrasses
-  Big Sagebrush / Bunchgrasses –Cheatgrass
-  Big Sagebrush –Spiny Hopsage / Bunchgrasses –Cheatgrass
-  Threetip Sagebrush / Bunchgrasses
-  Spiny Hopsage / Bunchgrasses
-  Spiny Hopsage / Cheatgrass
-  Black Greasewood / Sandberg's Bluegrass
-  Winterfat / Bunchgrasses
-  Winterfat / Cheatgrass
-  Snow Buckwheat / Indian Ricegrass
-  Bunchgrasses
-  Planted Non-native Grass
-  Bitterbrush / Bunchgrasses Sand Dune Complex
-  Bitterbrush / Cheatgrass
-  Alkali Saltgrass –Cheatgrass
-  Riparian
-  Basalt Outcrops
-  White Bluffs Cliffs
-  Riverine Wetlands and Associated Deepwater Habitats
-  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

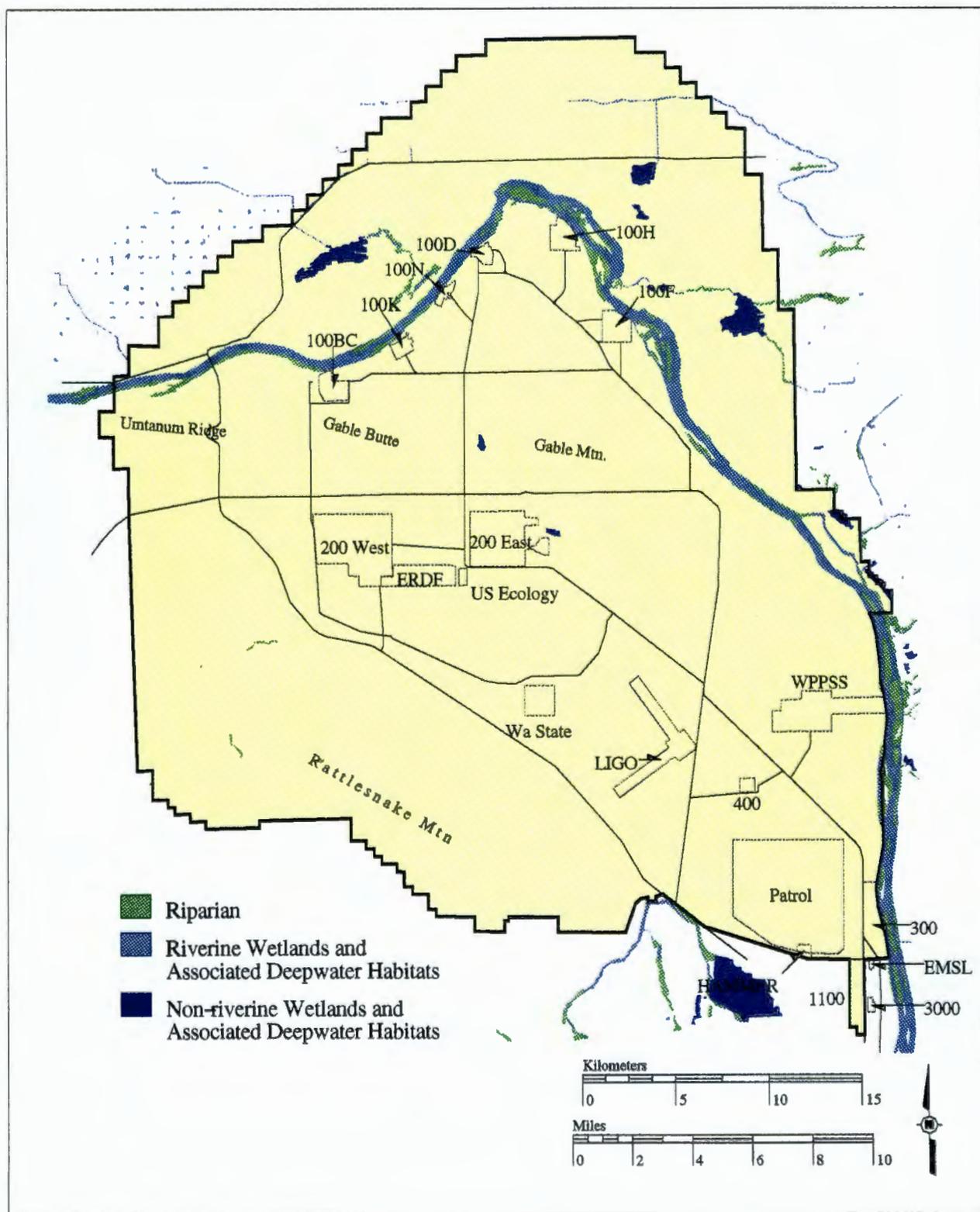
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Figure 6-3. Rare Habitats Present on the Hanford Site.

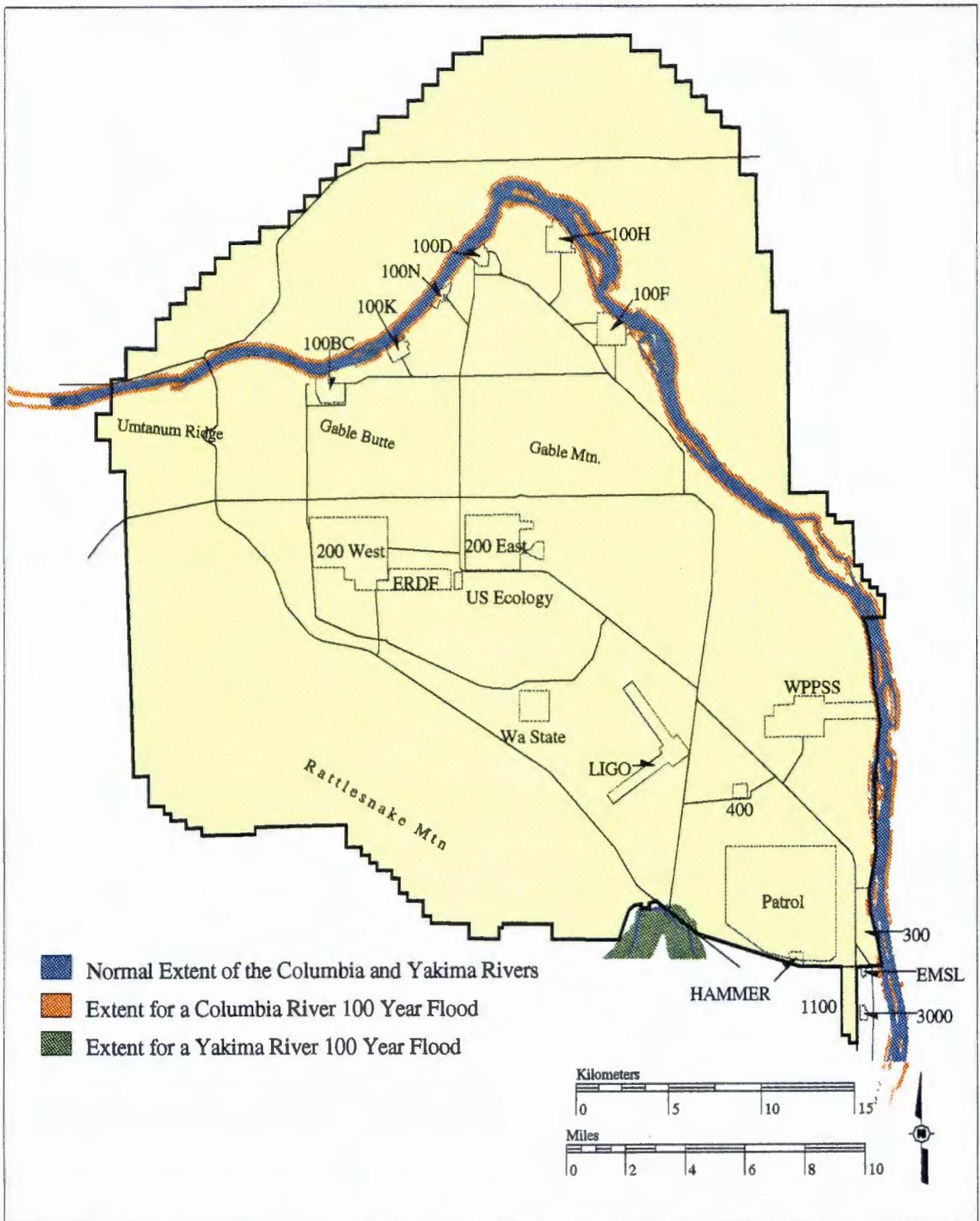


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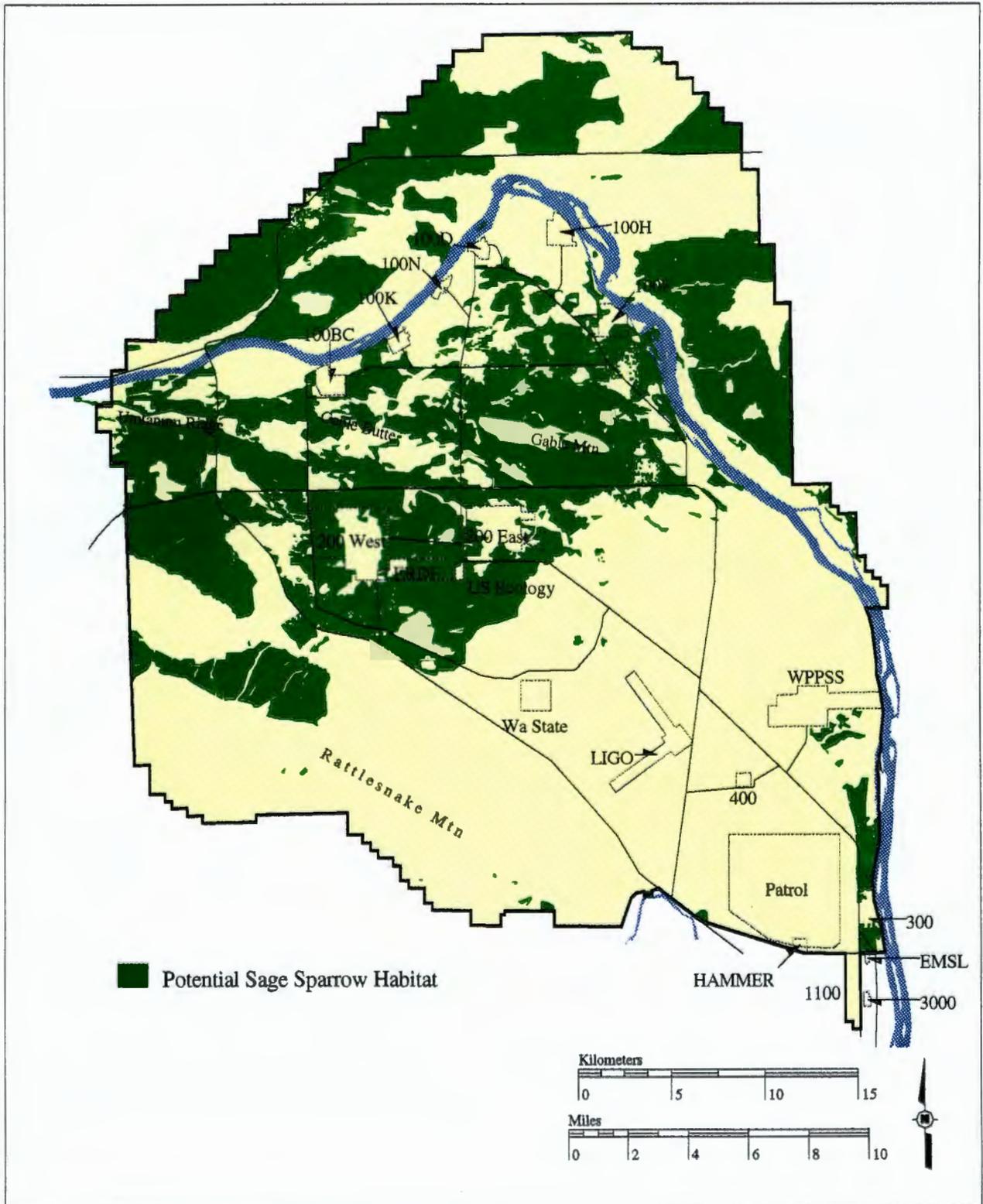
Figure 6-4. Wetlands and Deep Water Habitats of the Hanford Site.



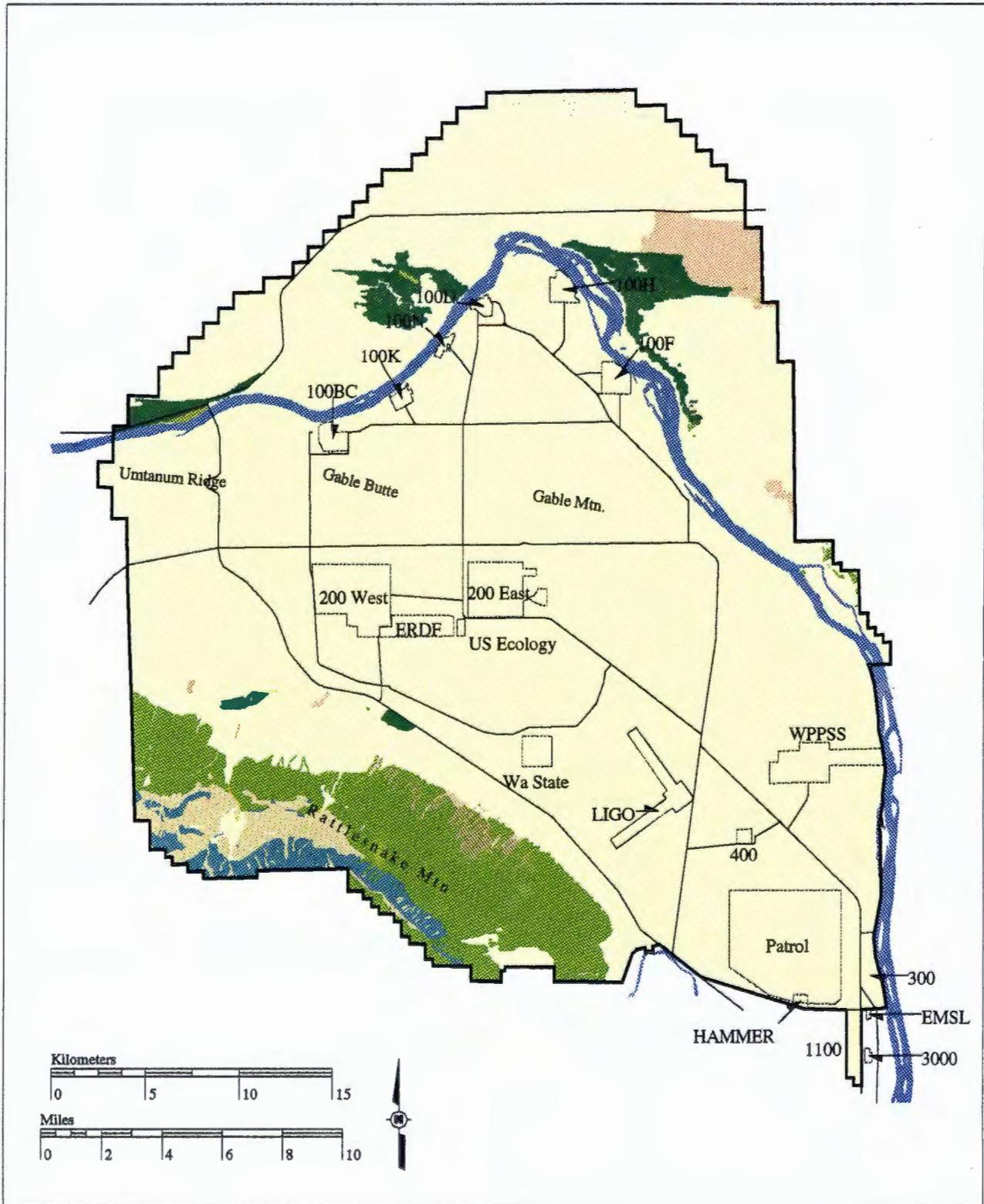
1 **Figure 6-5. 100-Year Floodplain of the Columbia and Yakima Rivers.**
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1 *Figure 6-6. High-Quality Late-Successional Sagebrush-Steppe*
2 *Habitat Based on Potential Sage Sparrow Habitat Model.*



1 **Figure 6-7. Washington State Natural Heritage Program Terrestrial**
 3 **Element Occurrences.**

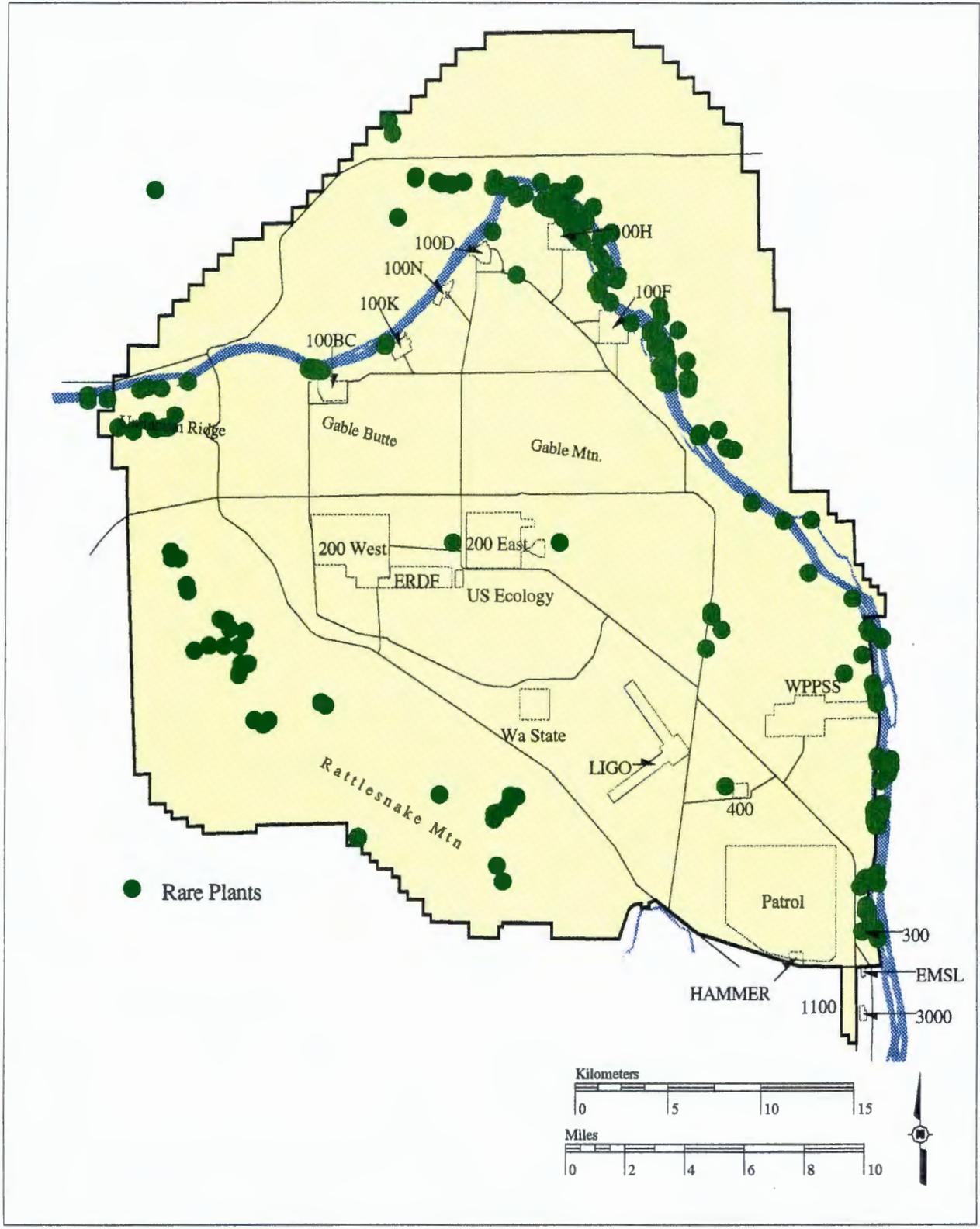


1 **Figure 6-7. Washington State Natural Heritage Program Terrestrial**
3 **Element Occurrences (Legend).**

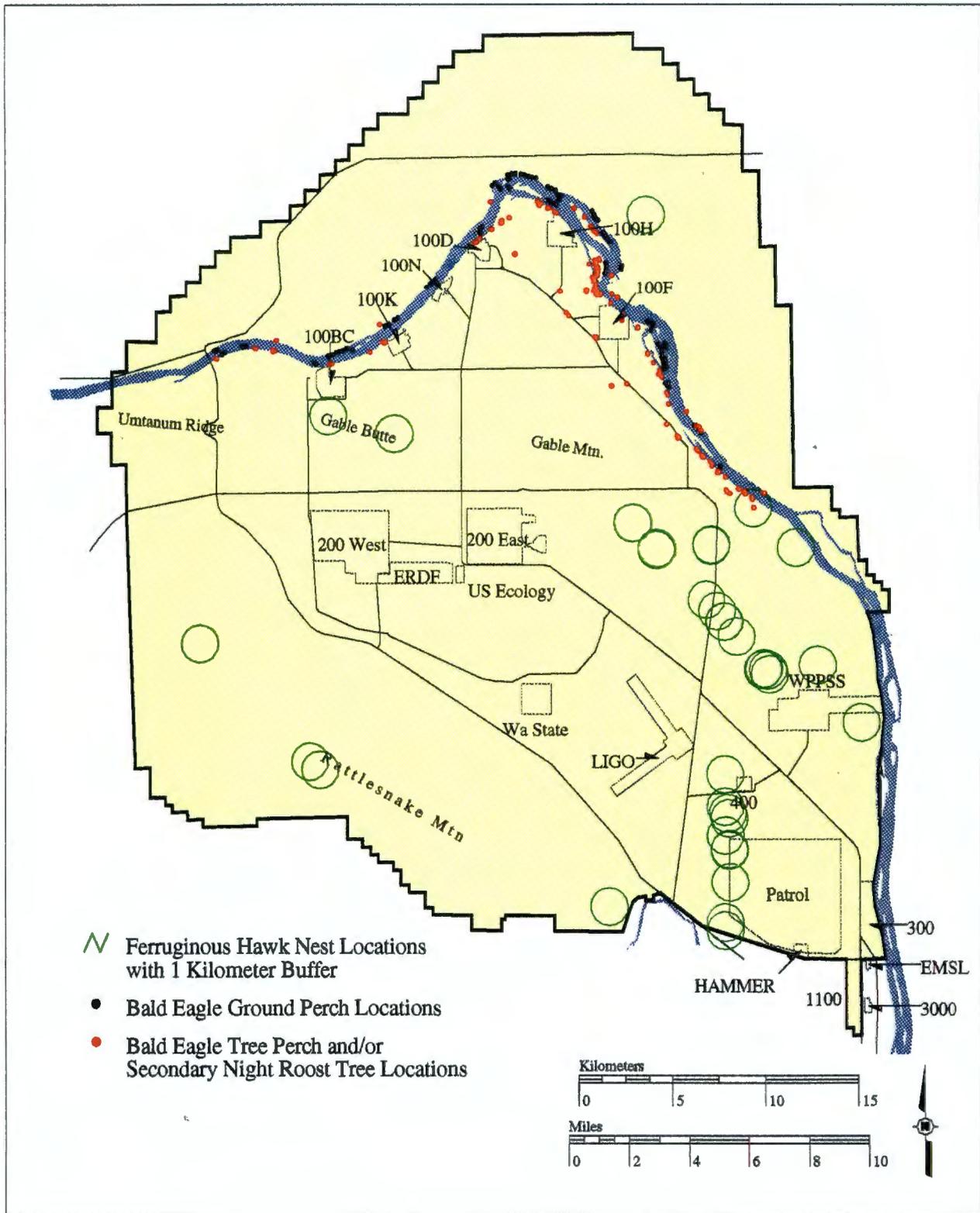
-
-  Stiff Sagebrush / Sandberg's Bluegrass
 -  Big Sagebrush / Bluebunch Wheatgrass
 -  Big Sagebrush / Needle-and-Thread
 -  Spiny Hopsage / Sandberg's Bluegrass
 -  Winterfat / Sandberg's Bluegrass
 -  Bitterbush / Indian Ricegrass Sand Dune Complex
 -  Bitterbush / Needle-and-Thread
 -  Sand Dropseed - Sandberg's Bluegrass
 -  Alkali Saltgrass
 -  Black Greasewood / Alkali Saltgrass
 -  Threetip Sagebrush / Needle-and-Thread
 -  Threetip Sagebrush / Idaho Fescue
 -  Threetip Sagebrush / Bluebunch Wheatgrass
 -  Rock Buckwheat / Sandberg's Bluegrass
 -  Thyme Buckwheat - Rock Buckwheat / Sandbergs Bluegrass
 -  Willow Riparian Complex

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Figure 6-8. Approximate Locations of Plant Species of Concern.

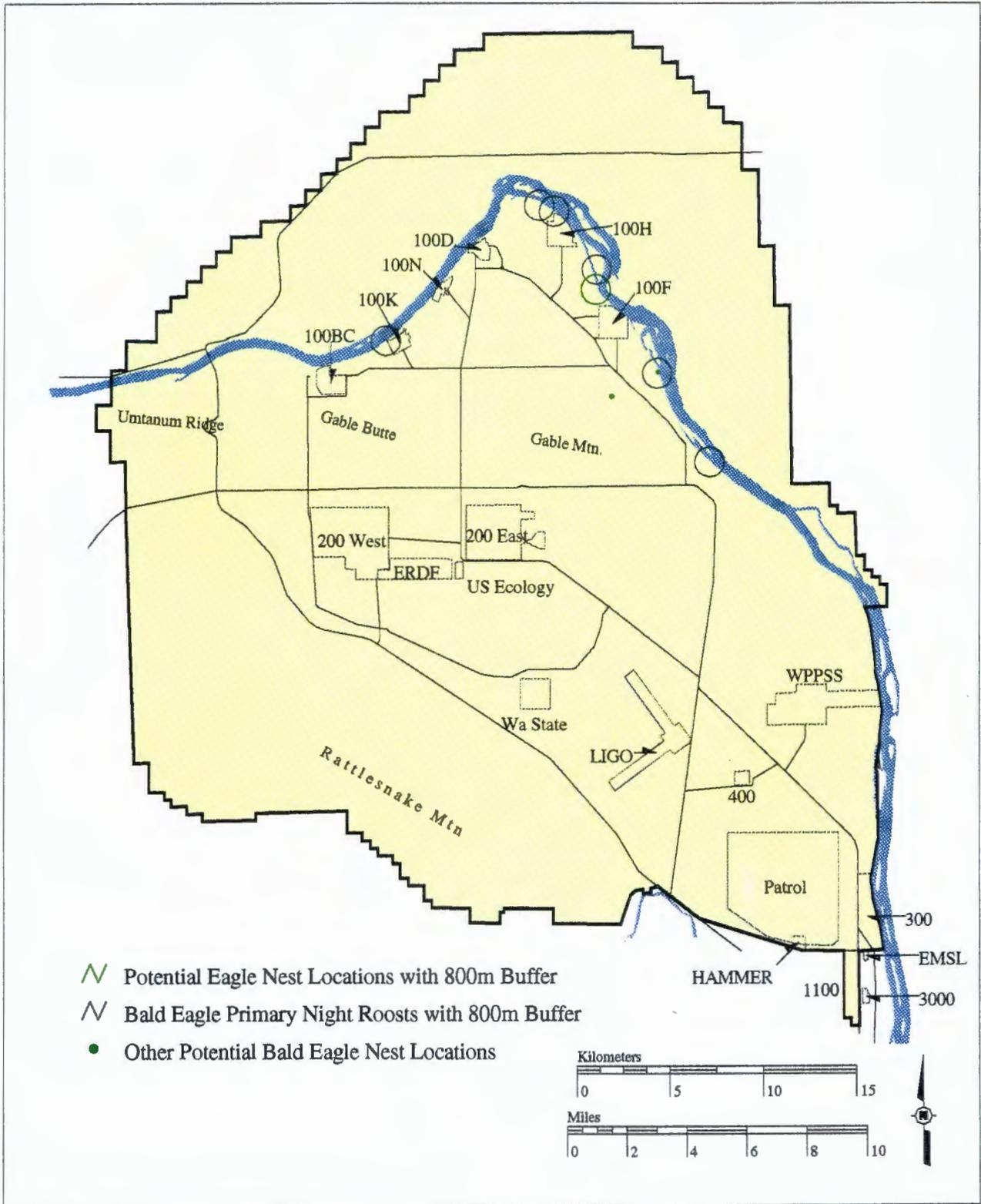


1 **Figure 6-9. Historic Ferruginous Hawk Nest Locations and Bald**
 2 **Eagle Perch and Secondary Night Roost Locations.**
 3



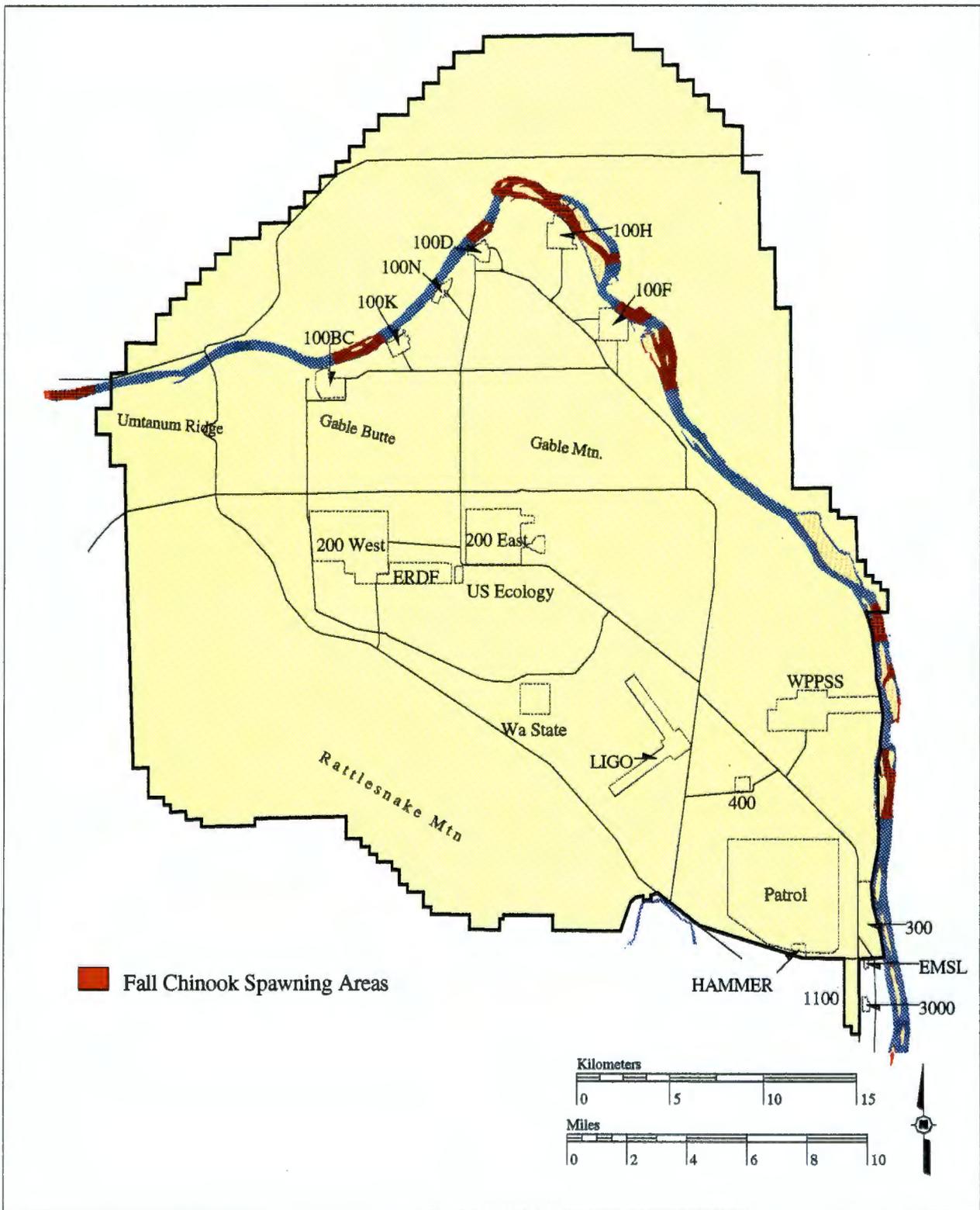
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Figure 6-10. Bald Eagle Potential Nest and Primary Roost Locations.

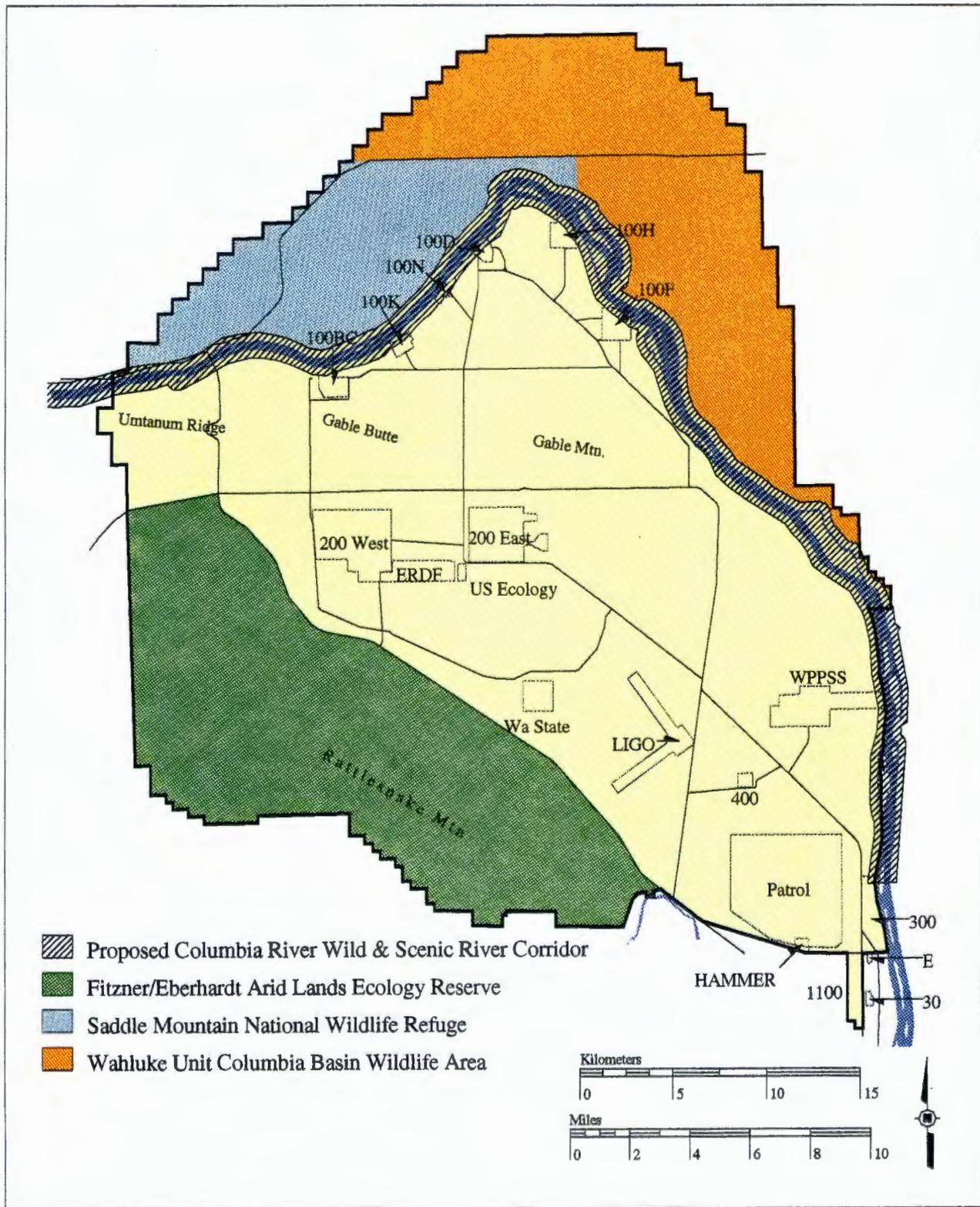


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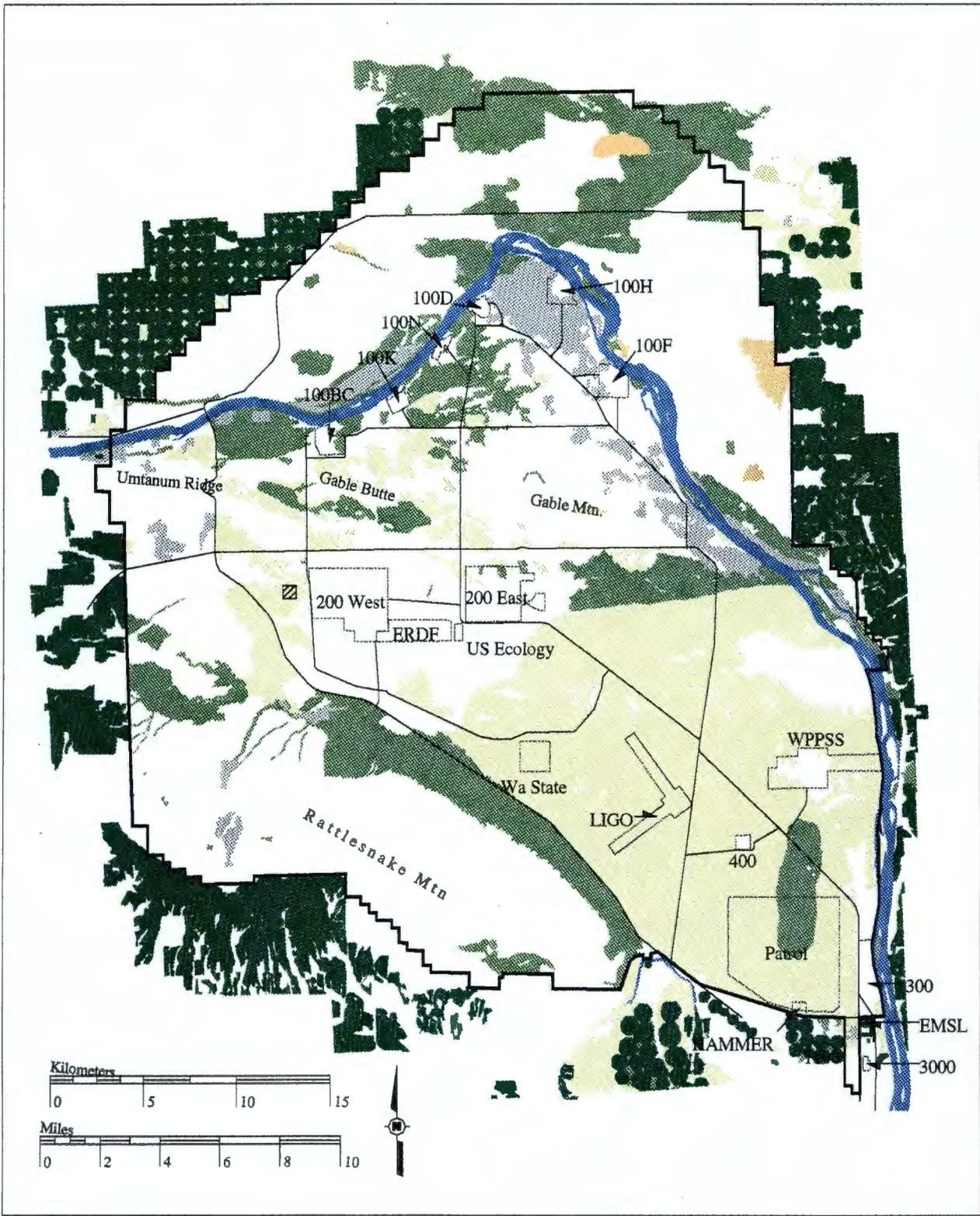
Figure 6-11. Fall Chinook Spawning Areas.



1 **Figure 6-12. Administratively Designated Areas Within Which**
 2 **Protection of Biological Resource Values is a Priority Consideration.**
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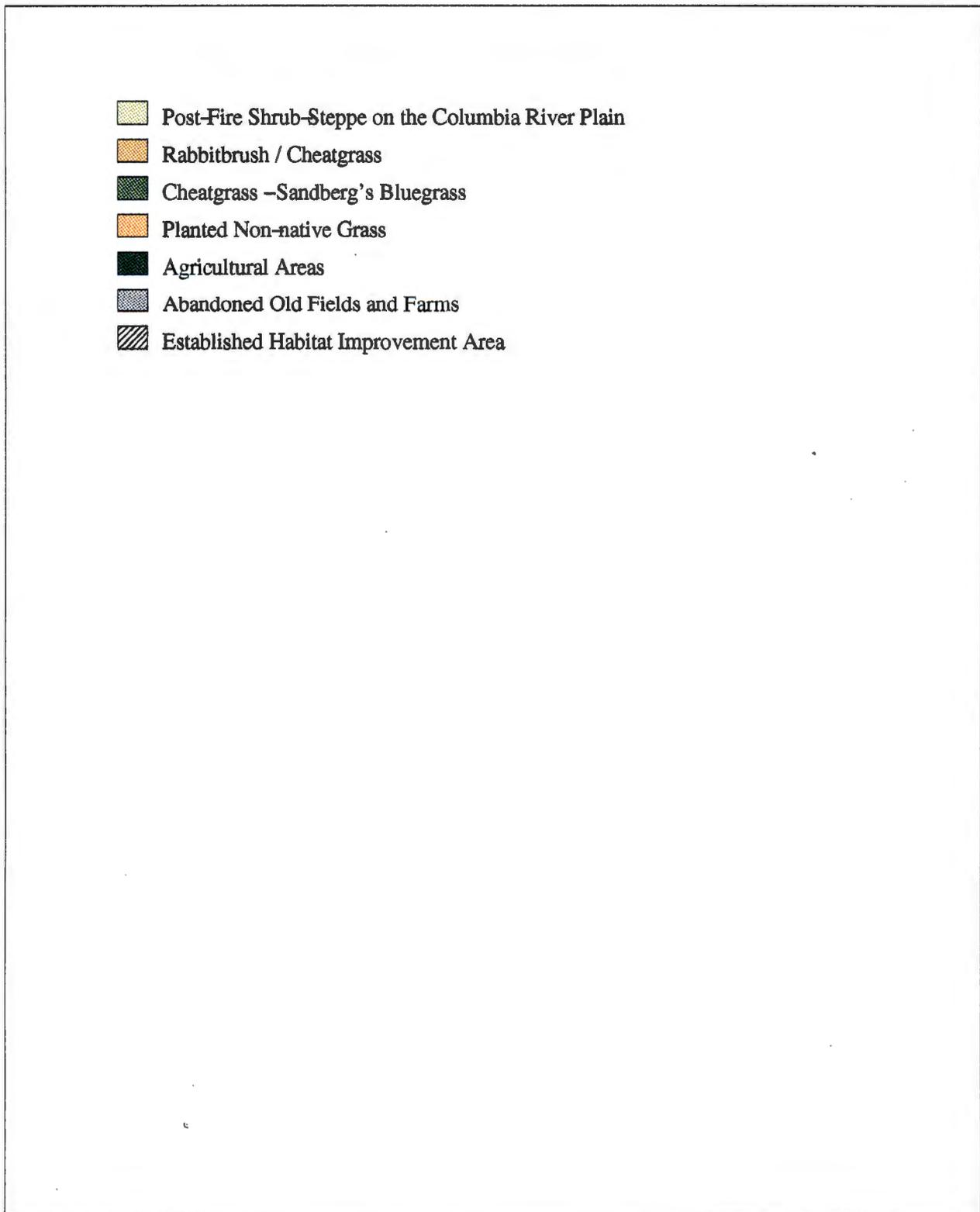


1/2 Figure 6-13. Established and Potential Habitat Improvement Areas.



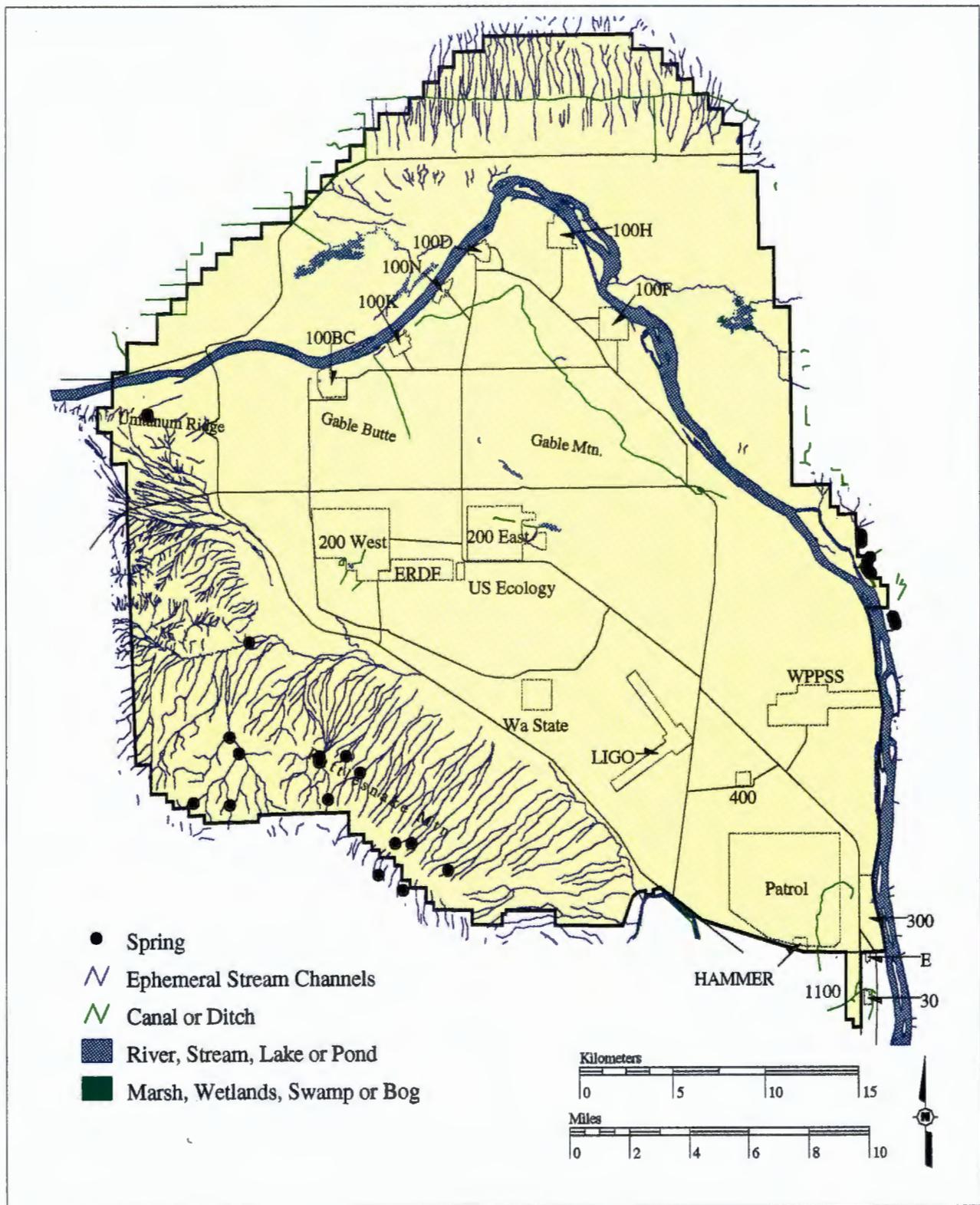
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1 *Figure 6-13. Established and Potential Habitat Improvement Areas*
3 *(Legend).*

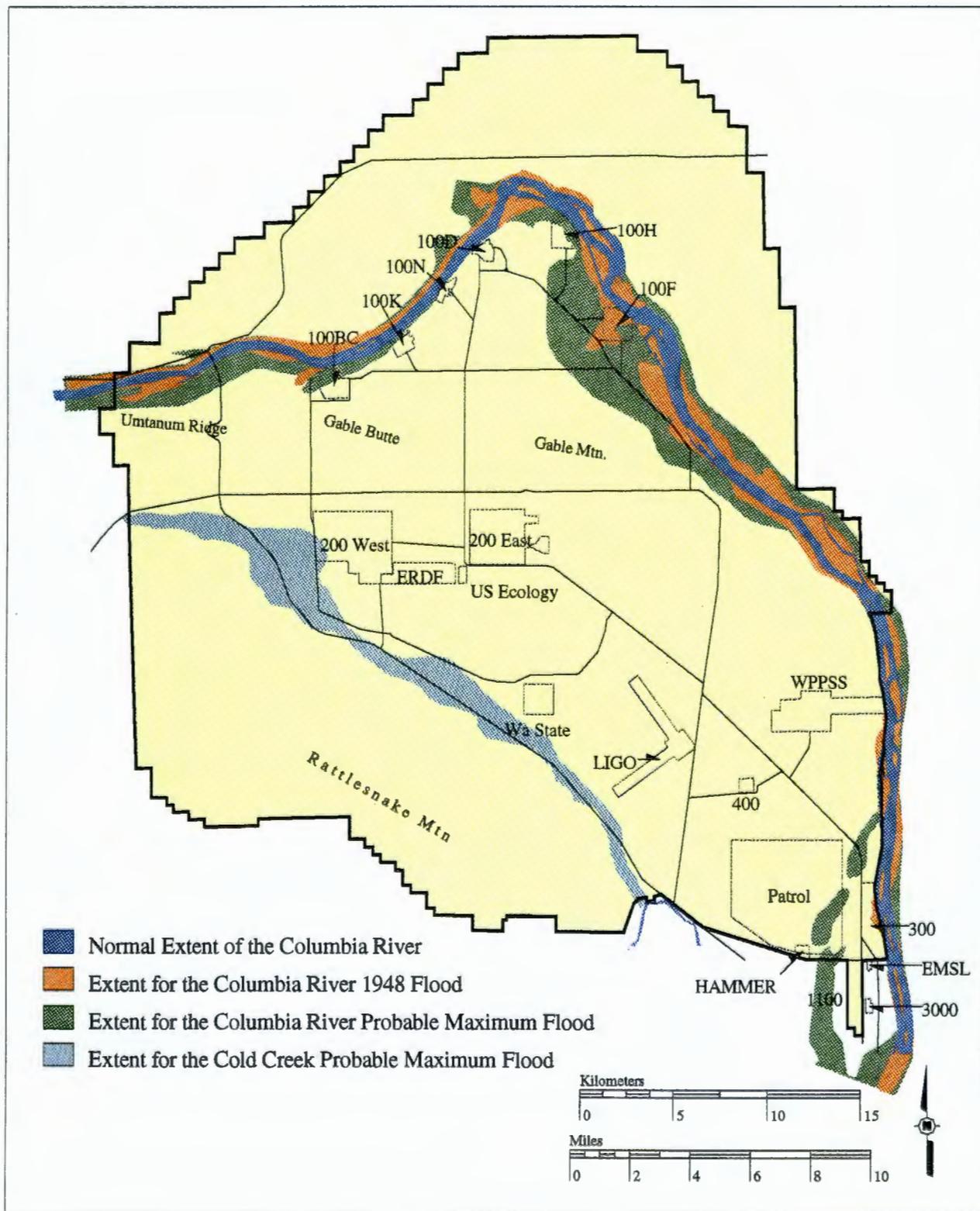


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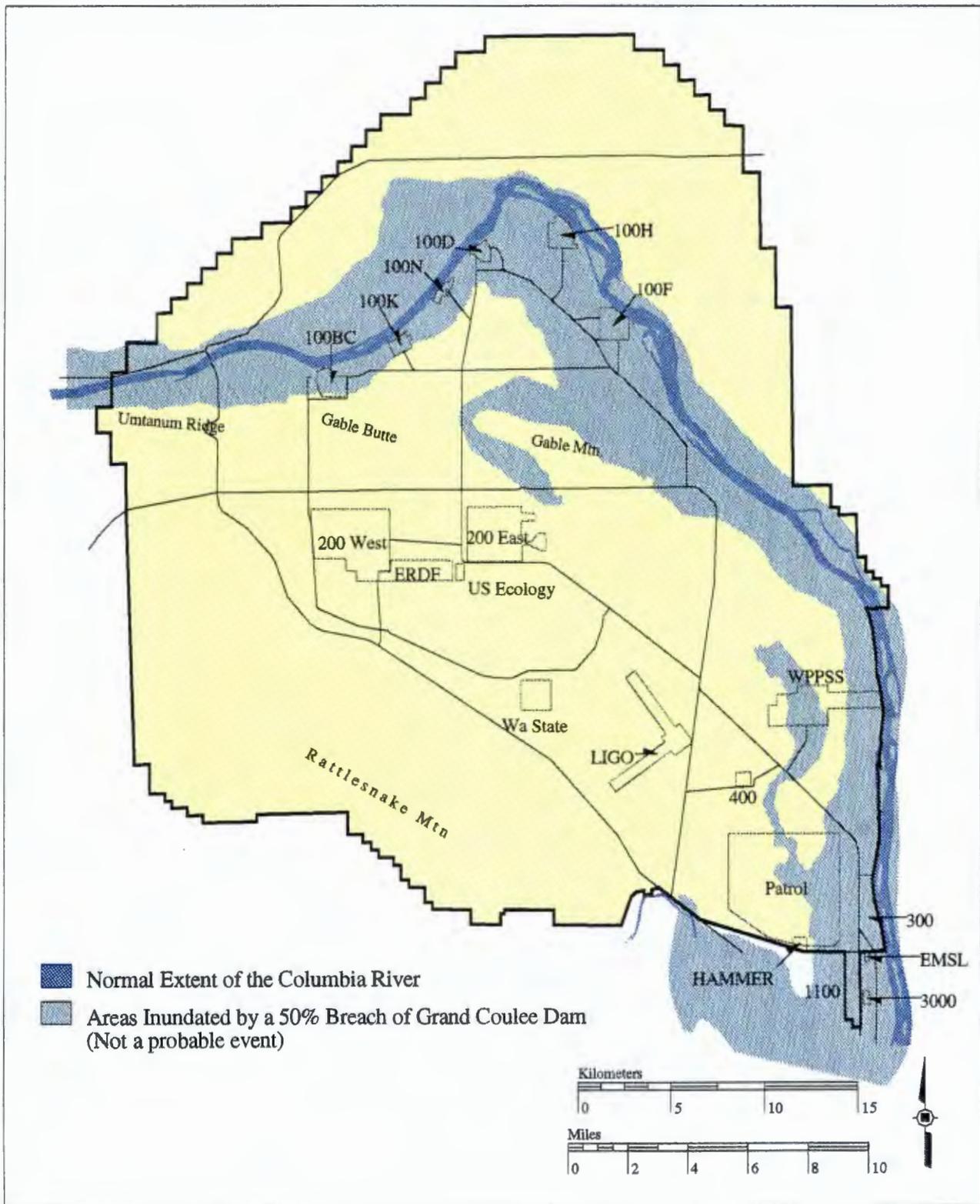
Figure 6-14. Surface Water on the Hanford Site.



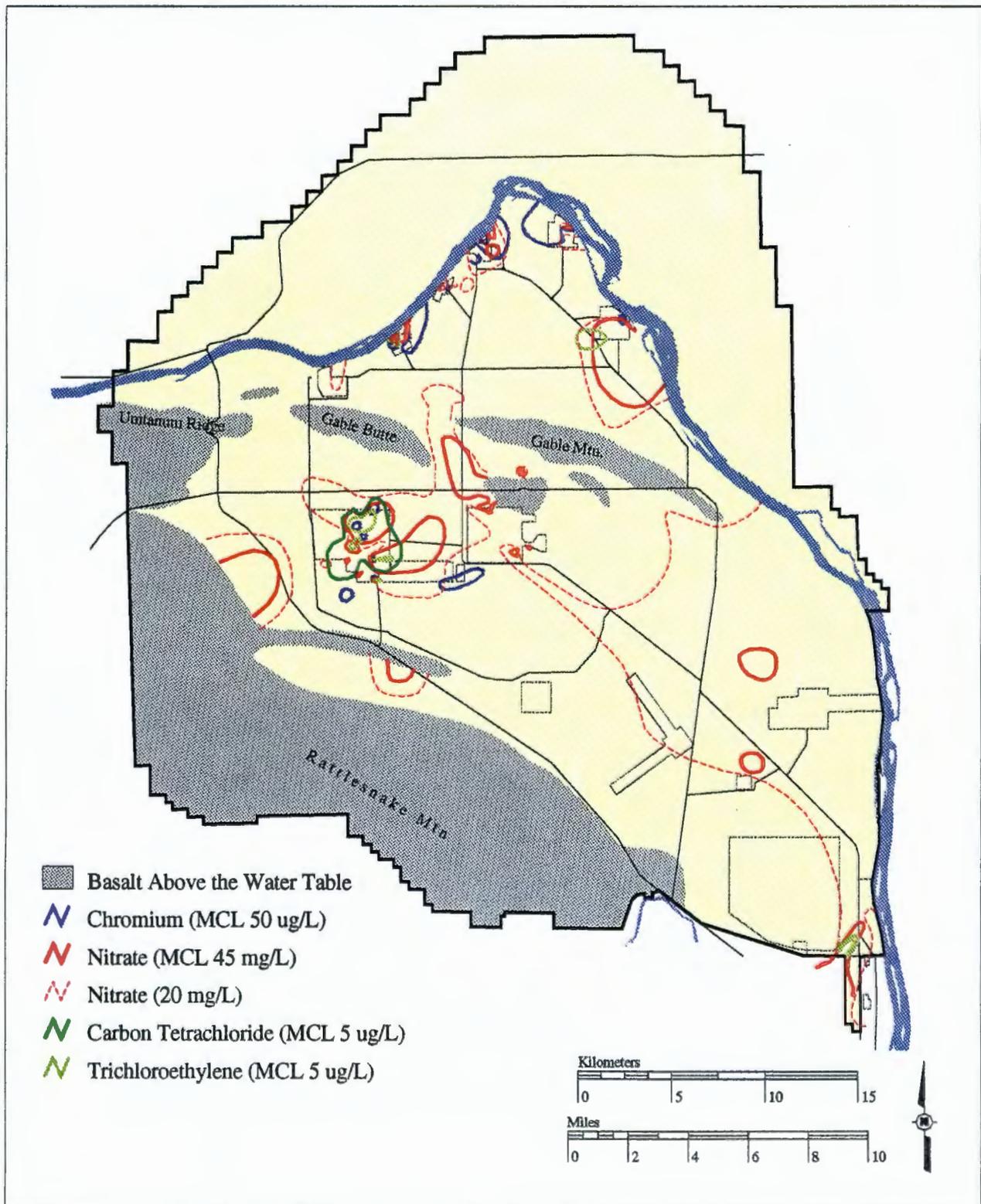
1 **Figure 6-15. Probable Maximum Flood of the Columbia River and**
2 **Cold Creek, and the Actual 1948 Flood of the Columbia River.**
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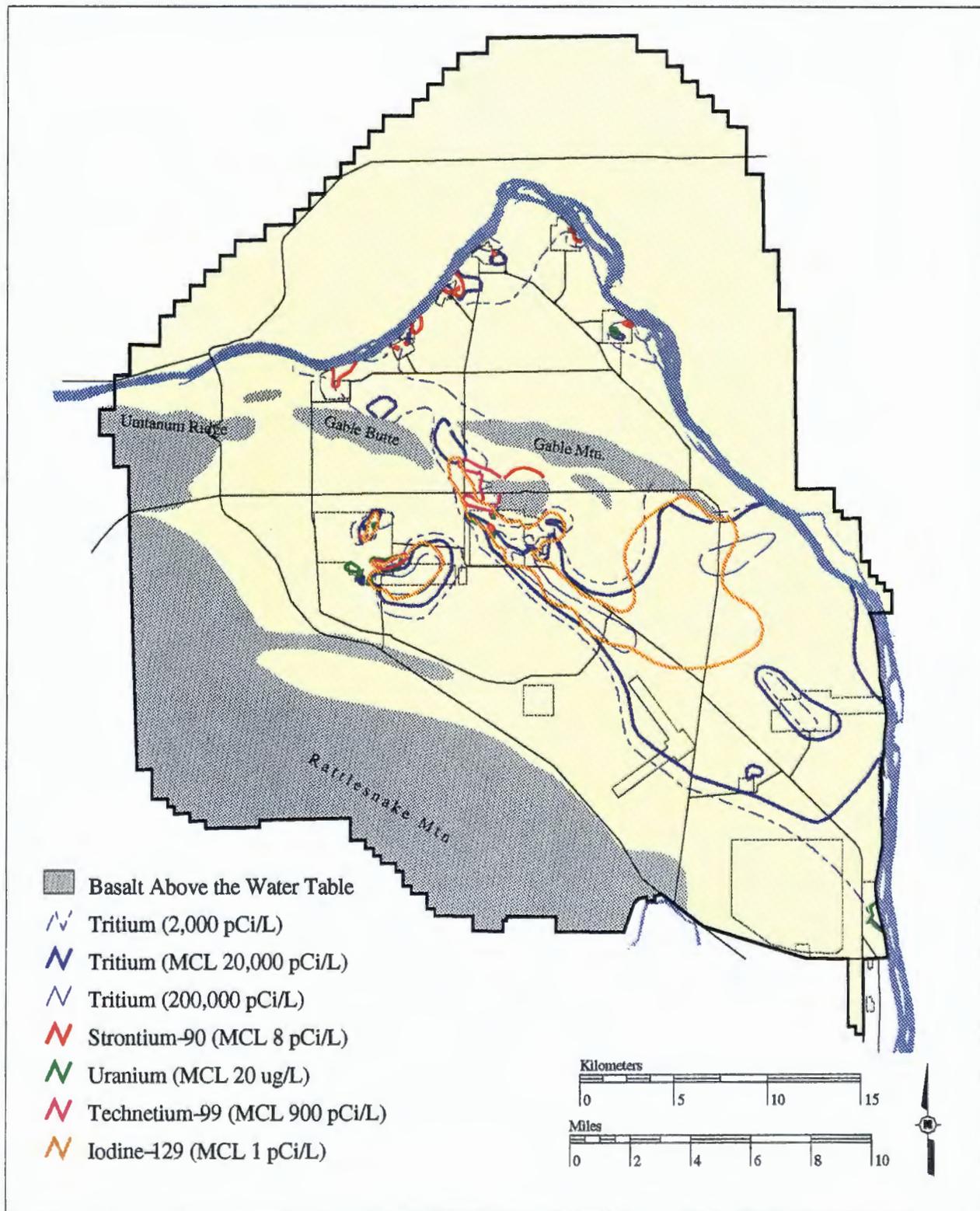
1 **Figure 6-16. Columbia River Flood Area of a 50 Percent Breach of**
 3 **the Grand Coulee Dam.**



1 *Figure 6-17. Distribution of Hazardous Chemicals in Groundwater Within the Hanford Site.*
 3
 4



1 **Figure 6-18. Distribution of Radionuclides in Groundwater Within**
 3 **the Hanford Site.**
 4



1 *Figure 6-19. Water Table Elevations for the Unconfined Aquifer of*
3 *the Hanford Site.*

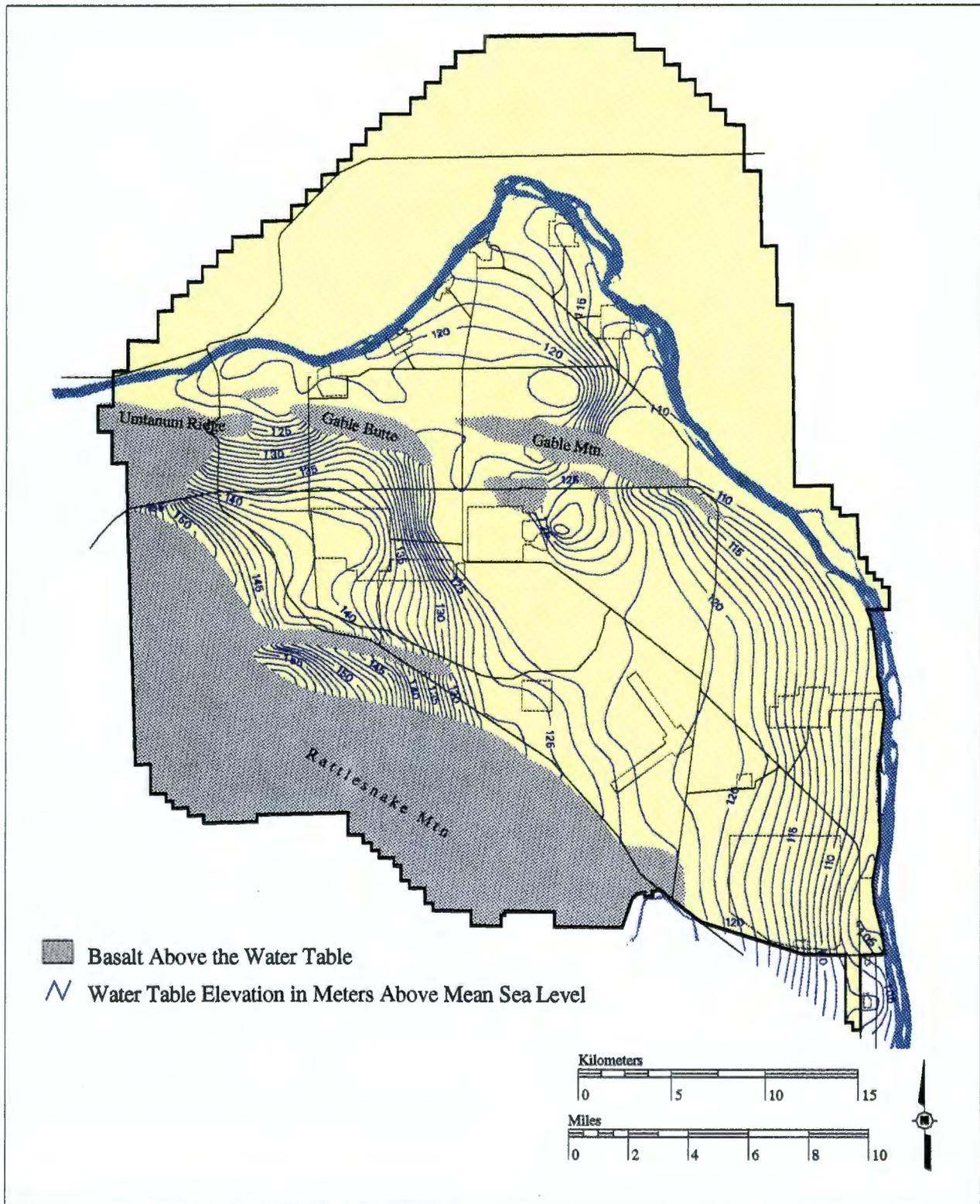
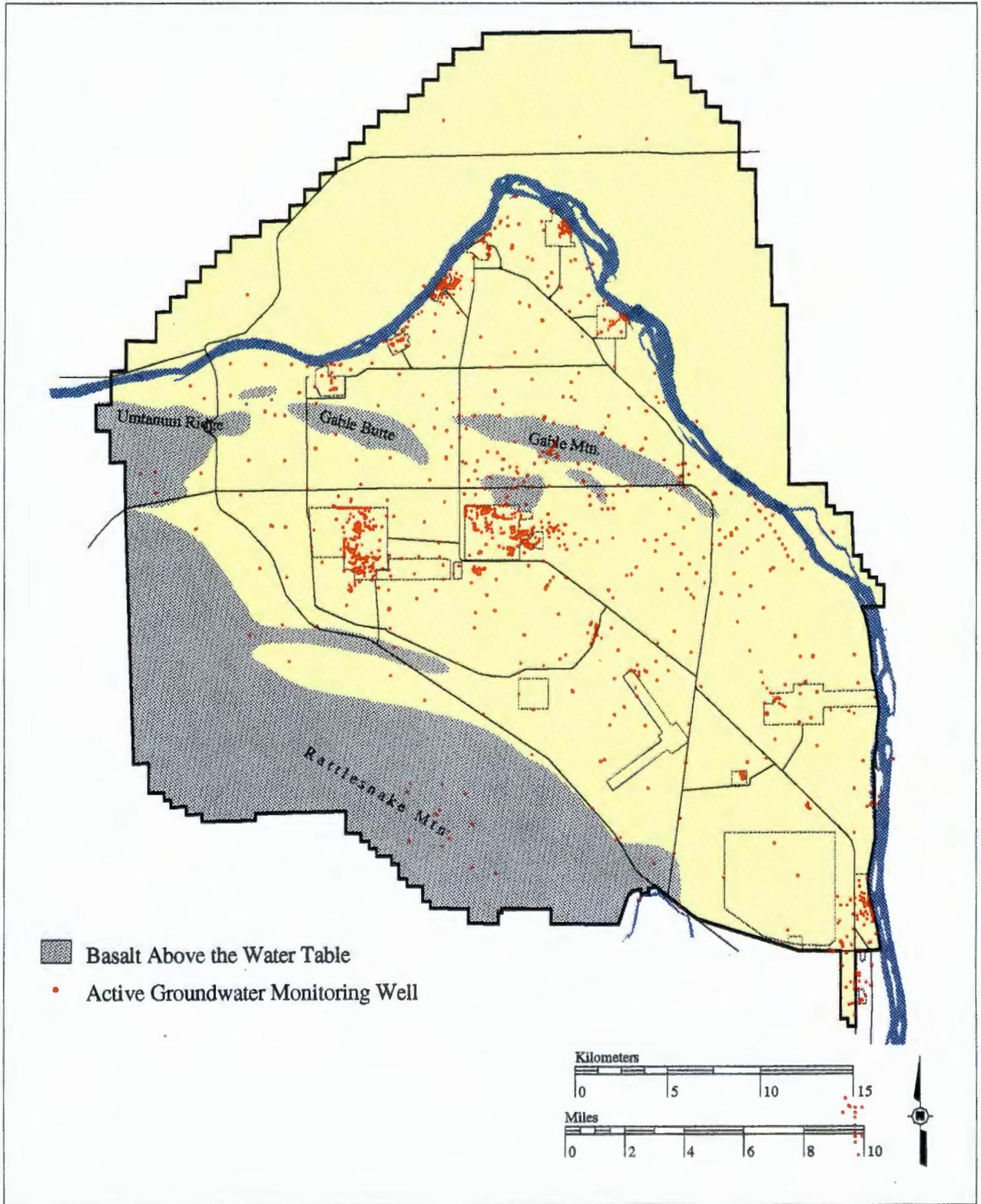
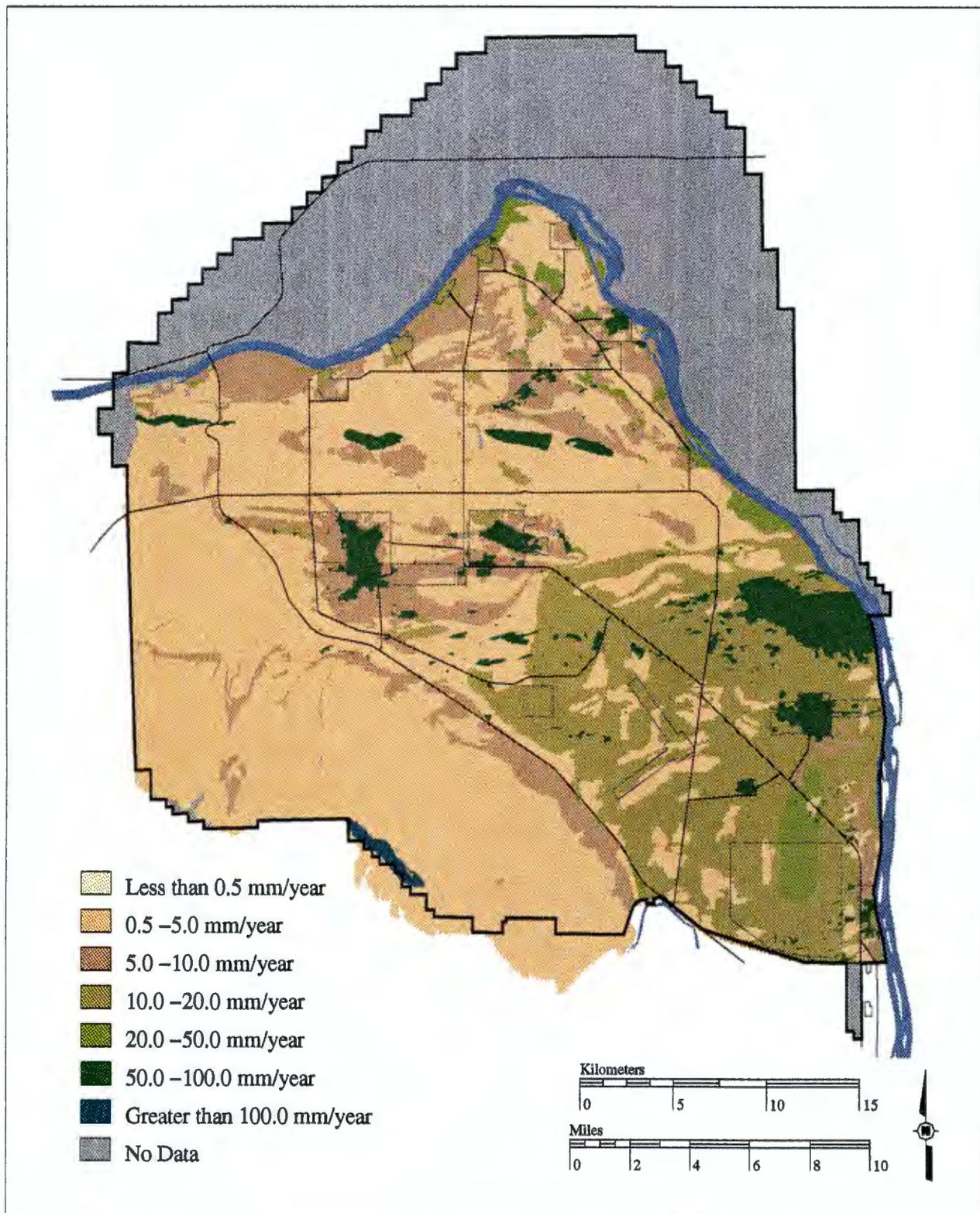


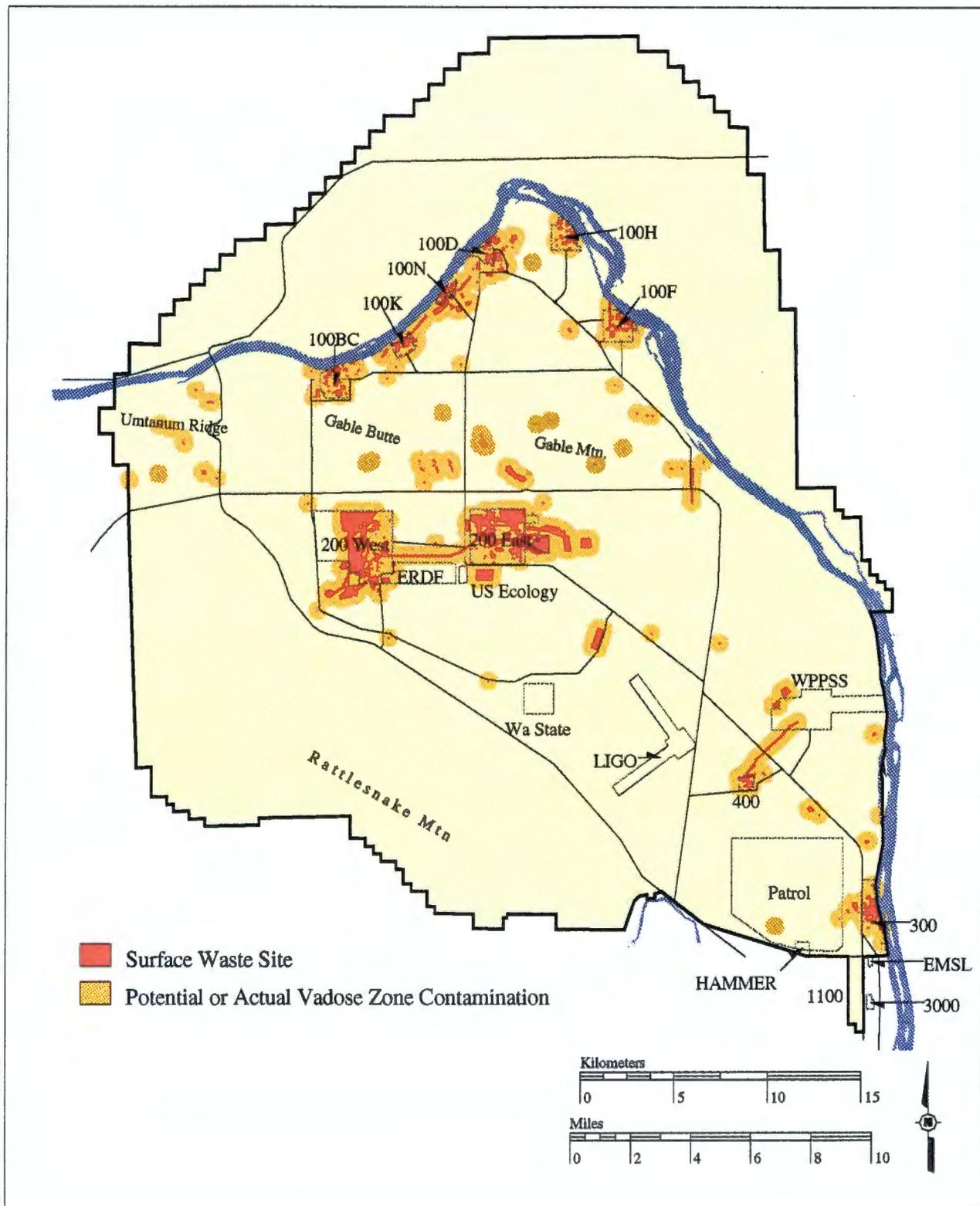
Figure 6-20. Hanford Site Monitoring Wells.



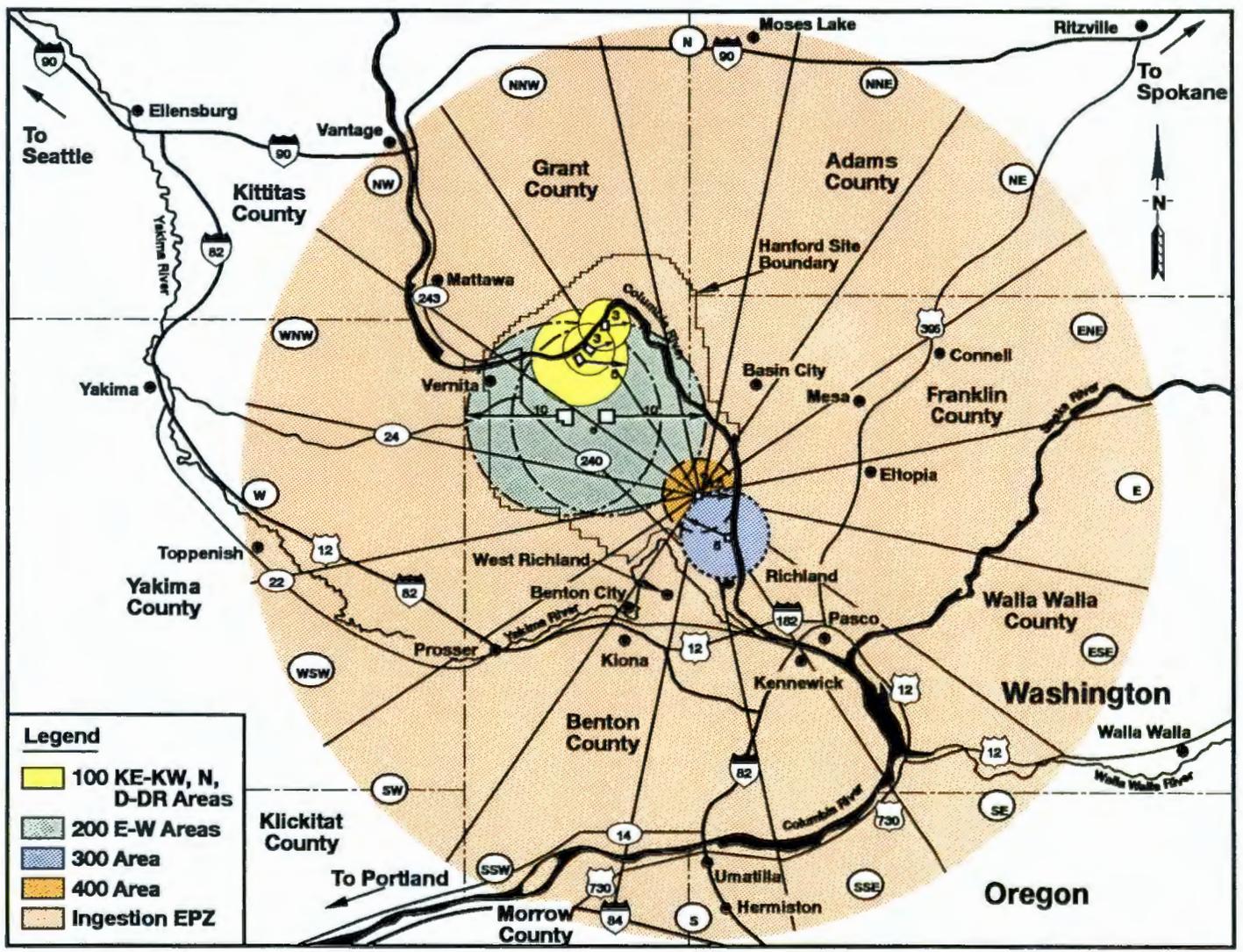
1 *Figure 6-21. Estimated Recharge From Infiltration of Precipitation*
2 *and Irrigation on the Hanford Site.*



1 **Figure 6-22. Hanford Site Waste Sites and Potential or Actual**
 3 **Vadose Zone Contamination.**

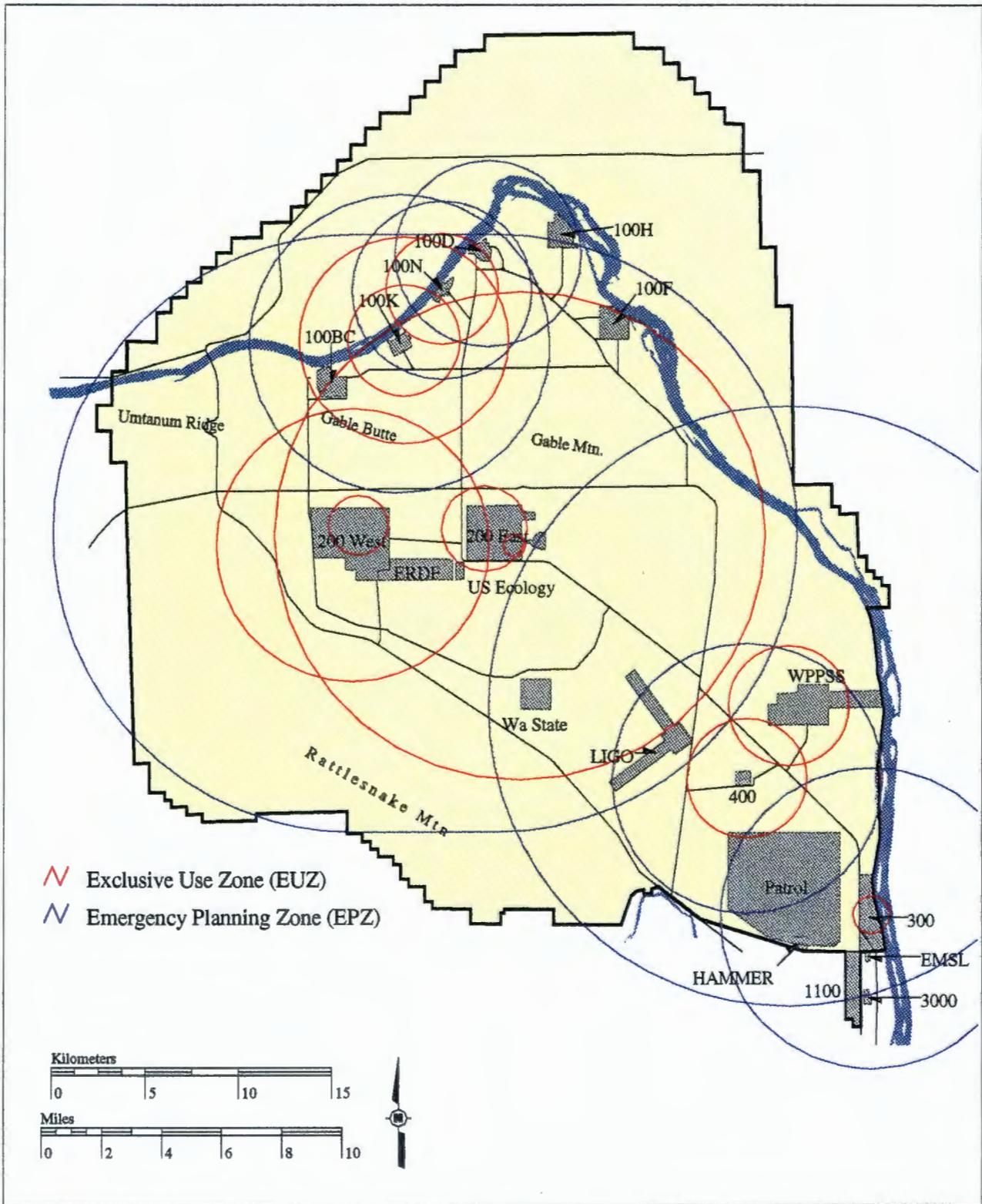


1 Figure 6-23. Ingestion Exposure Pathway Emergency Planning Zone
3 for the Hanford Site and the Supply System WNP-2.



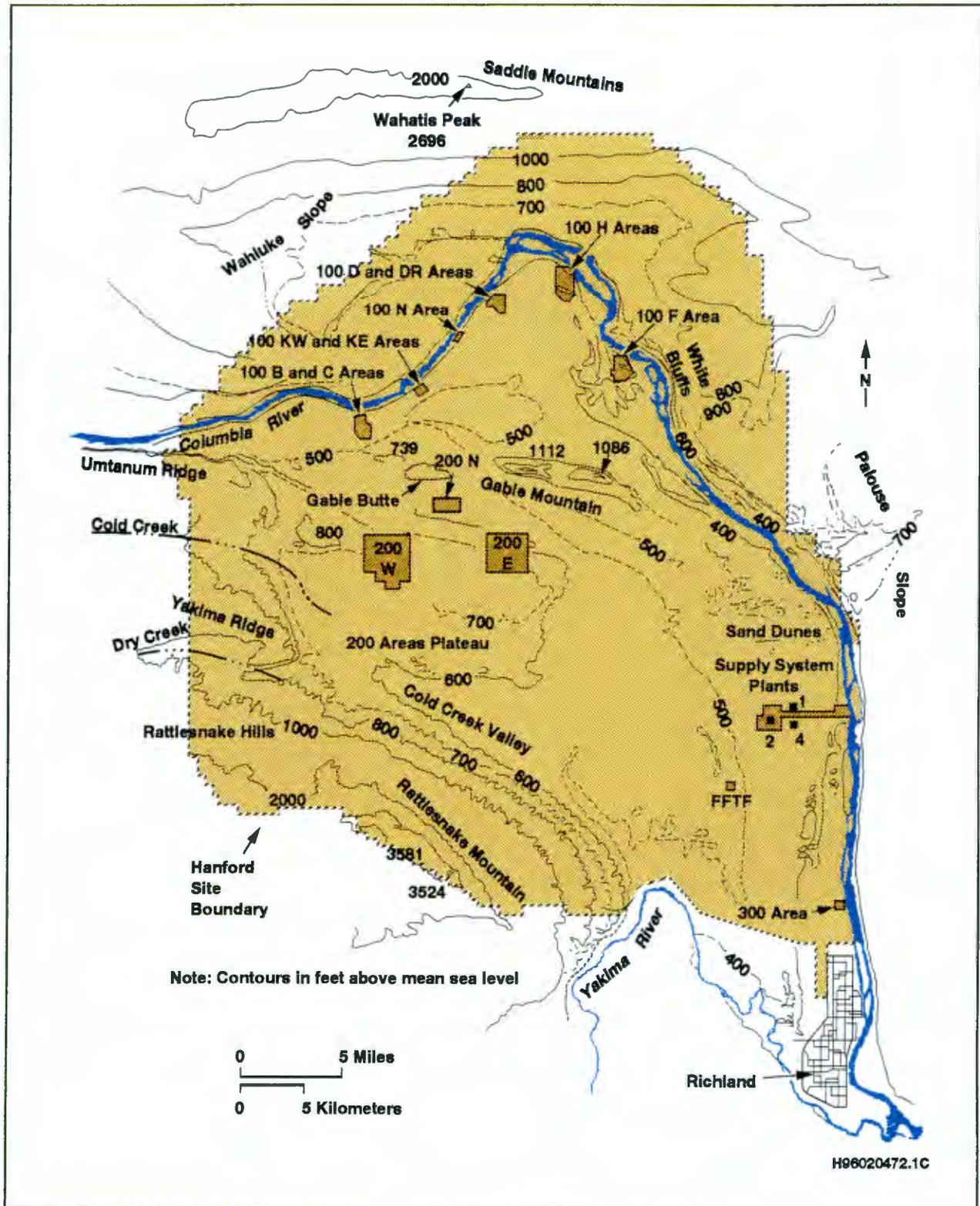
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Figure 6-24. Protective Safety Buffer Zones.



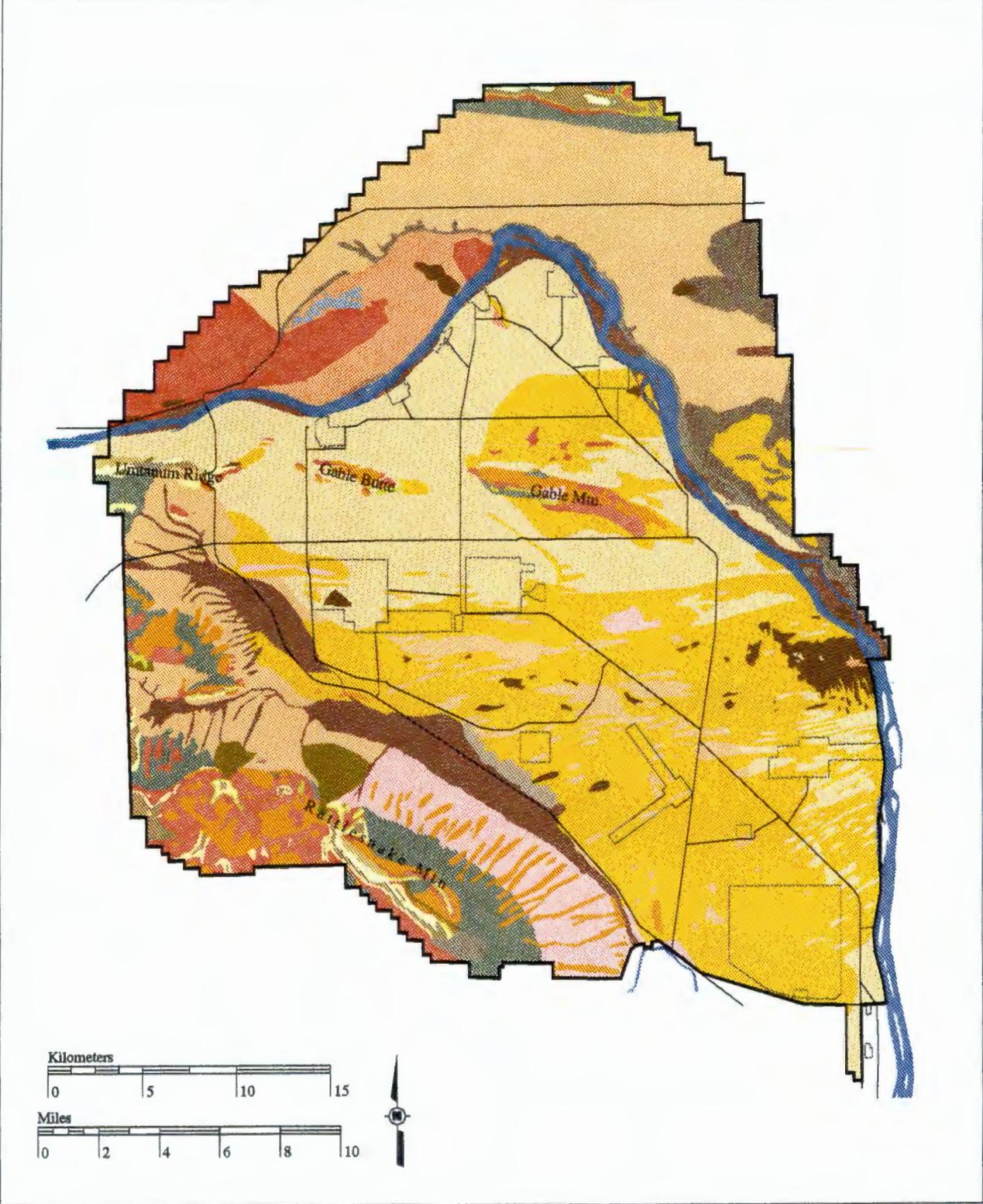
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Figure 6-25. Topography of the Hanford Site.



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Figure 6-26. Hanford Site Surficial Geology.

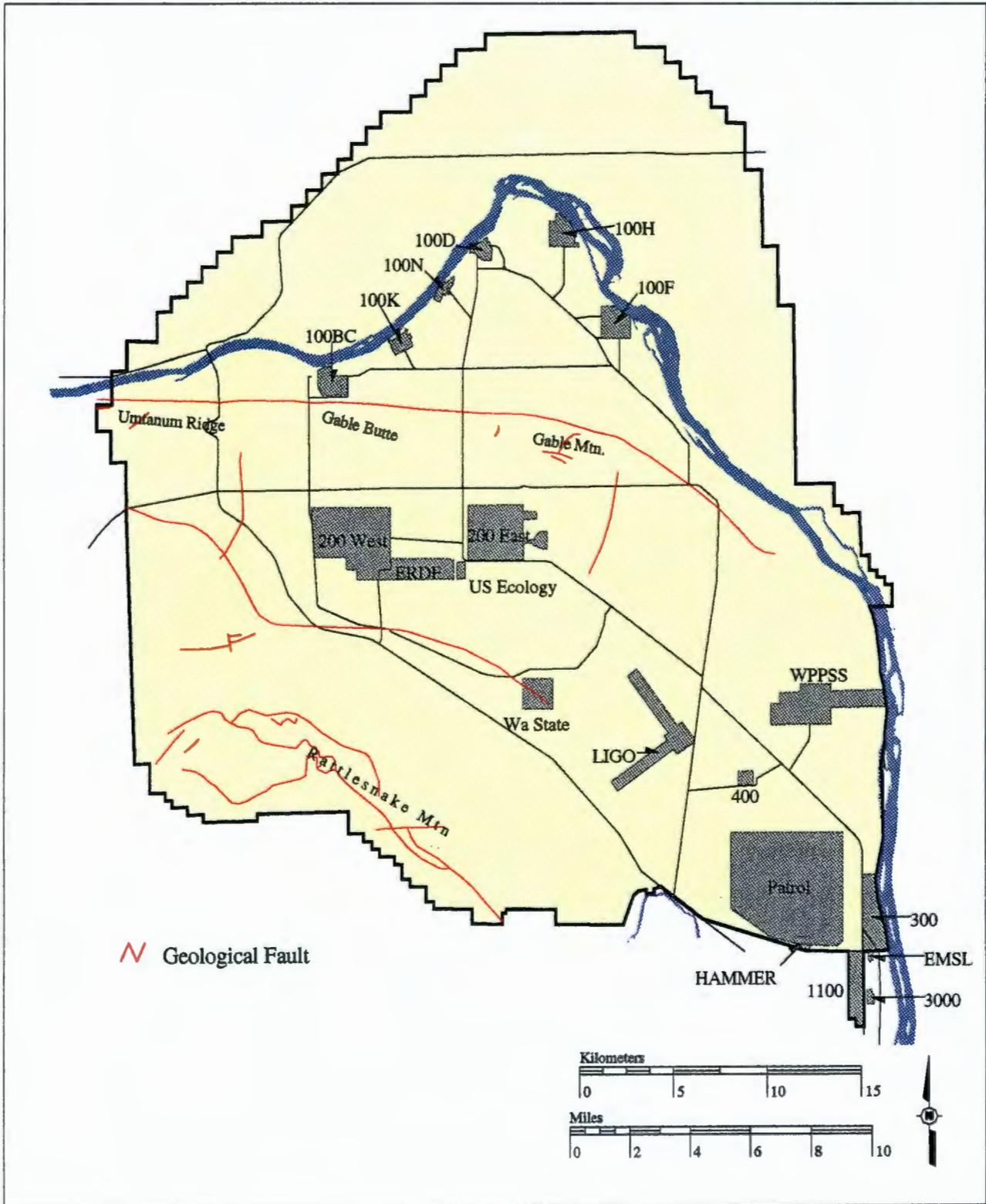


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Figure 6-26. Hanford Site Surficial Geology (Legend).

-  PLMc-Ringold Fm., Continental sed. (Plio.-Mio.)
-  PLMcg-Ringold Fm., Conglomerate (Plio.-Mio.)
-  Qa-Alluvium (Holo.-Pleis.)
-  Qaf-Alluvial fans (Holo.-Pleis.)
-  Qd-Dune sand (Holocene)
-  Qda-Dune sand, active (Holocene)
-  Qds-Dune sand, stabilized (Holocene)
-  Qfg-Outburst flood dep.(Pleis.), gravels, undiv.
-  Qfg(3-4u)-Outburst flood dep., gravels, undif.
-  Qfs(3-4u)-Outburst flood dep., sands, undif.
-  Ql-Loess (Holocene to Pleistocene)
-  Qls-Mass-wasting deposits (Holo.-Pleis.)
-  QPLg-Gravel (Pleistocene to Pliocene)
-  Mv(wr)-Wanapum Basalt, Roza Mbr (M. Mio)
-  Mv(wpr)-Wanapum Basalt, Priest Rapids Mbr (M. Mio.)
-  Mv(wfs)-Wanapum Basalt, Frenchman Spr. Mbr (M. Mio.)
-  Qfg(1)-Outburst flood dep.(Pleis.), gravels, oldest
-  Qfg(3)-Outburst flood dep.(Pleis.), gravels, 2nd youngest
-  Qfs(3)-Outburst flood dep.(Pleis.), silt & sand, 2nd young
-  Qfs(4)-Outburst flood dep.(Pleis.), silt & sand, youngest
-  Mc-Cont. sed. dep. -interbeds in Columbia R. Basalt
-  Mv(sem)-Saddle Mt Basalt, Elephant Mt Mbr (U. Mio.)
-  Mv(se)-Saddle Mt Basalt, Esquatzel Mbr (M. Mio.)
-  Mv(sa)-Saddle Mt Basalt, Asotin Mbr (Mio)
-  Mv(su)-Saddle Mt Basalt, Umatilla Mbr (M. Mio.)
-  Mv(sp)-Saddle Mt. Basalt, Pomona Mbr (M. Mio.)
-  Mv(gN2)-Grande Ronde Basalt, Up. flow-normal pol. (M. Mio.)
-  WTR-Water

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Figure 6-27. Hanford Site Geologic Faults.



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Figure 6-28. Hanford Site Soil Map.

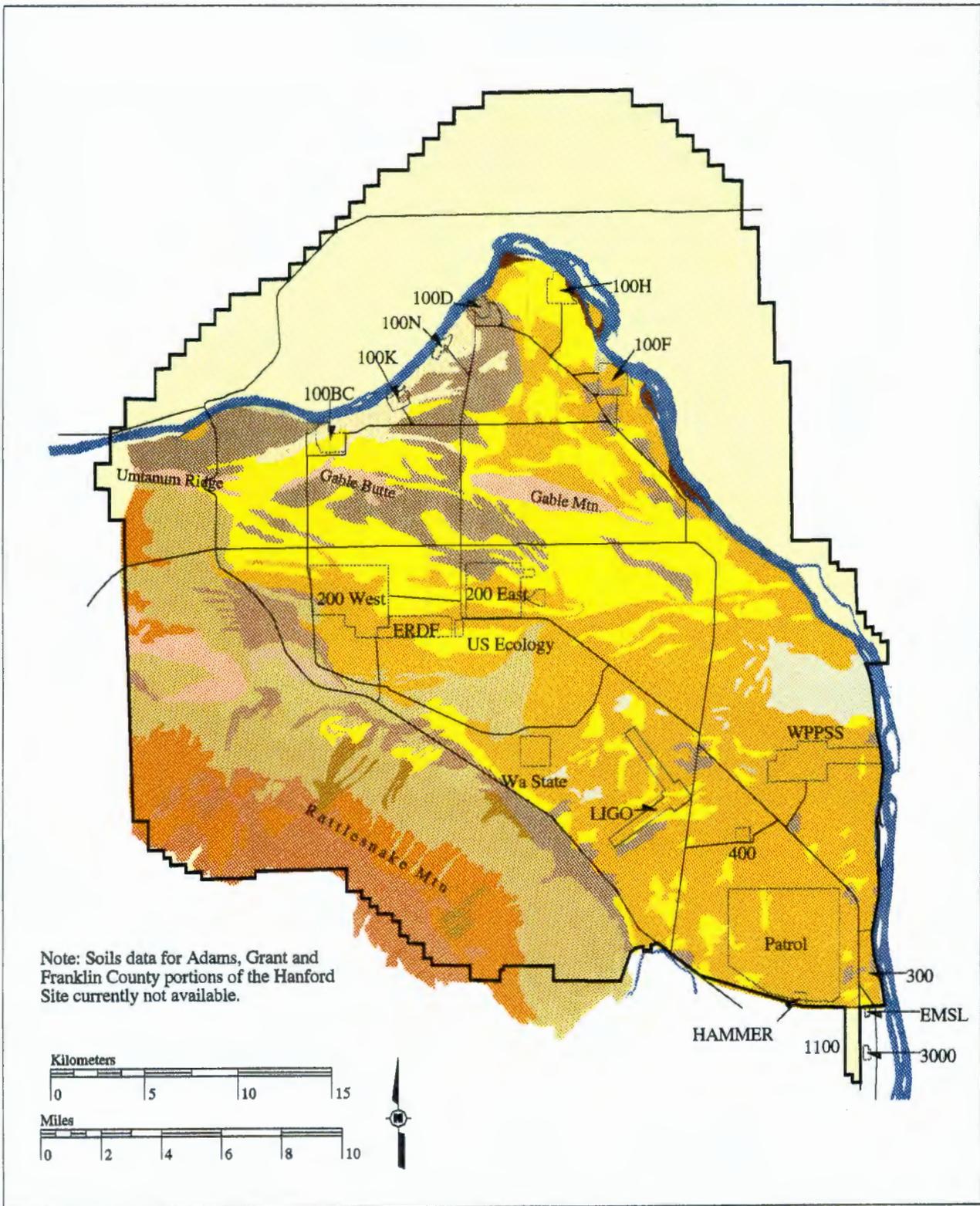
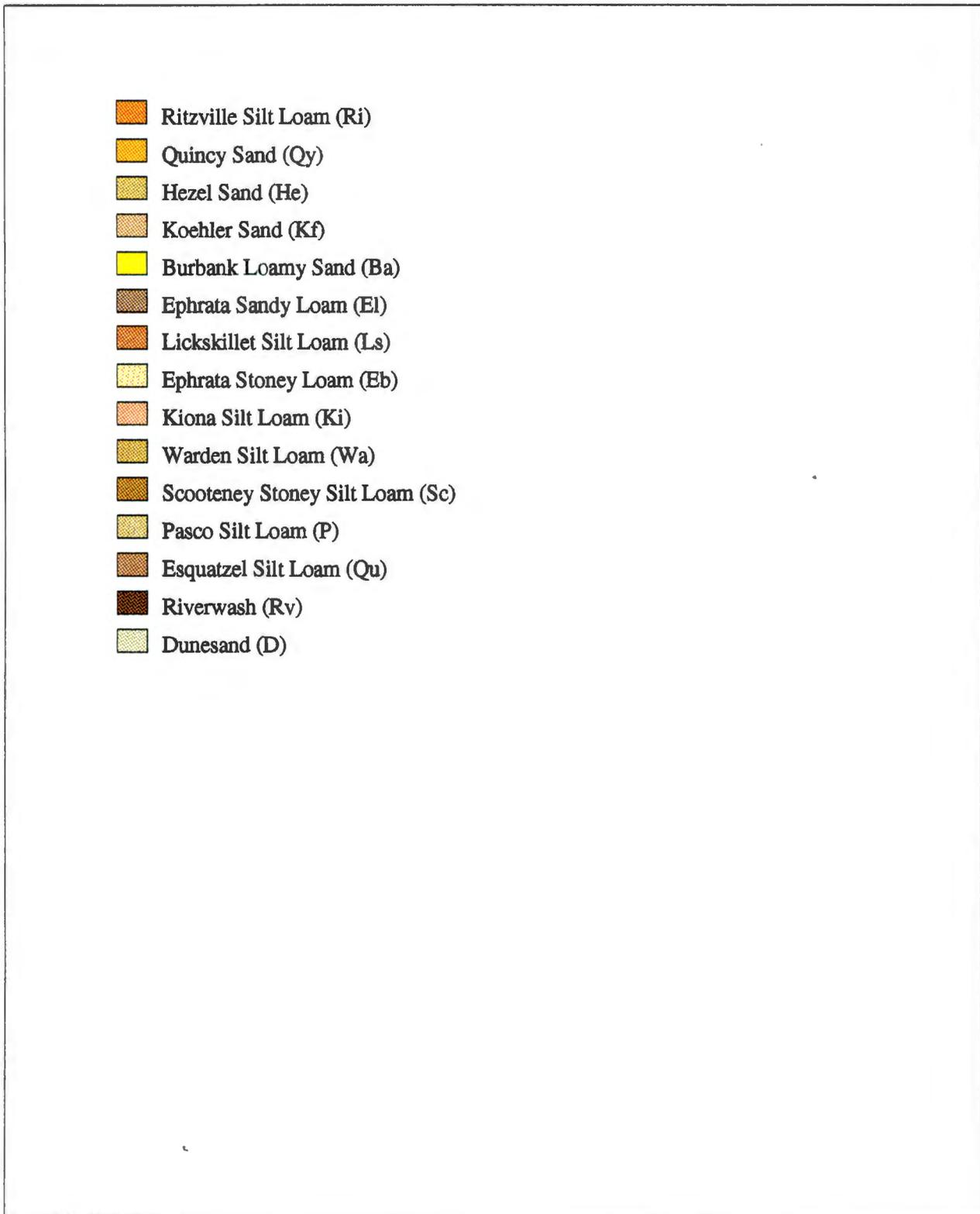
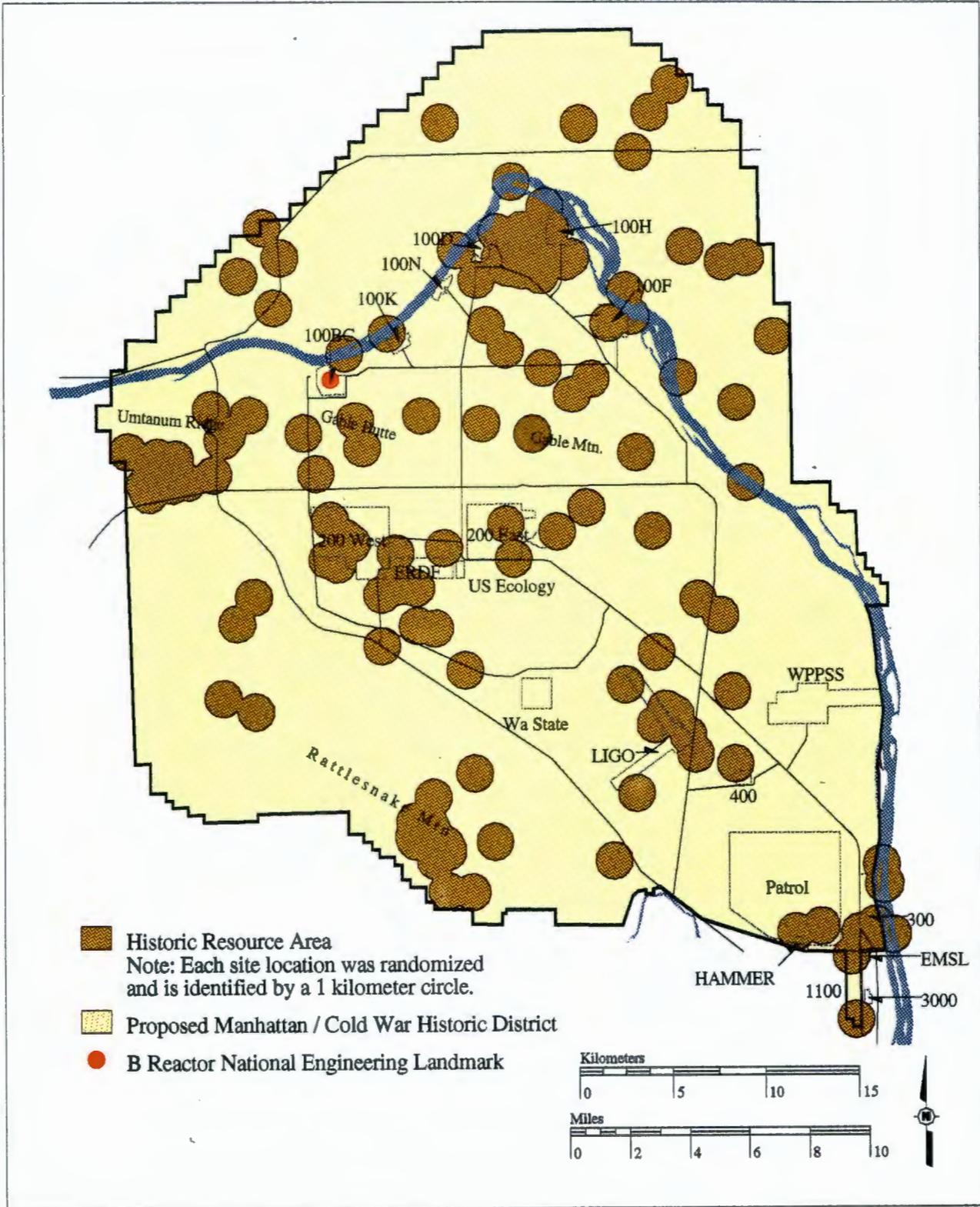


Figure 6-28. Hanford Site Soil Map (Legend).

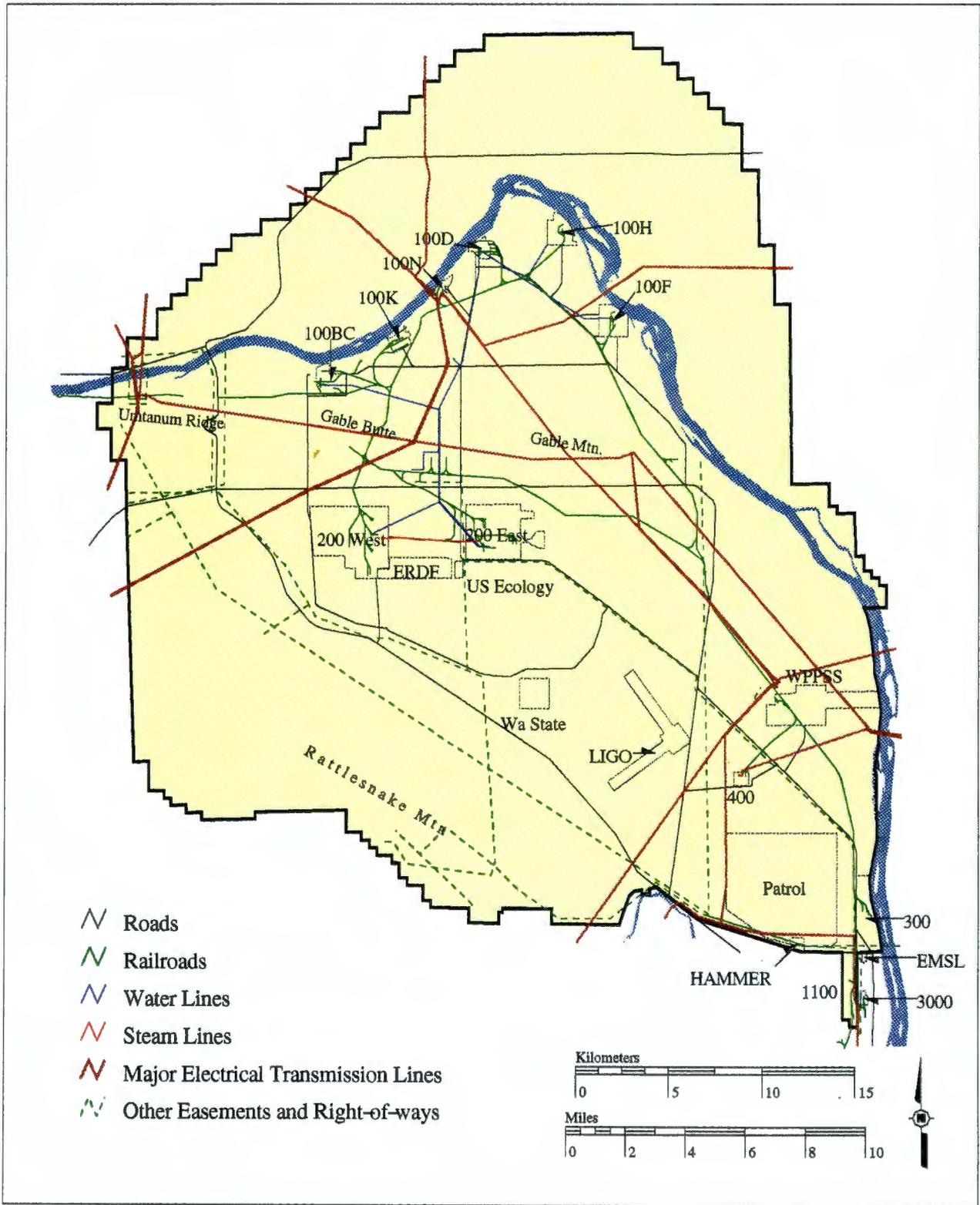
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Figure 6-29. Hanford Site Historic Areas.



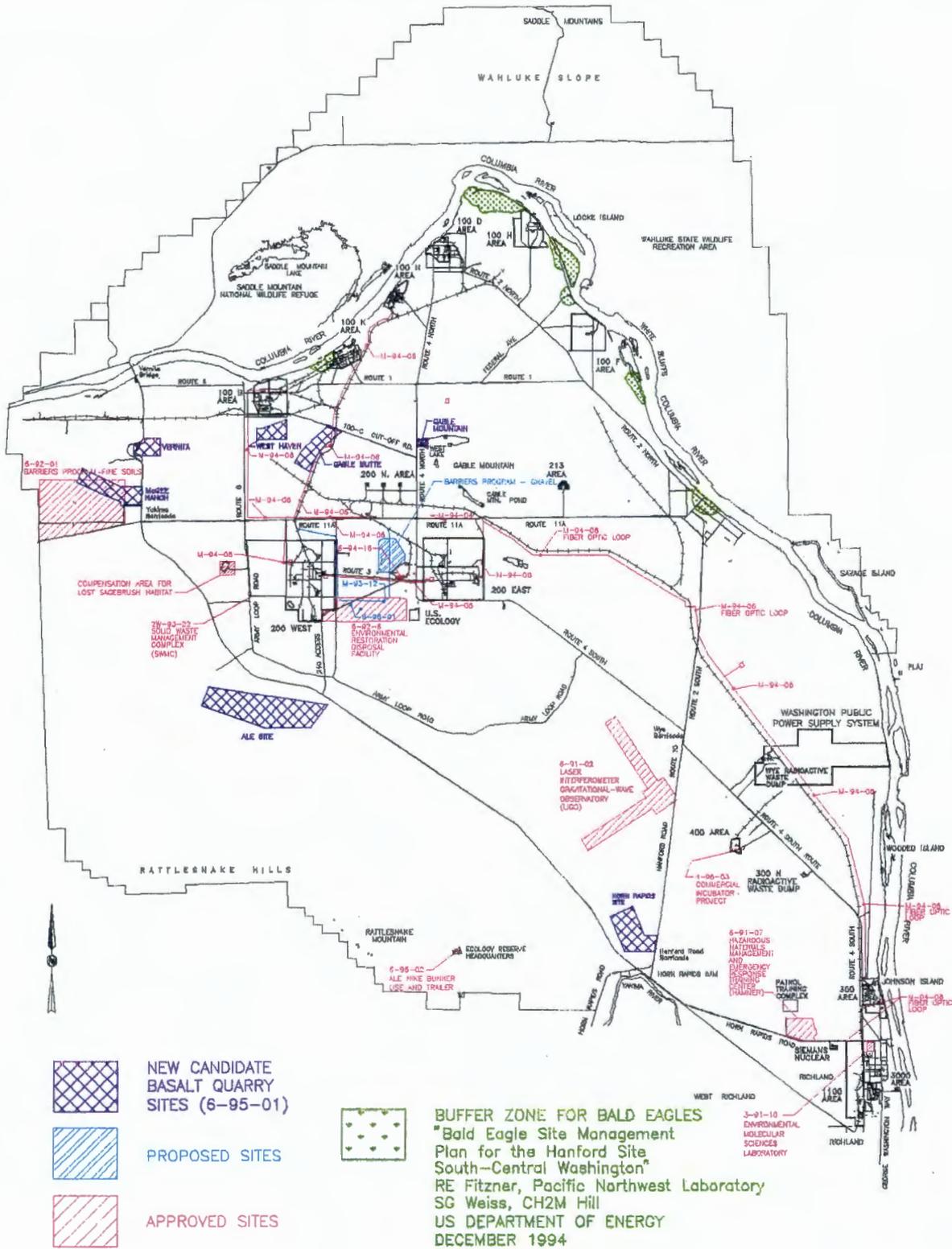
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Figure 6-30. Hanford Site Infrastructure.



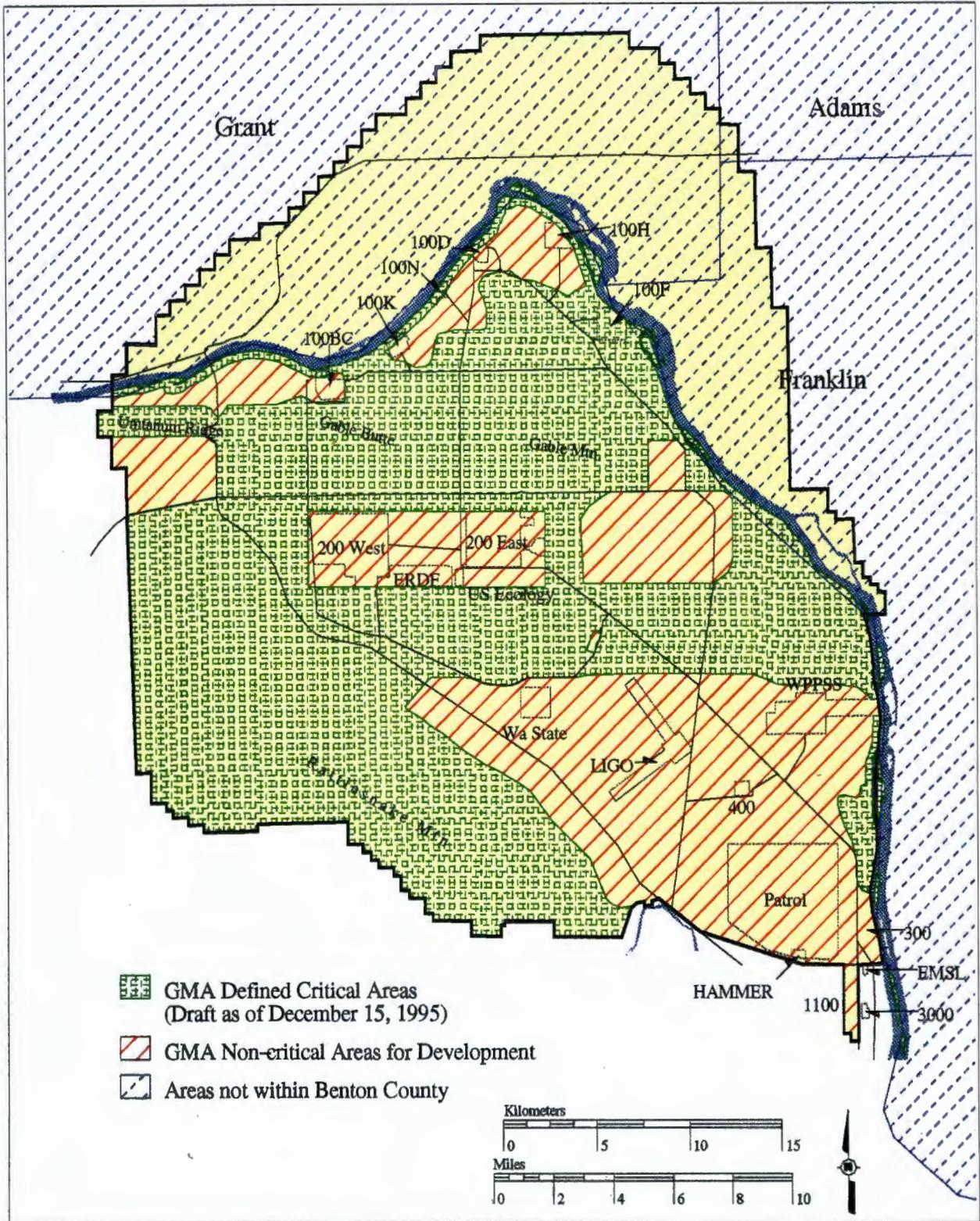
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Figure 6-31. Hanford Site Approved and Proposed Facility and Use.

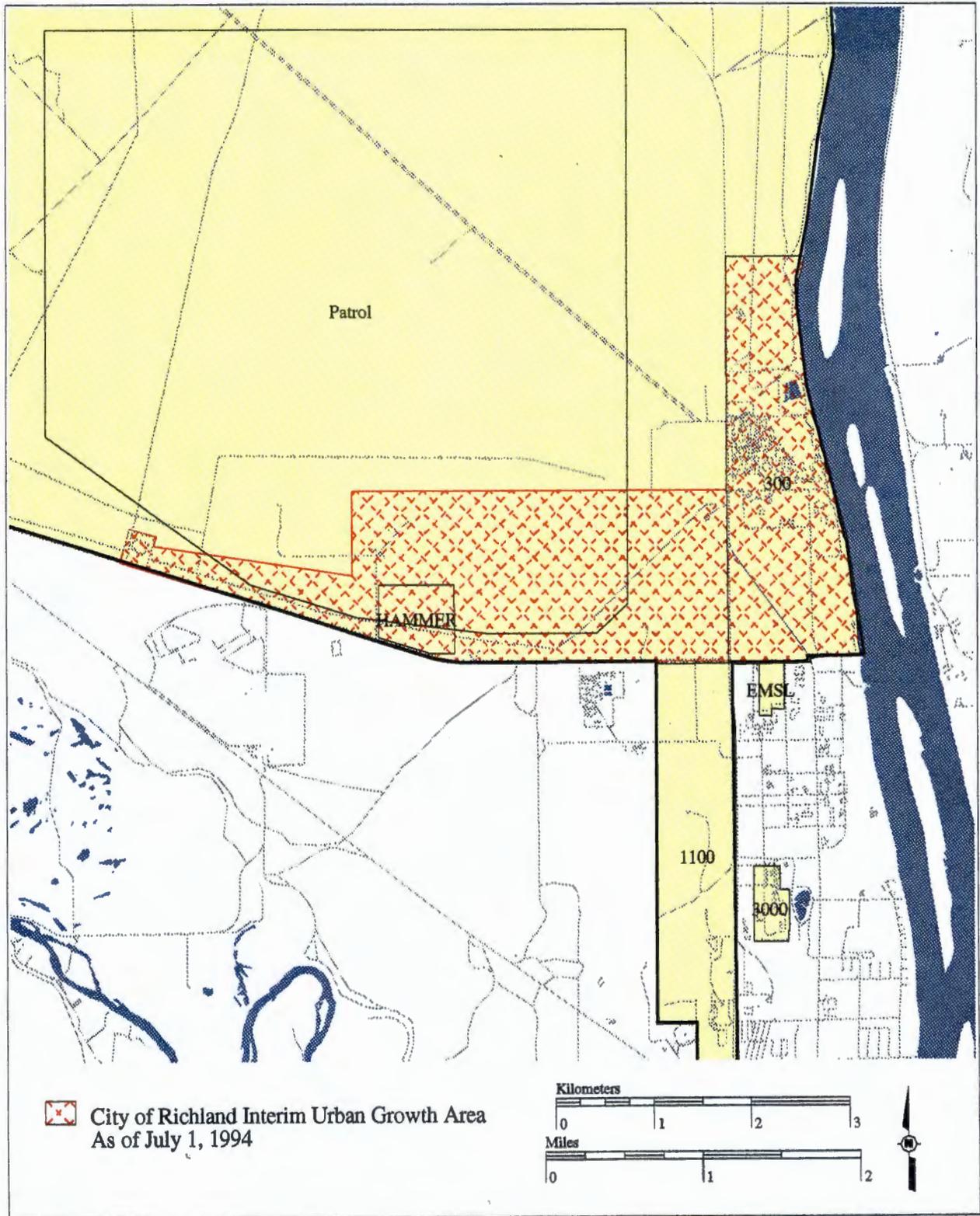


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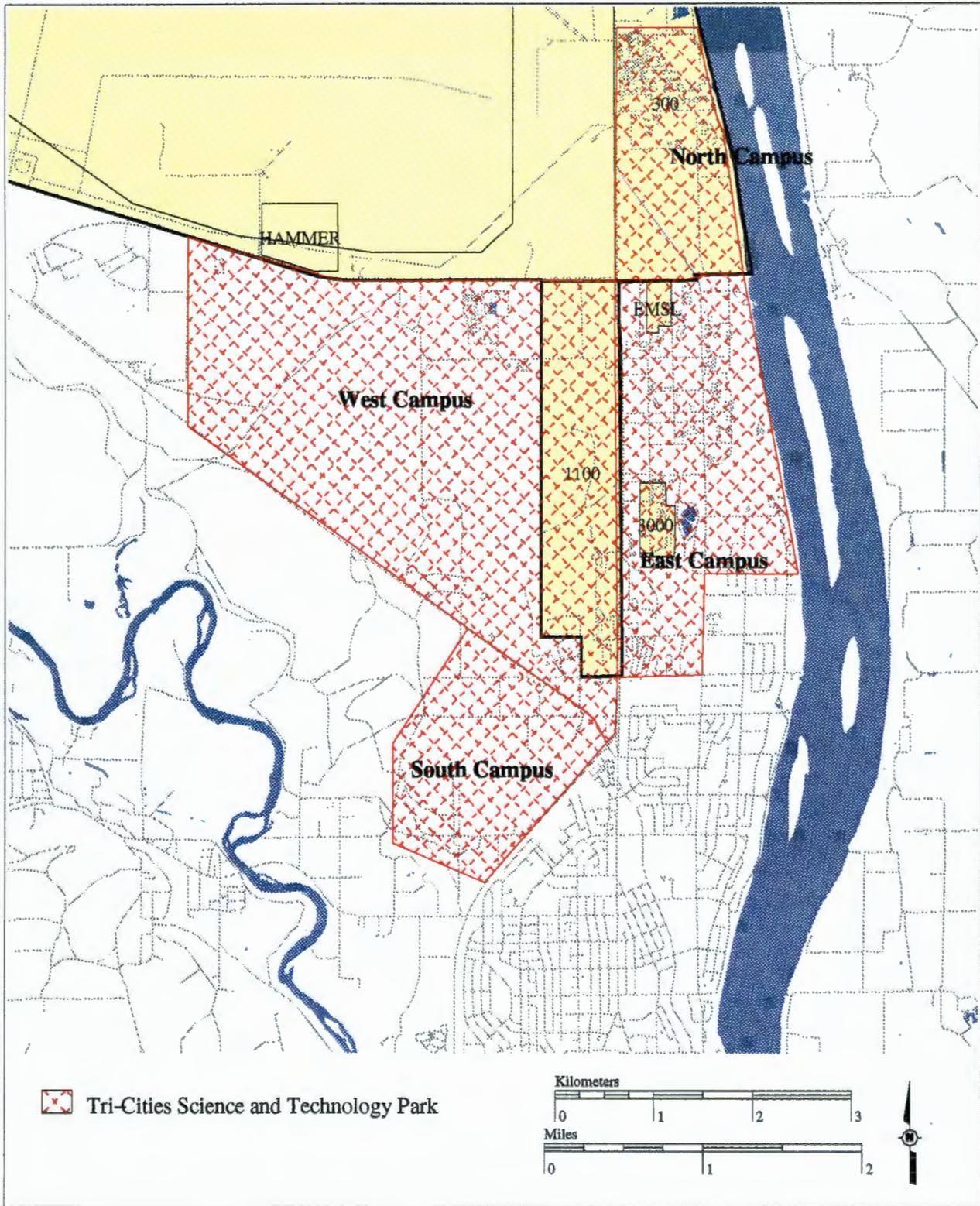
Figure 6-32. Benton County Critical Areas Map.



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Figure 6-33. City of Richland Interim Urban Growth Area Map.



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Figure 6-34. Tri-Cities Science and Technology Park Map.



1 **Figure 6-35. Port of Benton Proposed Economic Development Plan**
2 **Map.**
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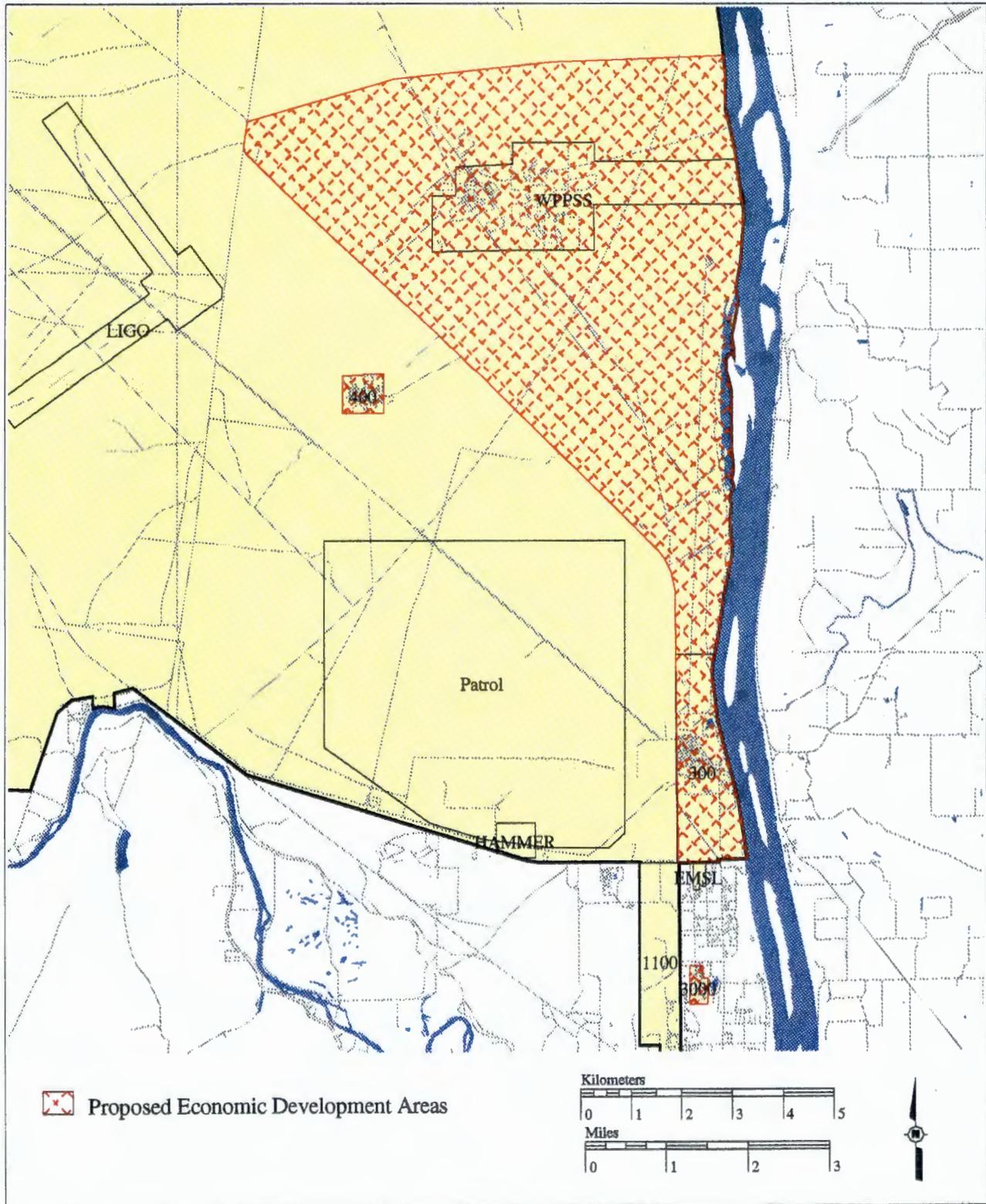
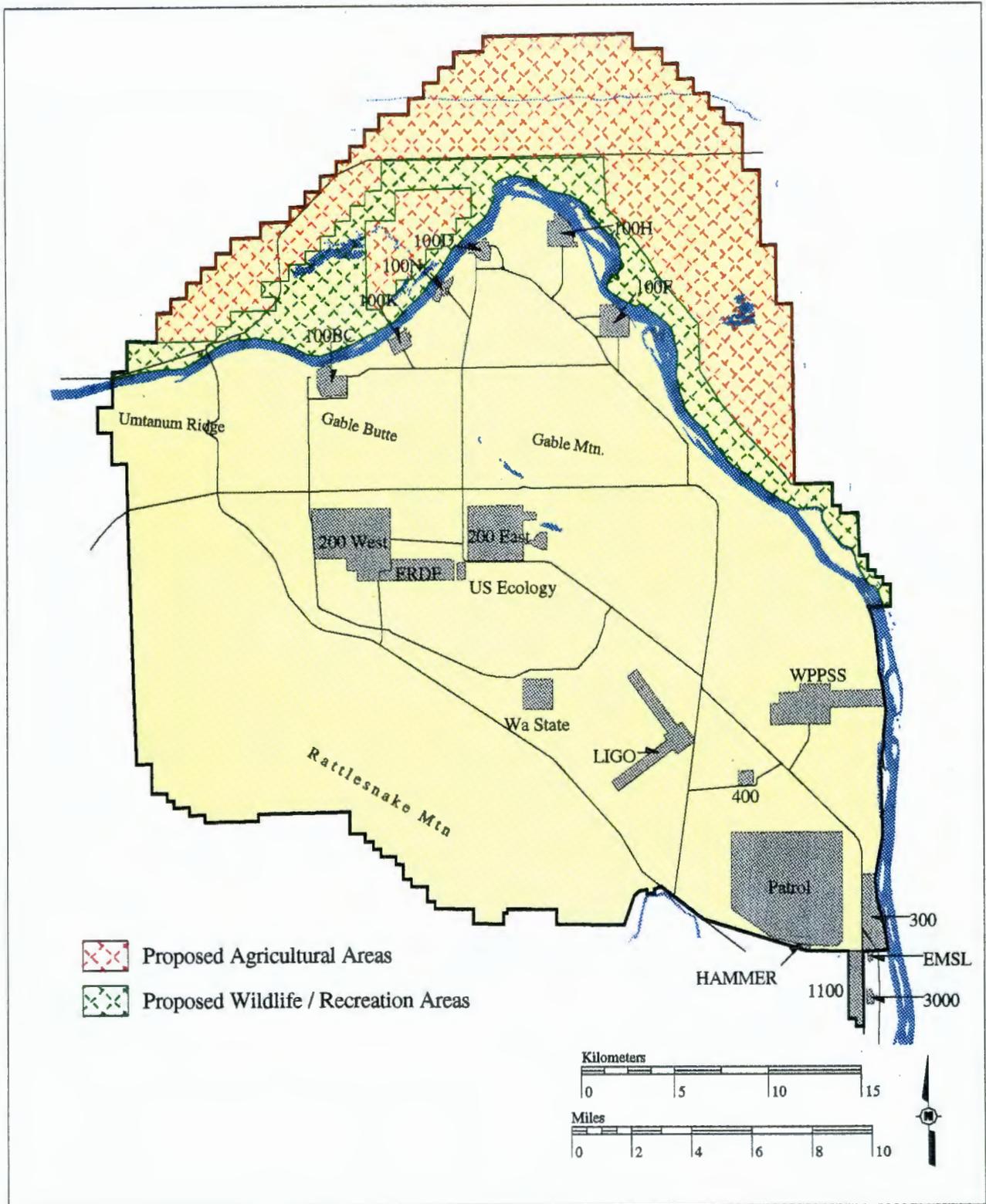


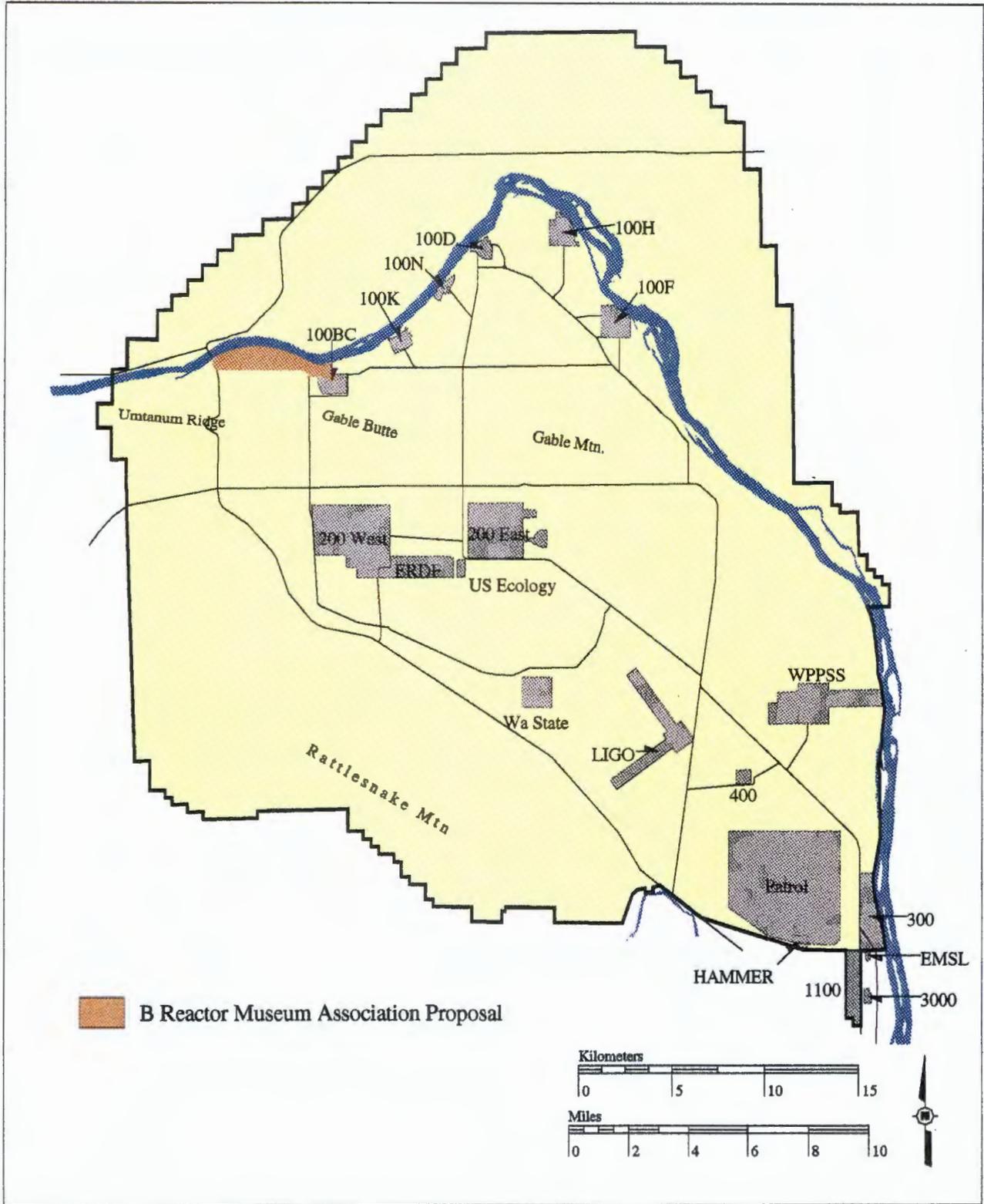
Figure 6-36. Wahluke 2000 Plan Map.

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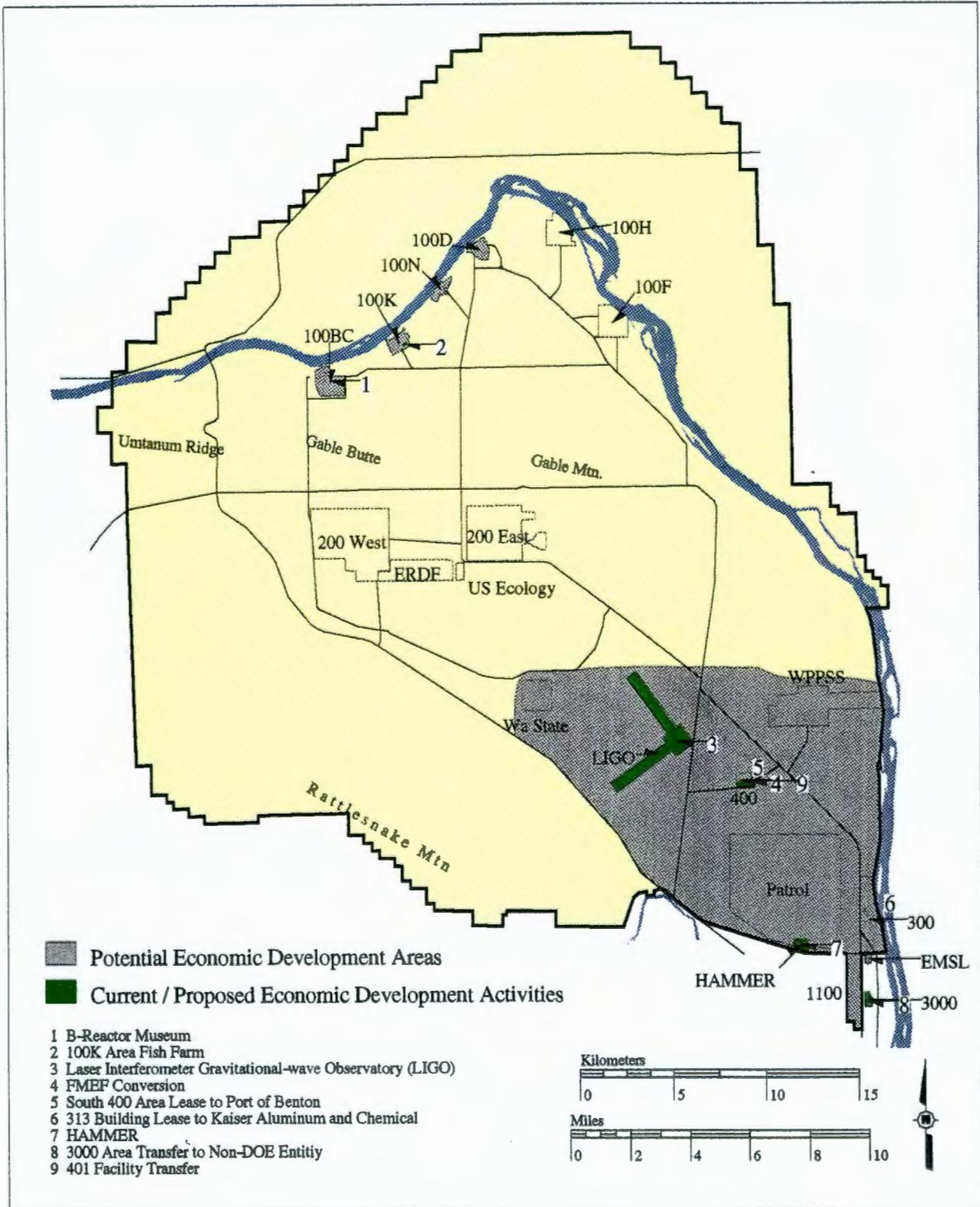
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Figure 6-37. B Reactor Museum Association Proposal.



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Figure 6-38. Potential Economic Development Map.



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Land-Use Suitability Analysis

7.0 *Land-Use Suitability Analysis*

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4 A "constraint" is defined as a feature, attribute, or issue associated with the natural or built
5 environment that must be addressed if a proposed land-use activity is to occur. Conversely, an
6 "opportunity" is defined as a feature, attribute, or issue associated with the natural or built environment
7 that presents some benefit if utilized. Constraint maps are useful for regional planning because they
8 identify the type and relative severity of the problems that need to be addressed if the land-use activity
9 is to be allowed.

10 11 12 *7.1 Analysis of Constraints*

13
14 A series of seven constraint tables and seven GIS maps were prepared over a base GIS map of
15 the Hanford Site; these tables and maps identified current DOE facilities and operating areas. The GIS
16 maps graphically depict the relevant site characteristics that are known to pose issues to land-use
17 activities--the constraints. The constraint tables identify a specific environmental feature or attribute
18 and evaluates the legal drivers (e.g., the statutes, laws, regulations, Executive Orders, treaties, and
19 DOE orders) associated with management of the particular factor at issue. The tables also identify and
20 describe the existing DOE programs, management initiatives, and the institutional capabilities available
21 to deal with and address the identified constraints. Professional judgement was exercised by the DOE's
22 land-use team in deciding the magnitude of the constraint by considering the relationship among the
23 particular constraint issue, its legal drivers, and the capability of the DOE to address or deal with the
24 particular factor or issue.

25 26 27 *7.1.1 Biological*

28
29 Table 7-1 identifies the type and magnitude of biological constraints based on the biological
30 maps presented in Section 6.1. Figure 7-1 is a GIS map that graphically depicts the location and
31 magnitude of biological constraints.

32 33 34 *7.1.2 Surface Water*

35
36 Table 7-2 identifies the type and magnitude of surface water constraints based on the surface
37 water maps presented in Section 6.2. Figure 7-2 is a GIS map that graphically depicts the location and
38 magnitude of surface water constraints.

39 40 41 *7.1.3 Groundwater Contamination*

42
43 Table 7-3 identifies the type and magnitude of groundwater contamination constraints based on
44 the groundwater contamination maps presented in Section 6.3. Figure 7-3 is a GIS map that
45 graphically depicts the location and magnitude of groundwater contamination constraints.

Table 7-1. Biological Minor, Moderate, and Major Constraints.

Attribute Factors	Minor Constraints	Moderate Constraints	Major Constraints	References - Statutes, Laws, and Regulations	Management - DOE Orders and RL Programs
Biological					
Plant, Fish, or Wildlife Usage	Habitats of low value	Habitats of Concern Wetlands and associated deep water habitats 100-year floodplain High Quality Late-successional sagebrush-steppe habitat	Rare habitats (includes wetland and aquatic ecosystem Element Occurrences)	Federal: <i>Wild and Scenic River Act 1968</i> , Pub L. 100-605, 33 U.S.C. § 1251, as amended <i>Clean Water Act of 1970</i> , 33 U.S.C. § 1251 et seq. <i>Migratory Bird Treaty Act</i> , 16 U.S.C. § 703 et seq. <i>Bald and Golden Eagle Protection Act</i> , 16 U.S.C. § 688, et seq. <i>Endangered Species Act</i> , Pub. L. 93-205, 16 U.S.C. § 1536, 7 CFR 136 <i>Fish and Wildlife Coordination Act</i> , 16 U.S.C. § 661 <i>National Environmental Policy Act of 1969 (NEPA)</i> , PL 91-190, 42 U.S.C. § 4321 et seq. <i>Federal Land Policy and Management Act of 1976</i> , 43 to U.S.C. § 1701 1784, 43 CFR Part 1600 10 CFR 1022, "Flood Plain/Wetland Environmental Review Requirements" 10 CFR 1021, " NEPA Implementation Procedures and Guidelines" Executive Order 11988, "Floodplain Management" Executive Order 11990, "Protection of Wetlands" U.S. Fish and Wildlife Service Mitigation Policy (46 Federal Register 7644) DOE/EIS-0212, Volume 1 & 2, <i>Final Environmental Impact Statement, Safe Interim Storage of Hanford Tank Wastes</i> , U.S. Department of Energy, Richland, Washington, October 1995. 60 FR 61687, 1995, "Safe Interim Storage of Hanford Tank Wastes," <i>Federal Register</i> , Vol. 60, p. 61687 (November 22). State: WDFW Priority Habitat and Species Program Natural Heritage Program (RCW 79.70)	The <i>Draft Biological Resource Management Plan (BRMAP)</i> will establish a consistent approach to monitor, assess, and mitigate impacts to biological resources from environmental cleanup and site development activities, as well as to better manage total resources. The <i>Draft Biological Resource Mitigation Strategy</i> will establish concepts and information necessary to effectively implement habitat mitigation on the Hanford Site. The <i>Bald Eagle Site Management Plan (DOE/RL-94-150)</i> provides for the management and protection of Bald Eagle habitat in accordance with federal and state laws. <i>Arid Lands Ecology (ALE) Facility Management Plan (PNL-8506)</i> provides policy and implementation methods for management of ALE for ecological research and education purposes consistent with its designation as a Research Natural Area and as a component of the Hanford Site National Environmental Research Park. Ecological Compliance Review Process through the <i>Ecological Compliance Assessment Management Plan (DOE/RL-95-11, Rev. 1)</i> , which requires an assessment of potential ecological impacts before proceeding with a proposed action. Cultural Resource Review Clearance (36 CFR 800). The DOE requires field surveys to be conducted prior to surface disturbances, as well as Excavation Permits (36 CFR 800)
Plant Community			Terrestrial Element Occurrences		
Administrative Area Designations (not reflected on constraint maps)		Fitzner/Eberhardt Arid Lands Ecology Reserve North Slope (USFWS) North Slope (WDFW) Columbia River corridor Hanford Site designation as a National Environmental Research Park	Established habitat improvement areas for compensatory mitigation • Approximately 530 hectares (1,300 acres) set aside for potential habitat improvements as compensatory mitigation for impacts related to the construction activities associated with the safe interim storage of Hanford tank waste.		
Species		Plant species of concern locations Ferruginous hawk historic nest locations Bald Eagle perch and secondary roost locations	Bald eagle primary night roost and potential nest locations Fall Chinook salmon spawning sites		

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Figure 7-1. Biological Minor, Moderate, and Major Constraints Map.

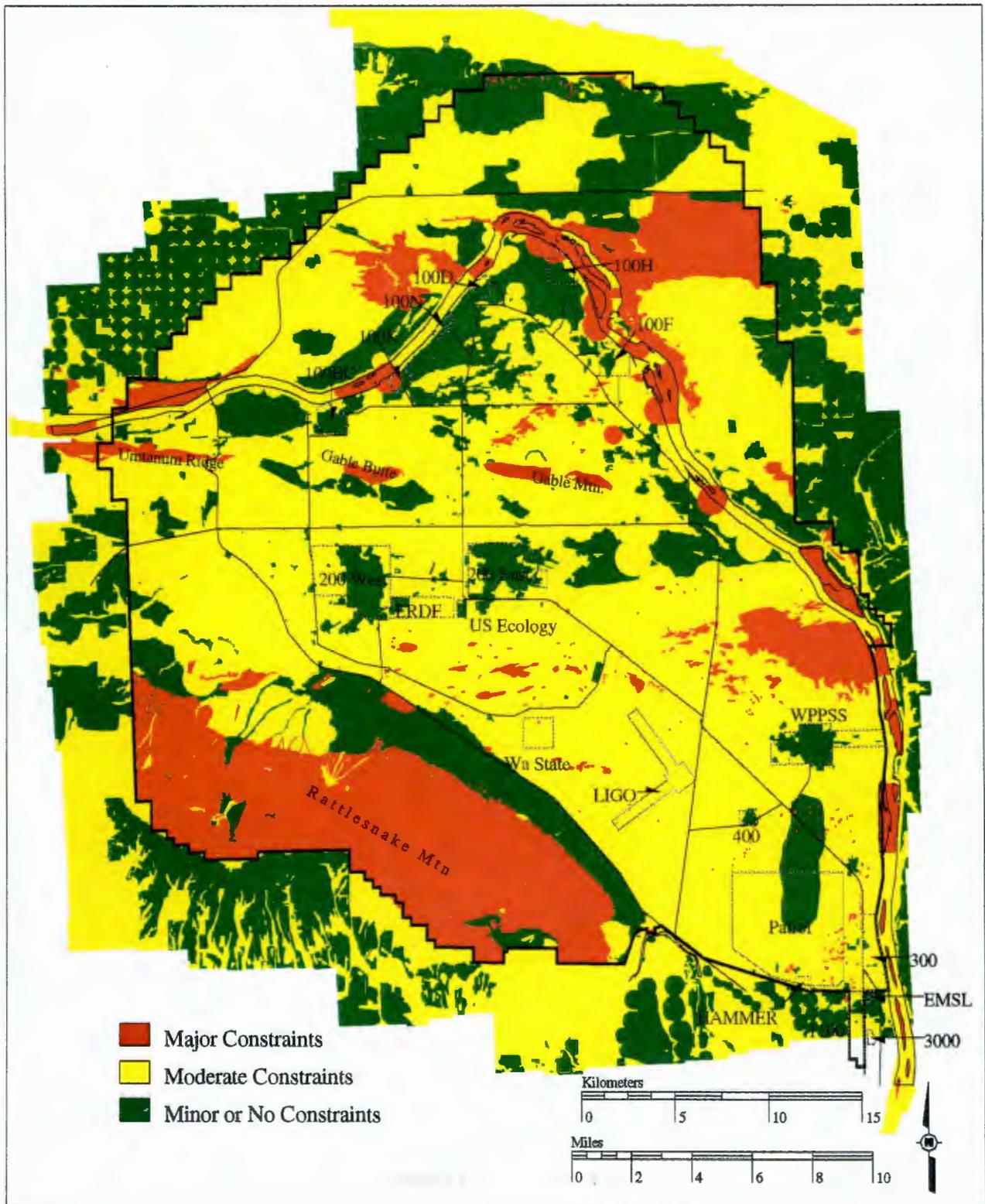


Table 7-2. Surface Water Minor, Moderate, and Major Constraints.

Attribute Factors	Minor Constraints	Moderate Constraints	Major Constraints	References - Statutes, Laws, and Regulations	Management - DOE Orders and RI Programs
Surface Water					
Columbia River	Flood Plains (Transient Water) <ul style="list-style-type: none"> • 50% Breach • 1948 Flood • Probable Maximum Flood 	Flood Plans (Part-time Water) <ul style="list-style-type: none"> • 100-year Flood Plain 	River Corridor (Full Time Water) <ul style="list-style-type: none"> • Columbia River Within High Water Marks 	<p>Surface Water - Columbia River</p> <p>Federal: <i>Federal Emergency Management Act</i> - the statute establishes guidelines for flood hazard areas. <i>Clean Water Act of 1977</i>, 33 U.S.C. § 1251 et. seq. - the statutes establish limits for discharges to surface waters.</p> <p>40 CFR 122 - EPA administered permit program: "The National Pollutant discharge Elimination System"; 40 CFR 129 - "Toxic Pollutant Effluent Standards"</p> <p>Consent Order DE-91NM-177 - the consent order establishes requirements for no new or increased discharges to the soil column.</p>	<p>Permit Programs and Implementation</p> <p>DOE Order 5420.28, <i>Natural Hazards Phenomena Hazards Mitigation</i> - provides facility design guidance for natural phenomenon hazards.</p> <p>Storm Water General Permit - required by the Environmental Protection Agency, this permit is for protecting the Columbia River from Storm water runoff from the construction site.</p> <p>Dredge and Fill Permit - required by the U.S. Army Corps of Engineers (USACE), this permit sets specifications to reduce the impact of construction on the Columbia River.</p> <p>Hydraulic Project Permit - a Hydraulic Permit is required from the Washington Department of Fish and Wildlife for any activity that causes a direct change in the flow of the river. This permit also reduces the impact on the salmon population by limiting construction activity to a specific time frame.</p> <p>Shoreline Development Permit - required by Benton County planning Department, this permit ensures the shoreline will be returned to its natural state after the construction is completed.</p> <p>Endangered Species Act - under the U.S. Fish and Wildlife Service, this act requires DOE-RI to conduct studies to determine whether there are any federally listed endangered species in the construction area and if construction will affect them.</p> <p>Right of Entry Permit - issued by the Department of Natural Resources, any entity or individual wanting to put any structure on the river bed must obtain a lease from the department as the state agency "owning" the land under an public water body. The Right of Entry Permit allows construction before finalization of the lease.</p> <p>Wild and Scenic River Act - Because the stretch of the Columbia River has been nominated for Wild and Scenic River Designation, any DOE-RI project in the river corridor is reviewed by the U.S. Park Service.</p> <p>Water Quality Modification Permit - required by Ecology, this permit allows a temporary modification of the water quality standards during construction.</p> <p>NEPA Implementation - under the DOE, NEPA procedures and guidelines are followed to address and evaluate environmental concerns.</p> <p>Wetland Management and Protection Program</p>
Yakima River		100-year Flood Plain	Yakima River Within High Water Marks	<p>NPDES Permit WA-000374-3 - NPDES permit establishes discharge limits for eight outfall structures to the Columbia River.</p> <p>Storm water Discharge Permits: WAR-00-00F, WAR-10-00F - the site has two Storm water discharge permits, one for the overall site, the other for runoff from construction projects.</p> <p>Other Federal requirements affecting the Columbia River:</p> <p>PL100-605, <i>Hanford Reach Study Act, Comprehensive River Conservation Study</i> - the river is under study for possible designation as wild and scenic river.</p> <p>33 CFR 330, Nationwide Permits - the Nationwide Permit is issued by the ACE for waterway activities not covered under the Wild and Scenic River Study Areas. The U.S. army permit is issued for discharging dredge and fill material into the waters of the United States.</p> <p>10 CFR 1022 - "Wetlands/Floodplain Management Assessment"; 33 CFR 325 - "U.S. Department of the Army Permit"; 33 CFR 322 - Section 10 Permit</p> <p>RLO-76-4, <i>Evaluation of Impact Potential Flooding Criteria on the Hanford Project</i>, U.S. Energy Research and Development Administration, 1976.</p>	
Cold Creek		Probable Maximum Flood		<p>State: The Hanford Reach of the Columbia River has been designated as Class A (Excellent). The designation requires that the water be usable for substantially all needs, including drinking water, recreation, and wildlife.</p> <p>WAC 173-201, 220, and 221; WAC 220-110; and WAC 173-14 through 173-20</p>	
Ephemeral Streams			<p>Springs</p> <ul style="list-style-type: none"> • Rattlesnake Springs • Snively Springs <p>Ephemeral Stream Channels</p> <ul style="list-style-type: none"> • North Slope • ALE 	<p>Drinking Water and Public Water Supplies</p> <p>Federal: <i>Safe Drinking Water Act 1977</i>, Pub L. 93-523</p> <p>40 CFR Parts 141 and 142 - "U.S. EPA, National Primary Drinking Water Regulations/Implementation", 40 CFR 143 - "National Secondary Drinking Water Regulations"</p> <p>42 U.S.C. § 300 - Regulates public water systems, establishes primary and secondary drinking water standards, and maximum contamination limits for radionuclides allowed in public drinking water supplies.</p> <p>State: WAC 246-290 through 246-300</p>	
Wetlands and Riparian Zone			Natural and Artificial Lakes and Ponds	<p>Wetlands Management and Protection</p> <p>Federal: <i>Wild and Scenic Rivers Act of 1968</i>, 16 U.S.C. § 1271-1287c</p> <p><i>Endangered Species Act</i>, Pub L. 93-205, 16 U.S.C. § 1536, 7 CFR 136</p> <p><i>National Environmental Policy Act (NEPA)</i>, Pub. L 91-190, 42 U.S.C. § 4321 et seq.</p> <p>Executive Order 11988, Floodplain Management</p> <p>Executive Order 11990, Protection of Wetlands</p>	

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Figure 7-2. Surface Water Minor, Moderate, and Major Constraints Map.

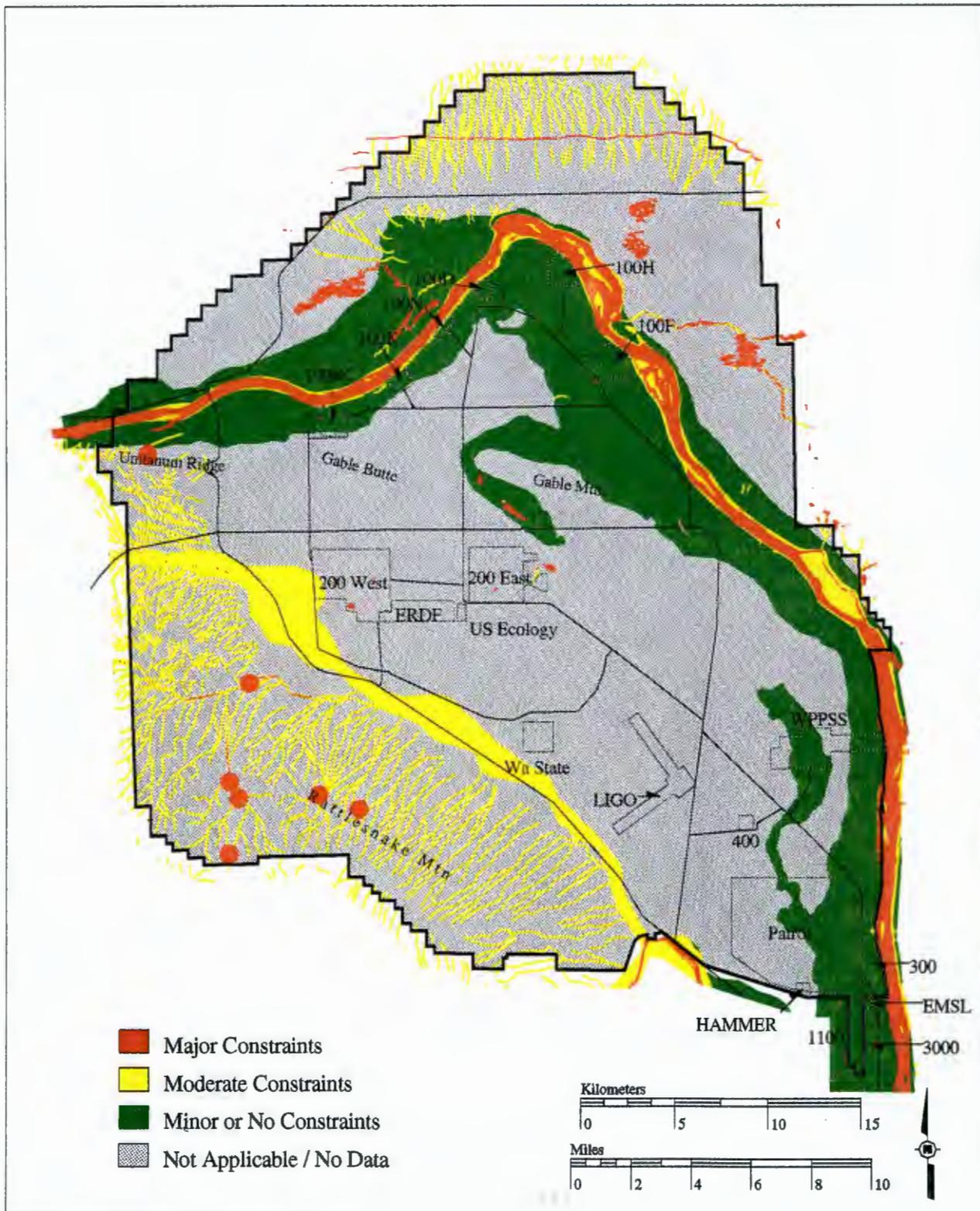


Table 7-3 . Groundwater Contamination Minor, Moderate, and Major Constraints. (2 Sheets)

Attribute Factors	Minor Constraints	Moderate Constraints	Major Constraints	References - Statutes, Laws, and Regulations	Management - DOE Orders and RI Programs
Groundwater Contamination					
<p>Hazardous:</p> <p>Chromium</p> <p>Nitrate</p> <p>Carbon Tetrachloride</p> <p>Trichloroethylene (TCE)</p>		<p>Less than MCLs for all hazardous groundwater contamination.</p>	<p>Greater than MCLs for all hazardous groundwater contamination. Risk of accelerating migration of hazardous contamination</p>	<p>Groundwater Federal:</p> <p><i>Safe Drinking Water Act of 1974</i> - 42 U.S.C. § 300 - Establishes national drinking water standards to protect groundwater against contamination, and restrict underground injections. Establishes underground injection control programs, programs to protect "sole or principal source aquifers," and state programs for well head protection areas.</p> <p>40 CFR Parts 144 and 146 - <i>Underground Injection Control Program: Criteria and Standards</i></p> <p>40 CFR 148 - "Hazardous Waste Injection Restrictions"</p> <p><i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and Superfund Amendments and Reauthorization Act of 1986</i>, 42 U.S.C. § 9601 - Establishes federal program for the cleanup of hazardous contamination from spills or abandoned hazardous waste disposal sites. Requires cleanup in accordance with applicable or relevant and appropriate ground-water standards or to risk-based levels where no existing federal or state standards have been promulgated. (40 CFR 300-399, subpart J)</p> <p><i>Resource Conservation and Recovery Act of 1976</i>, 42 U.S.C. § 6901 - Regulations established to protect human health and the environment, conserve material and energy resources through comprehensive management of solid and hazardous waste. Establishes a "cradle to grave" regulatory structure for the management of solid and hazardous waste. Regulations required impermeable liners and groundwater-monitoring at new replacement, or expanded landfills and surface impoundments. Land treatment facilities must establish an unsaturated zone monitoring program. (40 CFR 240-299, subpart I)</p> <p><i>Clean Water Act</i>, 33 U.S.C. § 1251, as amended - Restores and maintains chemical, physical, and biological integrity of the Nation's waters. Requires consideration of groundwater in individual and regional waste water treatment facility planning, and issuance of federal construction grants for treatment works. Regulates runoff, spills, leaks and drainage "associated with" regulated point sources. (40 CFR 121-136)</p> <p><i>Uranium Mill Tailings Radiation Control Act</i>, 42 U.S.C. § 2022 - Establishes federal standards, regulations, and remedial action program for uranium mill tailings sites. Protection of ground water from radioactive and nonradioactive hazardous substances must be ensured. (40 CFR 192)</p> <p><i>Toxic Substances Control Act</i>, 15 U.S.C. § 2101 - Regulates chemical substances and mixtures that present an unreasonable risk of injury to human health and the environment. Establishes requirements relating to the manufacture, processing, distribution, use, and disposal of certain chemical substances or mixtures. (40 CFR 761-766)</p>	<p>Protection Programs and Implementation</p> <p><i>Hanford Site Groundwater Protection Management Plan</i> - provides management and protection guidelines to protect groundwater from radioactive and nonradioactive hazardous substances.</p> <p><i>DOE Environmental Restoration Program</i> - Natural attenuation and selected treatment of "hot spots," if necessary to restore groundwater for useful purposes. No unpermitted discharges to groundwater.</p> <p>DOE Orders 5400.1, <i>General Environmental Protection Program</i>, and 5400.5 - DOE is obligated to regulate its own activities, so as to provide radiation protection for both workers and the public. "It is the policy of DOE to conduct effluent monitoring and environmental surveillance programs that are adequate to determine whether the public and the environment are in compliance with DOE and other applicable Federal, State, and local radiation standards and requirements. It is also DOE policy that Departmental monitoring and surveillance programs be capable of detecting and quantifying unplanned releases and meet high standards of quality and credibility. It is DOE's objective that all DOE operations properly and accurately measure radionuclides in their effluent and in ambient environmental media."</p> <p>DOE Order 5820.2A, - To establish policies, guidelines, and minimum requirements by which the DOE manages its radioactive and mixed waste and contaminated facilities. The DOE Order states that radioactive and mixed wastes shall be managed in a manner that assures protection of the health and safety of the public, and the environment. It establishes requirements for groundwater or vadose monitoring wells and steps to be taken to prevent further migration of a release to soil or surface water. Waste operations shall be managed to protect groundwater resources, consistent with Federal, State and local requirements. It includes design of an environmental monitoring program to measure: operational effluent releases; migration of radionuclides; disposal unit subsidence; and change in disposal facility and disposal site parameters which may affect long-term site performance.</p>
<p>Radionuclides:</p> <p>Tritium</p> <p>Strontium-90</p> <p>Uranium</p> <p>Technetium-99</p> <p>Iodine-129</p>		<p>Less than MCLs for all radionuclide groundwater contamination.</p>	<p>Greater than MCLs for all radionuclide groundwater contamination. Risk of accelerating migration of radionuclide contamination</p>	<p><i>Clean Water Act</i>, 33 U.S.C. § 1251, as amended - Restores and maintains chemical, physical, and biological integrity of the Nation's waters. Requires consideration of groundwater in individual and regional waste water treatment facility planning, and issuance of federal construction grants for treatment works. Regulates runoff, spills, leaks and drainage "associated with" regulated point sources. (40 CFR 121-136)</p> <p><i>Uranium Mill Tailings Radiation Control Act</i>, 42 U.S.C. § 2022 - Establishes federal standards, regulations, and remedial action program for uranium mill tailings sites. Protection of ground water from radioactive and nonradioactive hazardous substances must be ensured. (40 CFR 192)</p> <p><i>Toxic Substances Control Act</i>, 15 U.S.C. § 2101 - Regulates chemical substances and mixtures that present an unreasonable risk of injury to human health and the environment. Establishes requirements relating to the manufacture, processing, distribution, use, and disposal of certain chemical substances or mixtures. (40 CFR 761-766)</p>	<p>DOE Order 5820.2A, - To establish policies, guidelines, and minimum requirements by which the DOE manages its radioactive and mixed waste and contaminated facilities. The DOE Order states that radioactive and mixed wastes shall be managed in a manner that assures protection of the health and safety of the public, and the environment. It establishes requirements for groundwater or vadose monitoring wells and steps to be taken to prevent further migration of a release to soil or surface water. Waste operations shall be managed to protect groundwater resources, consistent with Federal, State and local requirements. It includes design of an environmental monitoring program to measure: operational effluent releases; migration of radionuclides; disposal unit subsidence; and change in disposal facility and disposal site parameters which may affect long-term site performance.</p>

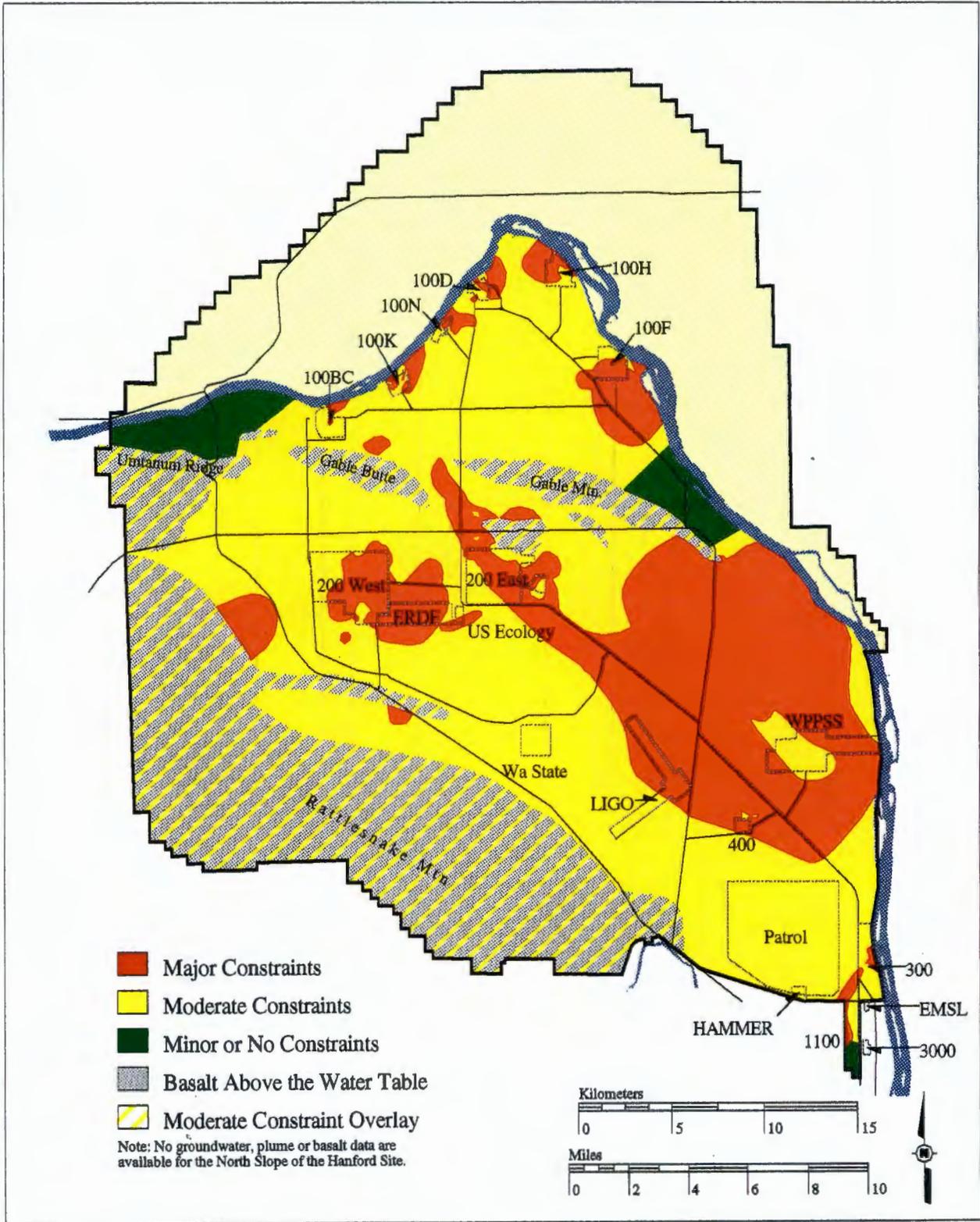
Table 7-3. Groundwater Contamination Minor, Moderate, and Major Constraints. (2 Sheets)

Attribute Factors	Minor Constraints	Moderate Constraints	Major Constraints	References - Statutes, Laws, and Regulations	Management - DOE Orders and RL Programs
Groundwater Contamination					
Water-Table Elevations	No impact on migration of groundwater contamination; location is outside of predicted pathway of contamination plumes.	Risk of accelerating migration of groundwater contamination; location up gradient or within predicted pathway of contamination plumes.	Risk of accelerating migration of groundwater contamination, location inside contamination plumes.	<p>Groundwater Federal:</p> <p><i>Atomic Energy Act of 1954</i>, 42 U.S.C. § 2011, as amended - Establishes radiation protection standards for management and disposal of spent nuclear fuel, and high-level and transuranic radioactive waste. Requires the EPA to issue generally applicable environmental protection standards (as authorized by the Atomic Energy Act) for releases of radioactive material to the environment.</p> <p><i>Low-Level Radioactive Waste Policy Act of 1980 and Amendments of 1985</i> - Outlines procedures for establishment and operation of regional low-level radioactive waste disposal facilities. Licensing requirements include sections that ensure disposal facilities are designed to limit radioactive releases below designated levels and for specific periods of time (10 CFR 61)</p> <p><i>Nuclear Waste Policy Act of 1982</i> - To receive and poses source, special nuclear, and byproduct material at geologic repository operations area. Licensing requirements include performance criteria which specify and engineered barrier and any release from the system shall be gradual process which results in releases to the geologic setting over long times. (10 CFR 60)</p>	<p>Existing and Future Decision Basis</p> <p>DOE Orders 5400.5 and elements of 5400.1 are expected to be codified soon in 10 CFR 834.</p> <p>In 1987 Congress directed DOE to prepare a "Plan and Schedule to Discontinue Disposal of Liquids Into the Soil Column at the Hanford Site." That document presents an implementation plan for providing alternative treatment and disposal on contaminated effluent discharged to the soil.</p> <p>TPA Milestone-24 requires RCRA-compliant groundwater monitoring.</p> <p>State of Washington drinking water standards provide a decision basis for use of groundwater within the 100 Areas. The presence of the contaminants makes groundwater in certain 100 Area locations unsuitable for drinking. The use of groundwater in the 100 Areas is thus restricted by State regulations.</p>
Estimated Recharge of Groundwater	No impact.	No impact.	No impact.	<p><i>National Environmental Policy Act of 1969 (NEPA)</i>, PL 91-190, 42 U.S.C. § 470 et seq. - To ensure that potential impact of federal actions, including cleanup activities, are evaluated. NEPA requires either an Environmental Assessment or Environmental Impact Statement for federal projects, unless they have been categorically excluded. Requires that Federal agencies assess the environmental impact of implementing their major programs and actions early in the planning process. For those projects or actions which are either expected to have a significant effect on the quality of the human environment or are expected to be controversial on environmental grounds, the agency is required to file a formal Environmental Impact Statement. (40 CFR, and 42 U.S.C. § 4321)</p> <p>State:</p> <p>WAC 173-100, 150, 154, 160, 200, 201a, 216, 218, 240, 303, 304, 340, 360, WAC 246-272, 290, WAC 365-190</p>	<p>The CERCLA Action Memorandum for groundwater contamination in 100-N Area directs a combination of a barrier wall and a pump-and-treat system to reduce the flux of strontium to the Columbia River.</p> <p>The Hanford Remedial Action EIS ROD will establish future site uses that will guide selection of cleanup levels within individual CERCLA and RCRA past-practices activities.</p> <p>CERCLA RODs and RCRA permit modifications will provide decisions to address contaminated groundwater.</p> <p>Consolidation of groundwater monitoring programs.</p>

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Figure 7-3. Groundwater Contamination Minor, Moderate, and Major Constraints Map.



1 **7.1.4 Waste Sites**

2
3 Table 7-4 identifies the type and magnitude of waste site constraints based on the biological
4 maps presented in Section 6.4. Figure 7-4 is a GIS map that graphically depicts the location and
5 magnitude of biological constraints.
6

7
8 **7.1.5 Protective Safety Buffer Zones**

9
10 Table 7-5 identifies the type and magnitude of protective safety buffer zones constraints based
11 on the protective safety buffer zones map presented in Section 6.5. Figure 7-5 is a GIS map that
12 graphically depicts the location and magnitude of protective safety buffer zone constraints.
13

14
15 **7.1.6 Geological**

16
17 Table 7-6 identifies the type and magnitude of geological constraints based on the geological
18 maps presented in Section 6.6. Figure 7-6 is a GIS map that graphically depicts the location and
19 magnitude of geological constraints.
20

21
22 **7.1.7 Cultural**

23
24 Table 7-7 identifies the type and magnitude of cultural constraints based on the cultural maps
25 presented in Section 6.7. Figure 7-7 is a GIS map that graphically depicts the location and magnitude
26 of cultural constraints.

Table 7-4. Waste Sites Minor, Moderate, and Major Constraints.

Attribute Factors	Minor Constraints	Moderate Constraints	Major Constraints	References - Statutes, Laws, and Regulations	Management - DOE Orders and RI Programs
Waste Sites					
<p>Waste Sites</p>	<p>The lack of hazardous, chemical radioactive, mixed, or solid waste sites</p> <p>Outside of known and suspected waste sites and having potential for unknown waste sites.</p>	<p>The lack of hazardous chemical, radioactive, mixed, or solid waste sites</p> <p>Suspected waste sites</p> <ul style="list-style-type: none"> • 100 Area • 200 Area • 300 Area • 400 Area <p>Potential or actual vadose zone contamination outside of known and suspected waste sites.</p>	<p>The presence and type of hazardous chemical radioactive, mixed or solid waste sites.</p> <p>Known waste sites in:</p> <ul style="list-style-type: none"> • 100 Area • 200 Area • 300 Area • 400 Area • 600 Area 	<p>Waste Management</p> <p>Federal:</p> <p><i>Atomic Energy Act</i>, 42 U.S.C. § 2011 et seq.</p> <p><i>Nuclear Waste Policy Act of 1982</i>, 42 U.S.C. § 10101 et seq.</p> <p><i>Low-Level Waste Policy Act</i>, 42 U.S.C. § 2021b et seq.</p> <p><i>Resource Conservation and Recovery Act (RCRA)</i>, 42 U.S.C. § 6901 et seq.</p> <p><i>Comprehensive Environmental Response Compensation and Liability Act (CERCLA)</i>, 42 U.S.C. § 9601 et seq.</p> <p>10 CFR 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material," 10 CFR 40, "Domestic Licensing of Source Material," 10 CFR 50, "Domestic Licensing of Production and Utilization Facilities," 10 CFR 57, " " "</p> <p>10 CFR 61, "Licensing Requirements for Land Disposal of Radioactive Waste," 10 CFR 70, "Domestic Licensing of Special Nuclear Material," 10 CFR 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste," 10 CFR 835, "Occupational Radiation Protection," 40 CFR 61, "National Emission Standards for Hazardous Air Pollutants," 40 CFR 141, "National Primary Drinking Water Regulations," 40 CFR 190, "Environmental Radiation Protection Standards for Nuclear Power Operations,"</p> <p>40 CFR 192, "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings," and 49 CFR 173, "Shippers--General Requirements for Shipments and Packagings"</p> <p>General requirements for waste management units under RCRA and CERCLA. 40 CFR 262, "Standards Applicable to Generators of Hazardous Waste," 40 CFR 268, "Land Disposal Restrictions," 40 CFR 279, "Standards for the Management of Used Oil," 40 CFR 761, "PCBs Manufacturing, Processing, Distribution in Commerce, and Use Prohibition"</p> <p>State: dangerous waste regulations. WAC 173-303, and 340 WAC 296-62, and 67</p> <p>Remediation</p> <p>Federal:</p> <p>RCRA and CERCLA remediation authorities, EPA's guidance for radiation site cleanup and radiation protection for exposure to the public. 40 CFR 263, "Standards Applicable to Transporters of Hazardous Waste," 40 CFR Parts 264-265, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," and 40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan"</p> <p>State: The Dangerous Waste Regulations cite the Model Toxics Control Act for remediation standards. Remediation standards under MTCA are based on maximum exposures expected under current and future land use. WAC 173-303, and 340</p> <p>Underground Storage Tanks</p> <p>Federal:</p> <p>Regulations and standards governing only underground storage tanks. The regulations established standards for designing, construction, installation, release detection, general operations requirements, and notification. 40 CFR 112, "Oil Pollution Prevention, and " 40 CFR 280, "Technical Standards and Corrective Action Requirements for Owners and Operators of USTs"</p> <p>State: WAC 173-360</p>	<p>Potential Future Use of Waste Sites</p> <p>The HRA-EIS ROD will establish future site uses that will guide selection of remediation levels within individual CERCLA RCRA pact-practices activities.</p> <p>CERCLA RODs and RCRA permit modifications will provide remediation decisions for contaminated soil.</p> <p>Hazardous/Dangerous Waste Facilities</p> <p>Tri-Party Agreement and Amendments</p> <p>Hanford Dangerous Waste Facility Permit Program</p> <p>Radioactive Waste Management - DOE Orders</p> <p>Project Management, DOE Orders 4701.B</p> <p>(See DOE Orders under Table 7-3)</p>

1 **Figure 7-4. Waste Site Minor, Moderate, and Major Constraints**
2 **Map.**
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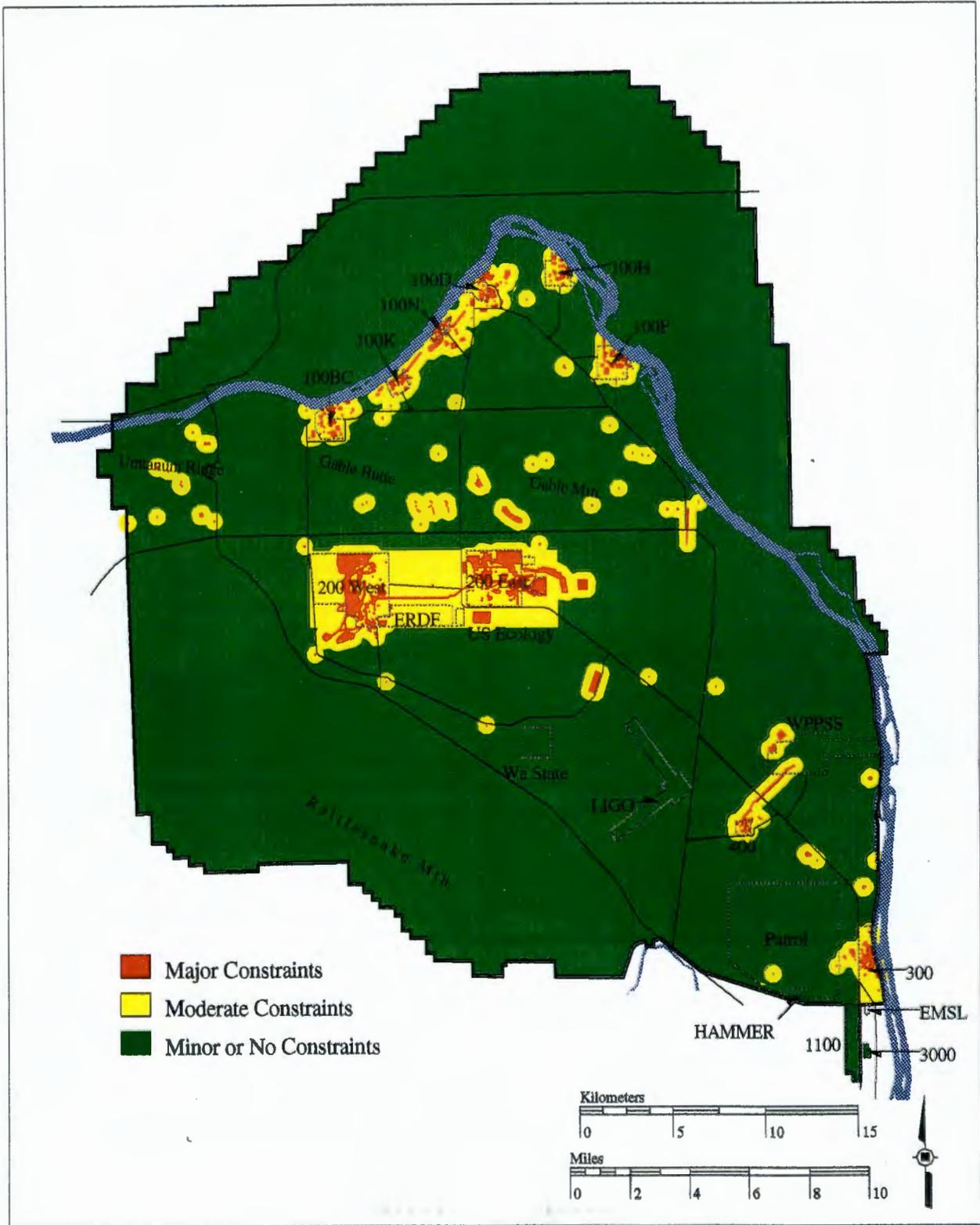


Table 7-5. Protective Safety Buffer Zone Minor, Moderate, and Major Constraints.

Attribute Factors	Minor Constraints	Moderate Constraints	Major Constraints	References - Statutes, Laws, and Regulations	Management - DOE Orders and RL Programs
Safety Buffer Zone					
<p>DOE Facilities*</p> <ul style="list-style-type: none"> • 105-D • 105-N • 100-KE & KW Basins • 315 • 324 • PUREX • B-Plant/ WESF • 200-E & W HLW Tanks • PFP • FFTF • Proposed Tank Waste Vitrification Plant 		<p>Emergency Planning Zone</p> <p>Emergency Planning, and preparedness is required within this area to include warning, notification and the ability to implement appropriate protective actions commensurate with the hazards.</p>	<p>Exclusive Use Zone</p> <p>Exclusive Use Zone is required within this area to restrict public access. Nuclear facility training, and controlled access is required.</p>	<p>Public Radiological Dose Federal: Federal radiation protection guidance for exposure to the public. Limits dose from all routine activities to 100 mrem/yr. Limits dose from airborne emissions to 10 mrem/yr to the maximum exposed individual.</p> <p>10 CFR 835 - "Occupational Radiation Protection"</p> <p>40 CFR 61, "National Emission Standards for Hazardous Air Pollutants"</p> <p>State: Limits emissions of radionuclides in air to a level that does not cause an accumulated dose of more than 25 mrem/yr to the whole body, or 75 mrem/yr to a critical organ of any member of the public. WAC 246-247, WAC 173-480</p> <p>Public Risk Federal: Applies to employees with 10 or more workers. Safety and health standards for workers, hazard communication, record keeping, and reporting.</p> <p>10 CFR 20 - "Standards for Protection Against Radiation"</p> <p>10 CFR 830 - "Nuclear Safety Management"</p> <p>29 CFR Parts 1910, 1926 - "Occupational Safety and Health Standards, Safety and Health Regulations for Construction and Identification, Classification, and Regulation of Potential Occupational Carcinogens"</p>	<p>SEN 35-10, <i>DOE Nuclear Safety Policy</i> - restricts prompt fatality risk to 0.1% of prompt fatalities from all other accidents--distance assumed to be 1 mile, and restricts cancer fatality risk to 0.1% of sum of all cancer fatality risks--distance assumed to be 10 miles.</p> <p>DOE Emergency Management Program - establishes policy and assigns and scribes roles and responsibility for DOE-RL emergency system to include planning, preparedness, response, and recovery actions.</p> <p>DOE/RL-94-02, <i>Hanford Emergency Response Plan</i> - implements DOE Orders for emergency management. Includes state and local emergency management agreements.</p> <p>DOE Order 151.1, <i>Comprehensive Emergency Management System</i></p> <p>DOE Order 231.1, <i>Environment, Safety, and Health Reporting</i></p> <p>DOE Order 5400.1, <i>General Environmental Protection Program</i></p>
<p>Non-DOE Facilities</p> <ul style="list-style-type: none"> • Chlorinating facilities within the City of Richland • Siemens • WPPSS 		<p>Protective Action Zone</p> <p>Protective action area in which people are at risk of harmful exposure of hazardous substances.</p>	<p>Initial Isolation Zones</p> <p>Immediate response area to protect public health, safety and welfare.</p>	<p>29 CFR 1990 - "Identification, Classification, and Regulations of Potential Occupational Carcinogens"</p> <p>State: WAC 246-220, 221, 222 and WAC 173-303</p> <p>Air Federal: Clean Air Act, 33 U.S.C. § 7401 et seq.</p> <p>NESHAP control technology standard, ozone-depleting substances control, PSD, National Ambient Air Quality Standards, VOCs from TSD facilities, Compliance Agreement.</p> <p>40 CFR Parts 50-82 - "Air Programs"</p> <p>40 CFR Parts 264-265 - "Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities"</p> <p>FRCA for radionuclides NESHAP (2/7/94)</p> <p>State: DOH authority to regulate radionuclides from DOE facilities, Ecology's general regulations for air pollution sources, operating permits program, controls for new sources of toxic air pollutants, requirements for notices of construction permits and radioactive air emissions license, VOCs and gasoline distribution. RCW 70.94 and 70.98 ; WAC 173-400, 401, 425, 460, 480, and 491; and WAC 246-247</p> <p>Local: Benton County's control of airborne emissions of asbestos and open burning. General Regulation 1 (Benton County Clean Air Authority)</p>	<p>DOE Order 5400.5, <i>Radiation Protection of the Public and the Environment</i></p> <p>DOE Order 5480.4, <i>Environmental Protection, Safety, and Health Protection Standards.</i></p> <p>DOE Order 5480.23, <i>Nuclear Safety Analysis Reports</i></p> <p>DOE Order 5481.1B, <i>Safety Analysis and Review System (SARS)</i></p> <p>DOE Order 5481.2B, <i>Emergency Categories, Classes and Notifications and Reporting Requirements</i></p> <p>DOE Order 5500.1B, <i>Emergency Management System</i></p> <p>DOE Order 5500.3A, <i>Planning and Preparedness for Operational Emergencies</i></p>

*These facilities listed represent the worse case facilities that form the basis for defining the largest Safety Buffer zones for their particular geographical area. Other DOE facilities within the same geographical area present radiological and/or nonradiological hazards that contribute to the definition of these zones. Those facilities not listed could remain after the 50-year time frame and would continue to require the definition of a Buffer Safety Zone.

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Figure 7-5. Protective Safety Buffer Zone Minor, Moderate, and Major Constraints Map.

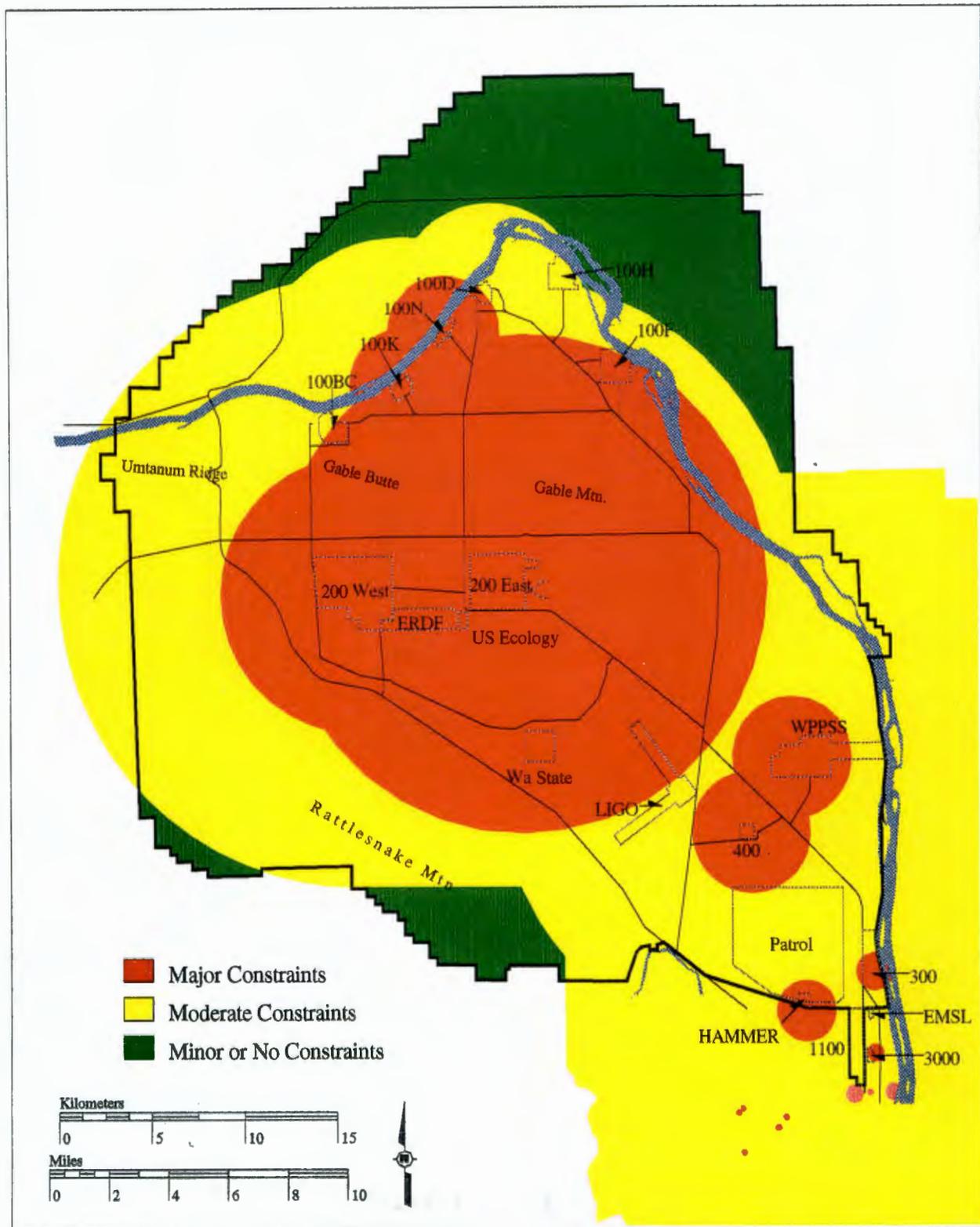


Table 7-6. Geological Minor, Moderate, and Major Constraints.

Attribute Factors	Minor Constraints	Moderate Constraints	Major Constraints	References - Statues, Laws, and Regulations	Management - DOE Policy and RL Programs
Geology					
Red Zone			Slope Instability and Mass Movement in the White Bluffs Vicinity	Federal: <i>Earthquake Hazards Reduction Act of 1977</i> , Pub. L. 95-124, 43 USC 7701 et seq.	DOE Order 5480.28, <i>Natural Hazards Phenomena Hazards Mitigation</i> and associated standards (codification pending) - provides facility design guidance for natural phenomenon hazards.
Geologic Faults		Medium Earthquake Hazards	High Earthquake Hazards	Executive Order 12699, "Seismic Safety of Federal and Federal Assisted or Regulated New Building Construction"	DOE Order 6430.1, <i>General Design Criteria</i>
Basalt Outcrops			Facility Siting - Practical Engineering Design, Siting and Construction Factors Limited To: <ul style="list-style-type: none"> • Slope Steepness • Stony/rock Soils • Generally Unsuitable for Facility and Building Sites 	Hanford Reach EIS - U.S. Bureau of Reclamation "Red Zone," (p.70 map 10)	U.S. Bureau of Reclamation Management Policy - Restrictions on incompatible uses such as irrigation, water application and infiltration to control risk of erosion.
Quaternary Land Slides			Slope Instability and Mass Movement	DOE Order 5480.28, <i>Natural Hazards Phenomena Hazards Mitigation</i>	DOE facility siting and permit review and approval (Site Selection Process)
Active Sand Dunes			Instability and Sensitive Erodible Soils: <ul style="list-style-type: none"> • Unsuitable for Building Sites 	State: <i>Washington State Growth Management Act</i> , RCW 36.70A	DOE Performance Standards, requirements, and integrated resource management techniques.
Sand Dunes Stabilized			Unstable and Sensitive Erodible Soils. <ul style="list-style-type: none"> • Generally Unsuitable for Building Sites • Surface Disturbance Activities Could Cause Sand Dunes to Become Active 	WAC 173-303, "Dangerous Waste Regulations"	
Slopes	Slopes less than or Equal to 6%	Slopes less than 15% and Greater than 6%	Slopes Equal to or Greater than 15% <ul style="list-style-type: none"> • Higher Probability of Instability • Unsuitable for Building Sites 	Local: Benton County's and City of Richland's Critical Sensitive Area Ordinance	
Alluvial Fans			Geologic Hazard Area <ul style="list-style-type: none"> • Potentially Subject to Flash Flooding, Land Sliding, and High Groundwater. 	<i>Uniform Building Code</i> , Washington Associated of Building Officials, as amended	
Wind Erodible Soils			Generally Include: <ul style="list-style-type: none"> • Air Pollution Particulates • Unstable Surface • Geologic Sensitive Areas 	<i>Soil Survey, Benton County Area, Washington</i> , U.S. Department of Agriculture, Soil Conservation Service, July 1971	
Other Soils	Little or No Limitations				

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Figure 7-6. Geological Minor, Moderate, and Major Constraints Map.

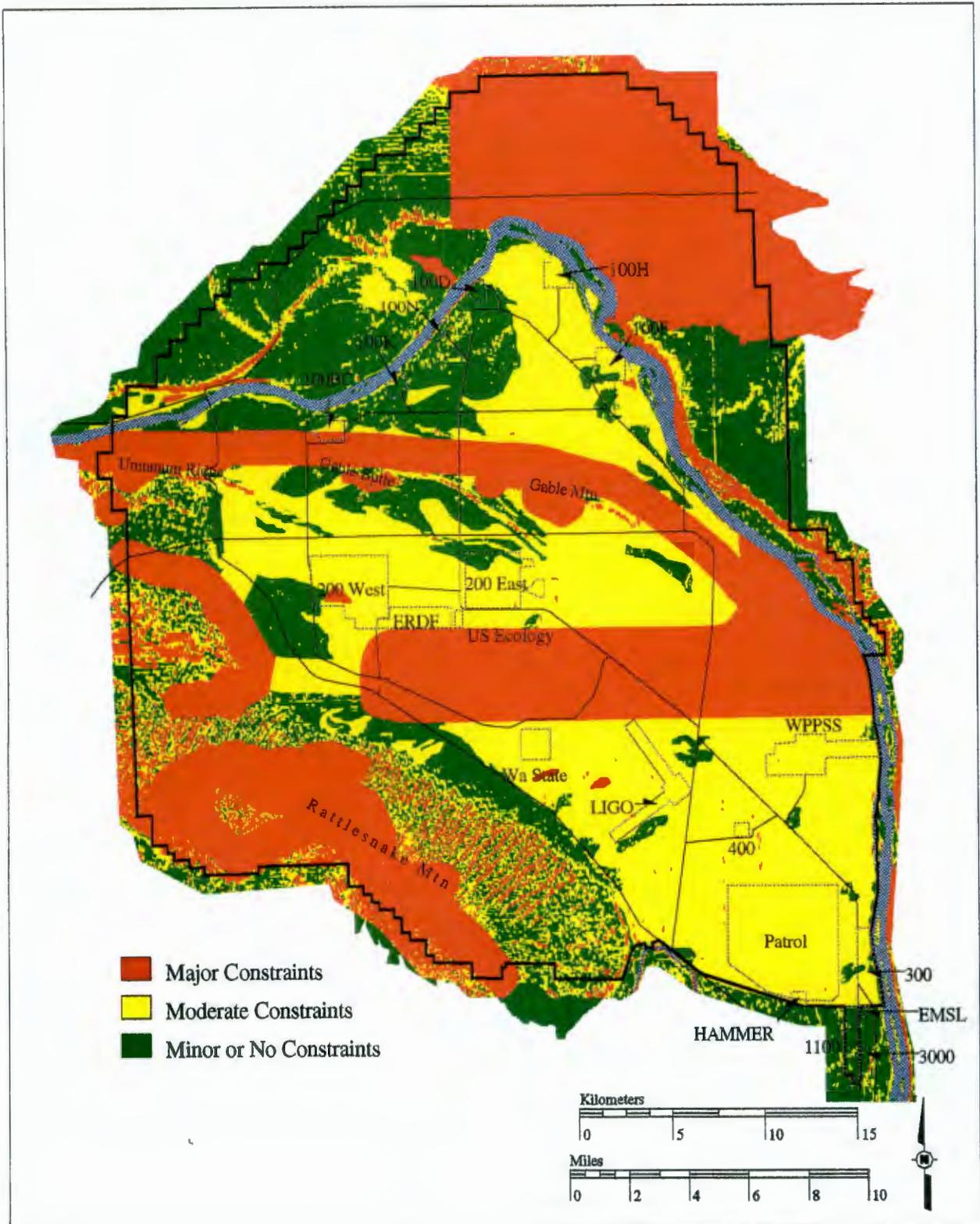
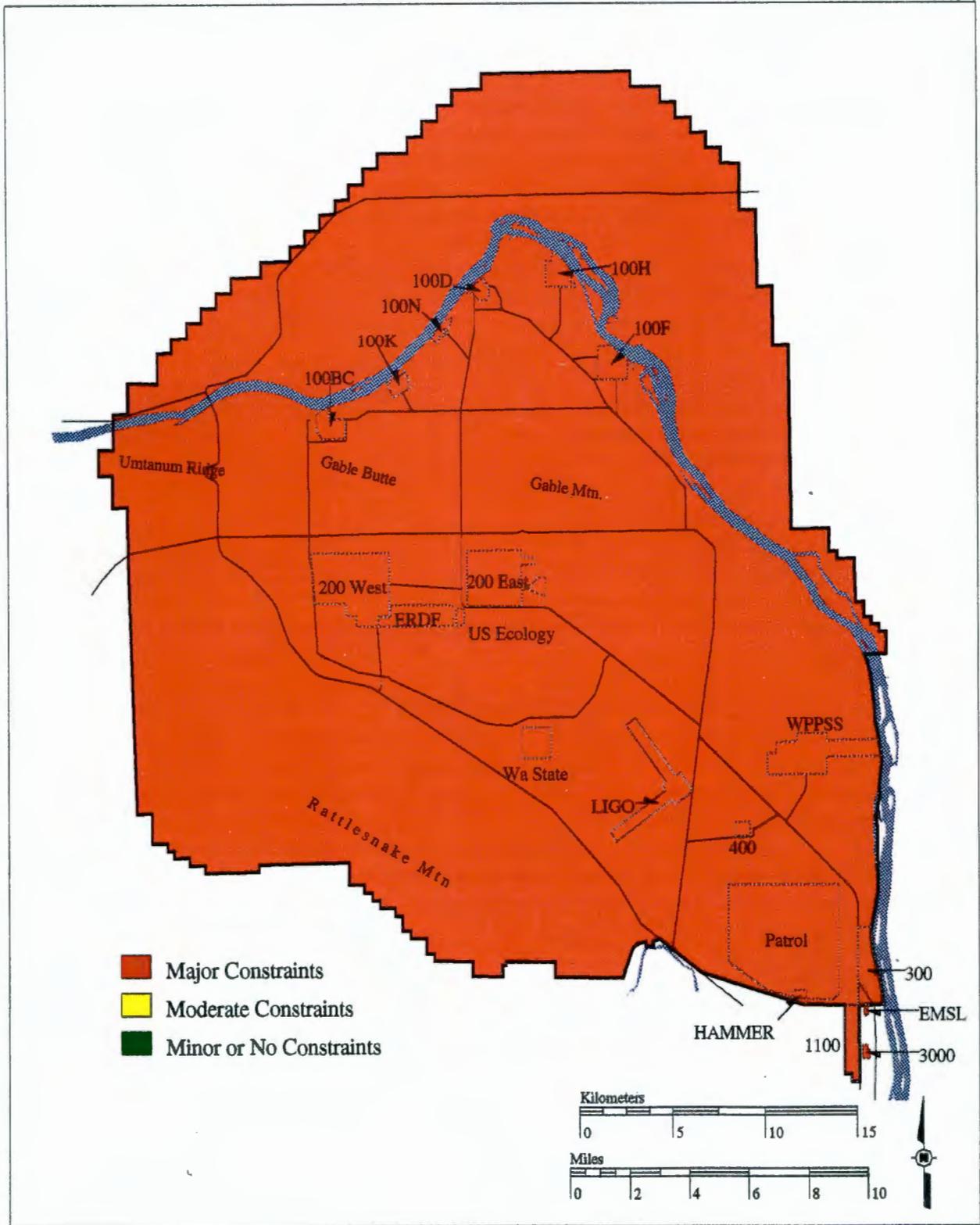


Figure 7-7. Cultural, Historical and Archeological Minor, Moderate, and Major Constraints.

Attribute Factors	Minor Constraints	Moderate Constraints	Major Constraints	References - Statutes, Laws, and Regulations	Management - DOE Orders and RL Programs
Cultural, Historic, and Archaeological					
Historic			<p>Consultation with Tribal Governments, Washington State Historic Preservation Office, Advisory Council on Historic Preservation and public are required.</p> <p>Cultural resource review process to determine the effects on significant cultural sites based on proximity and nature of disturbance.</p>	<p>Preservation of Cultural, Historic and Archeological Resources Federal: Treaties of 1855</p> <p><i>Native American Graves Protection and Repatriation Act</i>, 25 U.S.C. § 3001-3013 and 43 CFR 10 - Provides for the protection of Native American graves and the repatriation of Native American remains and cultural patrimony (e.g., inadvertent discovery of Native American remains and objects during project construction activities results in project shut-down for 30 days).</p> <p><i>Historic Sites, Buildings, and Antiquities Act</i>, as amended, 16 U.S.C. § 461-467 - Establishes National Survey of Historic Sites and Buildings.</p> <p><i>National Historic Preservation Act</i>, 16 U.S.C. § 470 et seq. and 36 CFR 60, 61, 63, 65, 67, 68, 79, and 800 - Establishes a national program to coordinate and support efforts to identify, evaluate and protect archaeological site, buildings, structures and objects, and artifacts, records and remains related thereto under the Section 106 and 110 processes. The Act also provides for a National Register of properties qualifying as "Historic Places or as "National Historic Landmarks," and outlines the process for curation of federally owned archaeological collections.</p> <p><i>American Indian Religious Freedom Act</i>, 42 U.S.C. § 1996, et seq. - Preserves the right of any Native American to believe, express, and exercise his or her traditional religion, including, but not limited to, access to any Native American to site, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites.</p> <p><i>Antiquities Act</i>, 16 U.S.C. § 431-433 and 43 CFR 3 - Requires permit before objects of antiquity, historic or prehistoric monuments or ruins may be destroyed, injured, excavated, or appropriated.</p> <p><i>Archeological Resources Protection Act</i>, 16 U.S.C. § 740aa-47011 and 43 CFR 7 - The principal federal law for regulation and protection of archaeological resources located on federal and Indian lands. Prohibited is the excavation, removal, damage, alteration or defacing, or any attempt to do so, of any archaeological resource located on federal or Indian land. Also prohibited is the sale, purchase, exchange, transport or receipt of, or any offer to sell, purchase or exchange, of any archaeological resource that was removed from federal or Indian land. Violators may be charged with civil penalties or a criminal offense.</p> <p>Executive Order 11593, "Protection and Enhancement of the Cultural Environment," states that federal agencies are responsible for location, inventorying, and nominating to the <i>National Register of Historic Places</i> those sites that appear to qualify for listing.</p> <p>State: Prohibits unauthorized disturbance of Indian graves, claims, glyptics, or painted records; prohibits collection, alteration or excavation of buried archeological materials. RCW 27.44, "Indian Graves and Records," RCW 27.53, "Archaeological Sites and Resources," RCW 27.34, "Archaeology and Historic Preservation," RCW 68.05, "Historic Graves Law," and RCW 25.48, "Archaeological Permits."</p> <p>Environmental Protection Federal: Several statutes and regulations address new projects, procurement, and design potentially affecting the environment. Includes cultural resource review, endangered species, and historical registry considerations under NEPA and Environmental ALARA plans. 42 U.S.C. § 4321, 16 U.S.C. § 461, 16 U.S.C. § 469, 16 U.S.C. § 470aa, 16 U.S.C. § 1531 10 CFR 1021, "NEPA Implementing Procedures," 40 CFR 1500-1508, "Council on Environmental Quality, NEPA," 50 CFR 17 and 10 CFR 834, "Endangered and Threatened Wildlife and Plants"</p> <p>State: WAC 197-11 - "SEPA Checklist."</p>	<p>Permit Programs and Implementation</p> <p>Cultural Resource Review Clearance, 36 CFR 800, DOE requires field surveys to be conducted prior to ground disturbing activities and modification of buildings eligible for listing on the National Register of Historic Places.</p> <p>"Excavation Permit," 36 CFR 800, DOE requires excavation permit prior to ground disturbance.</p> <p><i>Hanford Cultural Resources Management Plan</i> - Establishes policies and procedures for managing cultural resources on the Hanford Site in identification, evaluation, registration, protection, preservation, and enhancement of historical and cultural properties. Prior to commitment of federal funds, DOE-RL must assess the adverse effects of all undertakings on historic properties. Consultation with Tribal Governments, Washington State Historic Preservation Office, Advisory Council on Historic Preservation and public are required.</p>
Prehistoric			<p>Consultation with Tribal Governments, Washington State Historic Preservation Office, Advisory Council on Historic Preservation and public are required.</p> <p>Cultural resource review process to determine the effects on significant cultural sites based on proximity and nature of disturbance.</p>	<p>Consultation with Tribal Governments, Washington State Historic Preservation Office, Advisory Council on Historic Preservation and public are required.</p> <p>Cultural resource review process to determine the effects on significant cultural sites based on proximity and nature of disturbance.</p>	

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Figure 7-7. Cultural Minor, Moderate and Major Constraints Map.



1 **7.2 Analysis of Future Site Uses Working Group's**
2 **Plausible Future Use Options**
3

4 The DOE's land-use team prepared a GIS map identifying the geographic study areas (Figure
5 3-1) of the Hanford Site. The GIS map was created using the Working Group's six geographic areas as
6 an initial base map. The GIS then was used to overlay the potential economic development zone and
7 create a final geographic study area map that identifies a "South 600 Area." While part of the
8 600 Area, the ALE Reserve, the North Slope, and the South 600 Areas were identified and evaluated
9 individually during the analysis. To the extent appropriate, the land-use team also identified and
10 described the location of relevant sub areas, when the analysis of constraints indicated such an
11 identification was appropriate to distinguish it from surrounding lands.
12

13 A series of six tables that evaluate the recommended range of "Plausible Future Use Options"
14 identified by the Working Group were prepared (HFSUWG 1992). The Working Group did not select
15 a preferred option or use. These future-use options include the following:
16

- 17 • Agriculture
- 18 • Industrial and commercial
- 19 • Wildlife and habitat management
- 20 • Environmental restoration
- 21 • Waste management
- 22 • Public access and recreation.
23

24 Cultural resources were not evaluated as an independent land-use option, but rather were
25 evaluated as a factor, which must be deemed consistent and acceptable to any and all land-use
26 designations adopted in the final land-use plan, through the formal consultation process with the Tribal
27 governments.
28

29 Land uses are capable of causing various and different types of impacts to the natural
30 environment. Usually, the adverse impacts to soils, water, and environmental features are associated
31 with some type of surface disturbance (Table 7-8). For each plausible future use option, the DOE's
32 land-use team identified the presence (or absence) of identified constraints in the key geographic areas
33 (or sub areas, as appropriate) of the Hanford Site. This was accomplished by a visual evaluation of the
34 GIS constraint maps and documentation of the identified constraints for each geographic study area in
35 the tables. The detailed analyses of the constraints associated with each of the six "Plausible Future
36 Site Use Options" are provided in Tables A.1 through A.6 in Appendix A.

Table 7-8. Land Use Activities and Potential Impacts to Natural Resources. (3 Sheets)

Land Use	Nature of Activity	Type of Activity	Resource Affected	How Affected
Agricultural	Dryland Farming	Construction	Soils	Erosion
	Irrigated Farming	Ground Disturbance	Plants	Changes in plant and animal Species (i.e. diversity, abundance, and ecosystem characteristics)
	Livestock (open-range grazing)	Water Addition	Animals	
	Livestock (managed ranch)	Equipment Operations	Water	Contamination and Accelerated Migration of Contaminant Plumes
		Water Acquisition	<ul style="list-style-type: none"> • Surface • Groundwater 	Water Supply
		Effluent Discharge	Air	Particulates and Hazardous Materials
		<ul style="list-style-type: none"> • Air • Soils • Water - Surface - Groundwater 	Cultural, Historic, and Archaeological Sites	Impacts to Cultural, Historic, and Archaeological Sites
Waste Management	Waste Management Facilities and Operations	Construction	Soils	Erosion
		Ground Disturbance	Plants	Changes in Species (i.e., diversity and habitat characteristics)
		Water Addition	Animals	Changes in Species (i.e., diversity and habitat characteristics)
		Equipment Operations	Water	Contamination and Accelerated Migration Downgradient of Plumes
		Water Acquisition	<ul style="list-style-type: none"> • Surface • Groundwater 	Water Supply
		Effluent Discharge	Air	Particulates and Hazardous Materials
		<ul style="list-style-type: none"> • Air • Soils • Water - Surface - Groundwater 	Cultural, Historic, and Archaeological Sites	Impacts to Cultural, Historic, and Archaeological Sites

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Table 7-8. Land Use Activities and Potential Impacts to Natural Resources. (3 Sheets)

Land Use	Nature of Activity	Type of Activity	Resource Affected	How Affected
<i>Industrial</i>	<p>DOE - Other Land Dependent Missions (i.e., NASA, NSF, LIGO, DOD, Washington State, Us Ecology, and WPPSS)</p> <p>DOE and R&D Facilities (complex of buildings)</p> <p>Industrial Facilities</p> <p>Other Potential Industrial:</p> <ul style="list-style-type: none"> • Power Production Facilities • Commercial Business <ul style="list-style-type: none"> - hotels and motels - retail service related tourist and recreation facilities (e.g., golf courses and motor cross) - mining facilities and operations - commercial water facilities and operations (e.g., marinas, barge landings) - utilities (e.g., transmission lines towers, and substations, pipelines, and telecommunications) 	<p>Construction</p> <p>Ground Disturbance</p> <p>Water Addition</p> <p>Equipment Operations</p> <p>Water Acquisition</p> <ul style="list-style-type: none"> • River • Groundwater Pumping <p>Effluent Discharge</p> <ul style="list-style-type: none"> • Air • Soils • Water <ul style="list-style-type: none"> - Surface - Groundwater 	<p>Soils</p> <p>Plants</p> <p>Animals</p> <p>Water</p> <ul style="list-style-type: none"> • Surface • Groundwater <p>Air</p> <p>Cultural, Historic, and Archaeological Sites</p>	<p>Erosion</p> <p>Changes in plant and animal Species (i.e., diversity, abundance, ecosystem characteristics)</p> <p>Contamination and Accelerated Migration of Contaminant plumes</p> <p>Water Supply</p> <p>Particulate and Hazardous Materials</p> <p>Impacts to Cultural, Historic, and Archaeological Sites</p>
<i>Environmental Restoration</i>	<p>TSD Facilities, and Insitu Remediation</p> <p>Excavation and Removal Operations</p> <p>Reclamation and Restoration</p>	<p>Construction</p> <p>Ground Disturbance</p> <p>Water Addition</p> <p>Equipment Operations</p> <p>Water Acquisition</p> <ul style="list-style-type: none"> • River • Groundwater Pumping <p>Effluent Discharge</p> <ul style="list-style-type: none"> • Air • Soils • Water <ul style="list-style-type: none"> - Surface - Groundwater 	<p>Soils</p> <p>Plants</p> <p>Animals</p> <p>Water</p> <ul style="list-style-type: none"> • Surface • Groundwater <p>Air</p> <p>Cultural, Historic, and Archaeological Sites</p>	<p>Erosion</p> <p>Changes in Species (i.e., diversity and habitat characteristics)</p> <p>Changes in Species (i.e., diversity and habitat characteristics)</p> <p>Contamination and Accelerated Migration Downgradient of Plumes</p> <p>Water Supply</p> <p>Particulate and Hazardous Materials</p> <p>Impacts to Cultural, Historic, and Archaeological Sites</p>

Table 7-8. Land Use Activities and Potential Impacts to Natural Resources. (3 Sheets)

Land Use	Nature of Activity	Type of Activity	Resource Affected	How Affected
<i>Wildlife Management</i>	Passive Use of Natural Resources Unobstructive Research	None	Soils Plants Animals Water <ul style="list-style-type: none"> • Surface • Groundwater Air	Natural Erosion Only Natural Biome Maintained Water and Air Quality Protected Cultural, Historic, and Archaeological Resources Preserved and Protected
<i>Public Access and Recreation</i>	Potential Activities are Dependent on the Magnitude and Scope of Access and Management: <ul style="list-style-type: none"> • Shoreline Parks • Mountain Parks • Campsites (managed, primitive) • Trails (hiking, horseback) • Biking • Swimming • Fishing • Hunting • Vista Visitor Facilities 	Approved managed Trail and Road Access Approved Entry Use of River Corridor	Soils Plants Animals Water <ul style="list-style-type: none"> • Surface • Groundwater Air	Natural Erosion Only Natural Biome Maintained Water and Air Quality Cultural, Historic, and Archaeological Resources Preserved and Protected Impacts on the above four are dependent on magnitude and degree of access, use, or management through impact assessment, and monitoring, mitigation, and preservation. Potential Compensation Through Management

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1 **7.3 Analysis of Anticipated Changes the Existing Environment During the**
 2 **Next 50 Years**
 3

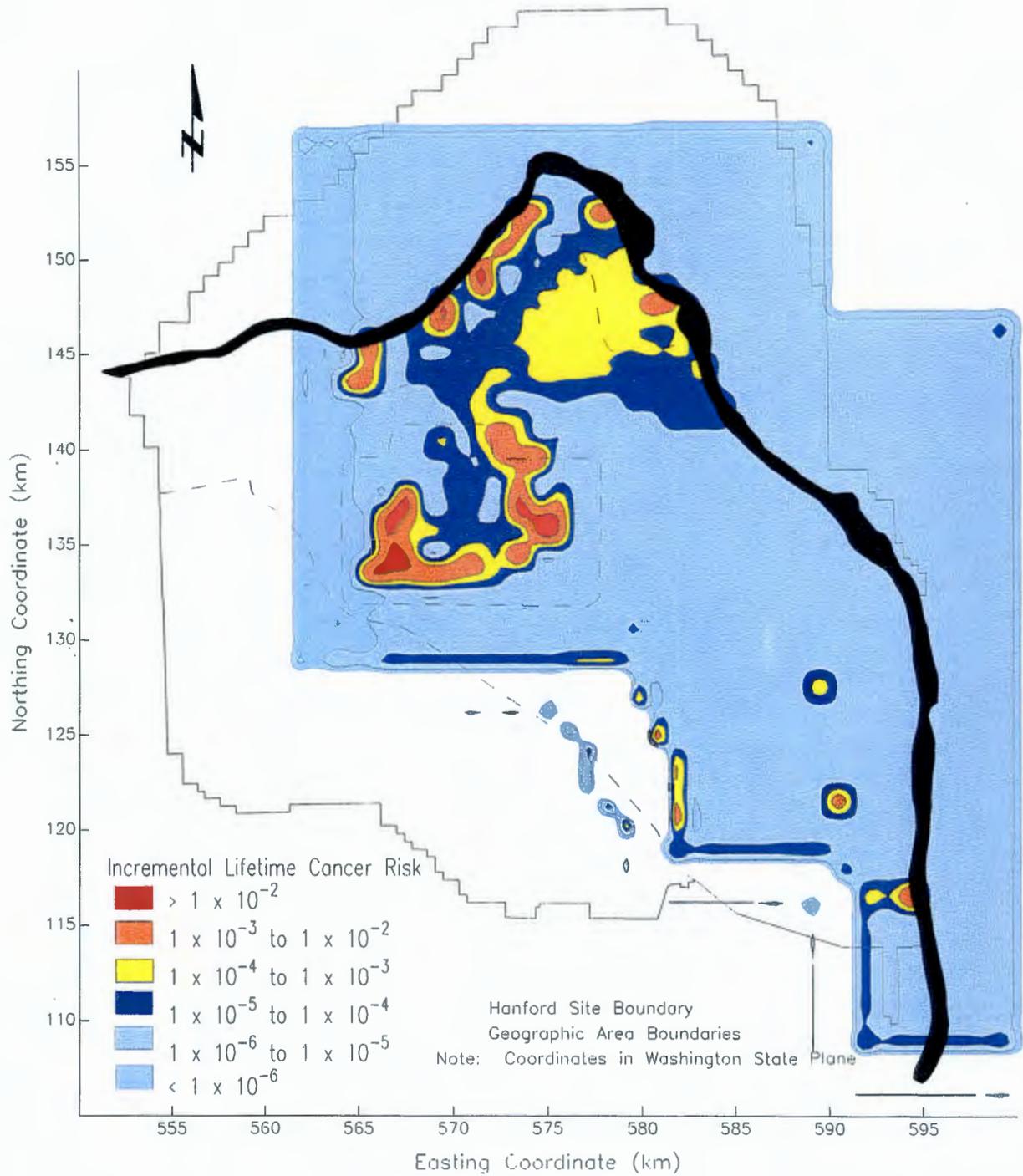
4 The DOE's land-use team reviewed the GIS data to identify the reasonably predicted changes to
 5 natural resources and attributes of the natural or built environment that are likely to occur over the next
 6 50 years. These changes were identified and documented in the constraint tables. GIS maps were then
 7 prepared to depict the characteristics of those factors which would change significantly over the next
 8 50 years, and have implications to future land uses. Table 7-9 summarizes the predicted changes over
 9 the next 50 years.
 10
 11

12 **Table 7-9. Anticipated Changes to The Existing Environment**
 13 **During the Next 50 Years.**

Site Attributes	Changes Over the Next 50 Years
Biological Resources	In the absence of a major wildfire, no changes of significance identified--post burn shrub-steppe continues to mature.
Surface Water	No changes of significance identified.
Groundwater Contamination	Major shift in location of groundwater contamination plumes as a result of groundwater migration and remediation actions taken. Figure 7-8 shows risk from the No-Action Alternative at 40 years, which is discussed in Section 5.8.4 of the HRA-EIS. The principal component of this risk is groundwater contamination.
Waste Sites	Waste sites will be remediated pursuant to the Tri-Party Agreement.
Protective Safety Buffer Zones	Some facilities will be decommissioned, and certain safety analysis requirements will be reduced or eliminated. Certain new nuclear materials storage facilities will be put into service and some existing facilities will continue. The buffer zones will continue to be based on safety analysis requirements for those facilities that require protective safety buffer zones.
Geological Resources	No changes of significance identified.
Cultural Resources	No major changes identified. Additional surveys will result in the identification of new sites that need to be protected and preserved. Documentation of historic structures will proceed.

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Figure 7-8. No-Action Alternative - Baseline Risk Isopleths for the Agricultural Scenario at T₄₀ (Year 2029).



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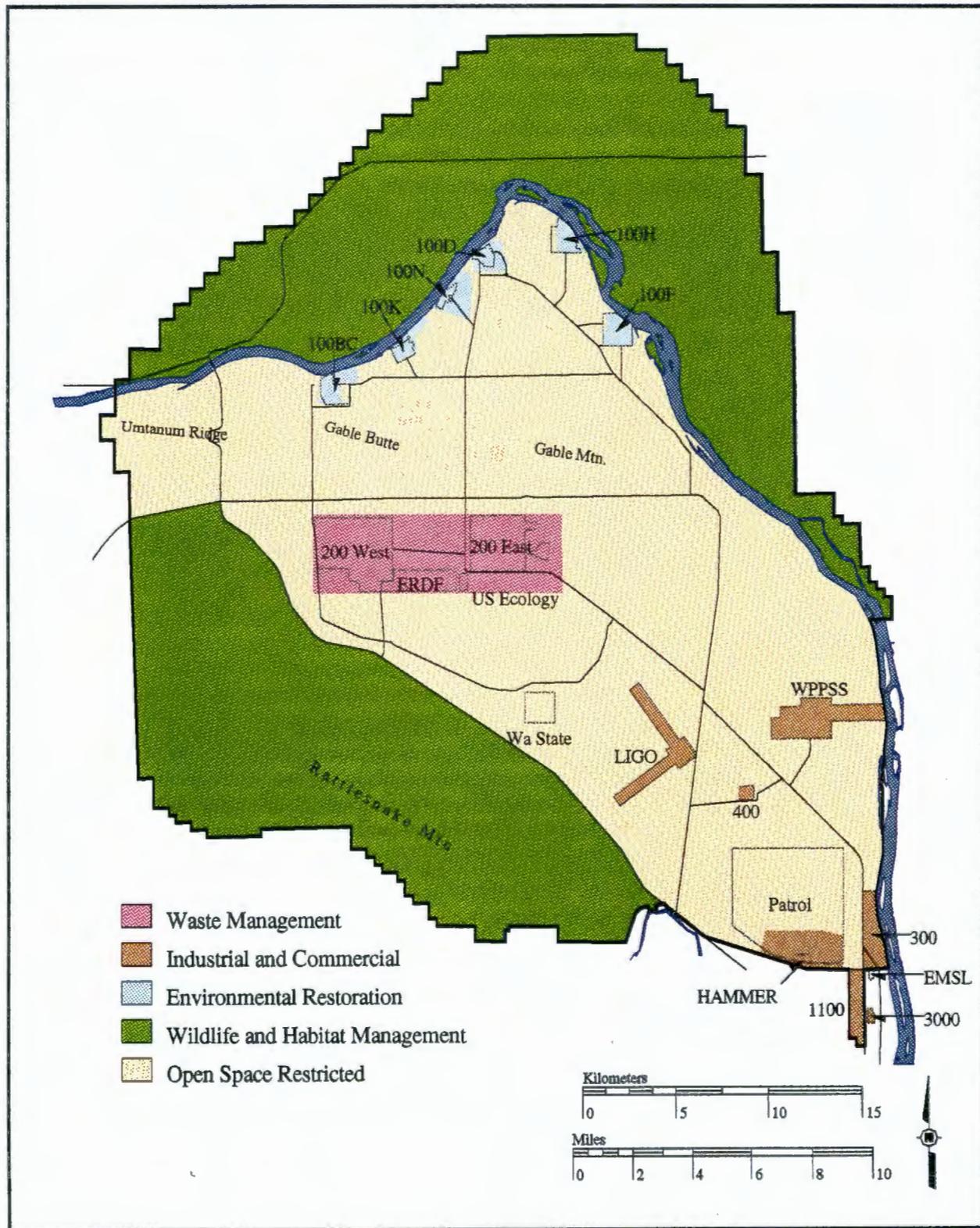
8.0 Comprehensive Land Use Plan

The DOE's land-use team reviewed and evaluated the GIS maps along with the constraint tables in Chapter 7.0 and the tables evaluating plausible future-use options in Appendix A, respectively, to develop existing (Figure 8-1), proposed (Figure 8-2), and projected (Figure 8-3) land-use maps for the Hanford Site. The development of the proposed and projected land-use maps included the evaluation of the identified values important to land-use planning. The relationship and use for each of these land-use maps are explained in the following sections. The land-use team developed nine land-use designations (Table 8-1) for the Hanford Site that are used in the existing, proposed, and projected land-use maps.

Table 8-1. Hanford Site Land-Use Designations.

Proposed Land-Use Designations	Proposed Land-Use Designations
Waste Management (WM)	Areas used primarily for treatment, storage, and disposal of hazardous, radioactive, and nonradioactive wastes. Includes environmental restoration, industrial and commercial, and business land-use activities.
Environmental Restoration (ER)	Areas used primarily for characterization and remediation of reactor operation sites, land, facilities, and groundwater. Includes compatible industrial and commercial land-use activities.
Industrial and Commercial (IC)	Areas used primarily for a wide range of industrial and commercial activities. Includes required environmental restoration and business land-use activities.
Business (B)	Areas used for a wide range of administration and office activities.
Wildlife and Habitat Management (WHM)	Areas used primarily for protection and management of diverse biological resources, including both plant and animal communities. May include areas for compatible special use or controlled access and recreation land-use activities, and environmental restoration activities.
Open Space Restricted (OSR)	Areas restricted from access, based on constraints and implementation requirements, to support existing missions. Includes areas identified for potential compatible development to meet future projects and mission needs. Includes use of an area for environmental restoration activities, wildlife and habitat management, and approved Tribal activities.
Special Use Areas (SUA)	Areas identified as unique and limited resources that require protection for a specific use or uses.
Potential Economic Development Zone (PEDZ)	Area north and west of the 300 Area identified as a geographic zone where a significant number of potentially compatible economic development activities or proposals have been identified. This is not an industrial or commercial land-use designation, but rather an identification of a contiguous geographic area in which the majority of potentially viable economic development proposals received, by the DOE to date, tend to be located.
Controlled Access and Recreation (CAR)	Potential range of compatible-restricted uses to areas identified for potential tourism, visitor, fishing, boating, hiking, wildlife viewing, and biking activities, based on constraints and implementation requirements. Controlled access restriction, at a minimum, entails approved Tribal usage, and escorted day trips.

Figure 8-1. Hanford Site Existing Land Use Map - 1996.



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Figure 8-2. Hanford Site Proposed Comprehensive Land Use Plan Map - 1997.

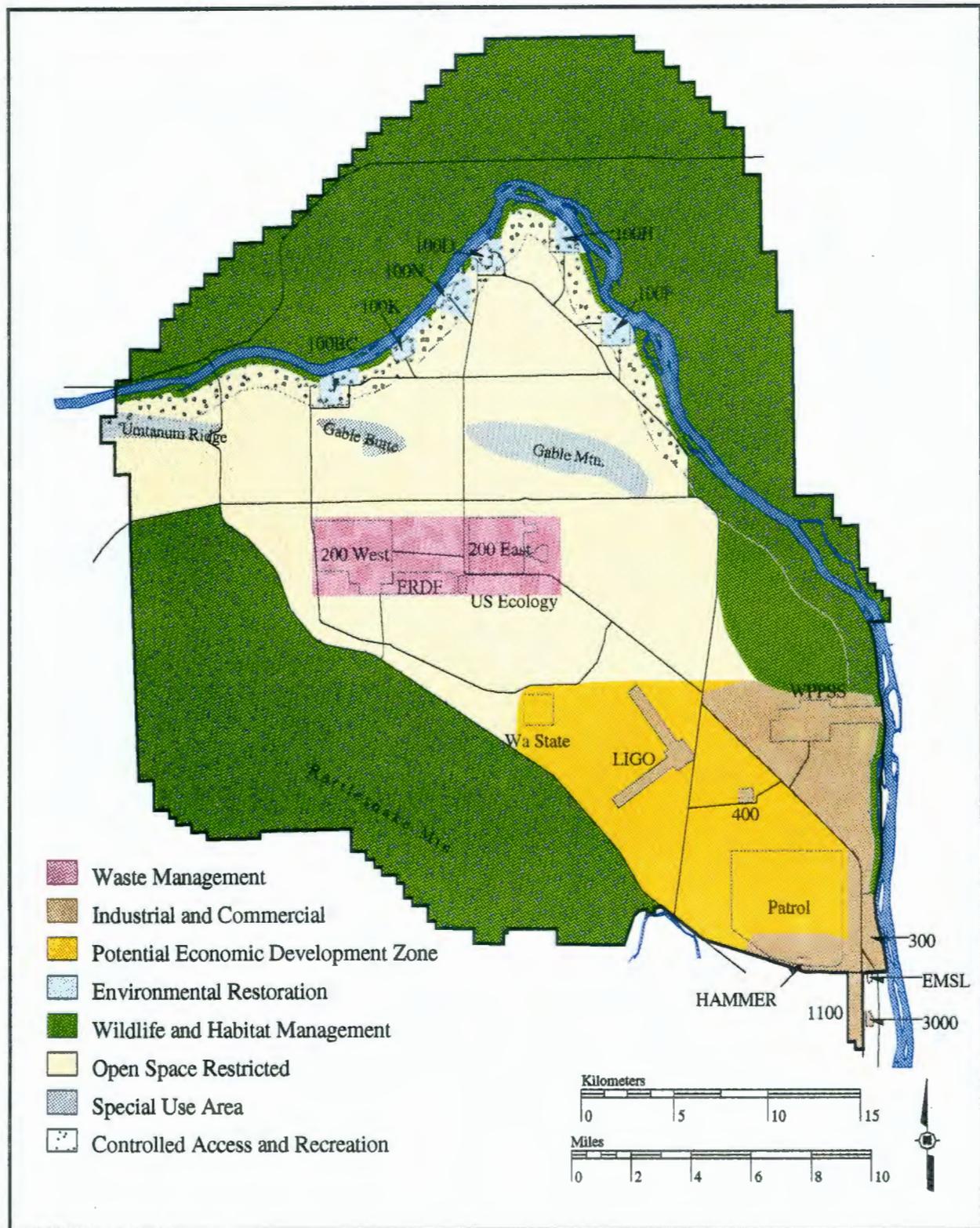
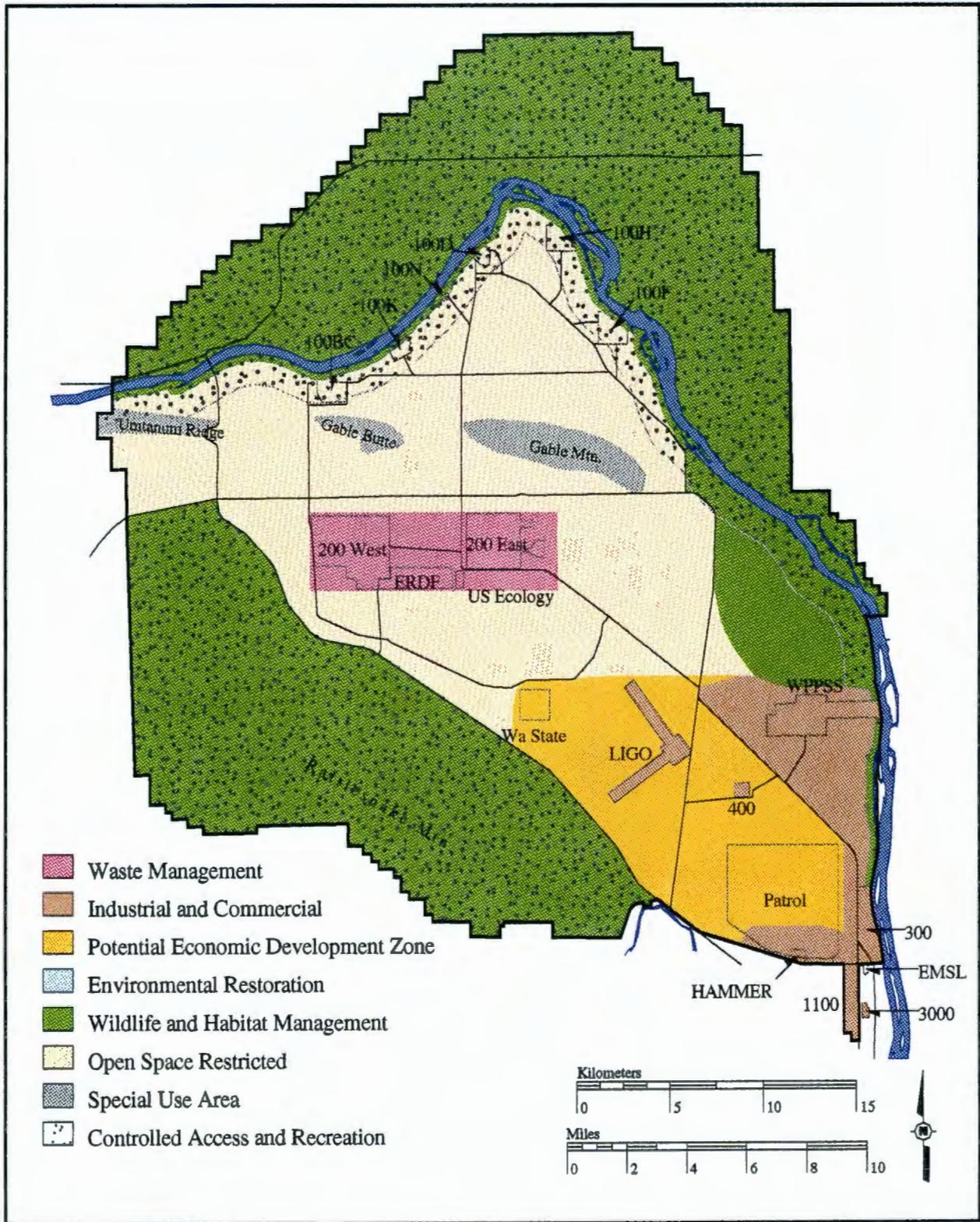


Figure 8-3. Hanford Site Projected Land Use Map - 2046.



8.1 Existing Land Use Map (1996) at the Hanford Site

The DOE's land-use team reviewed and evaluated the GIS maps along with the constraint and option tables, and prepared a GIS map (Figure 8-1) based on and depicted by the existing land uses. This GIS map (Figure 8-1) identifies the type of land uses that existed prior to initiating DOE's land-use planning process, and serves as the baseline for the evaluation of plausible future-use options.

8.2 Proposed Comprehensive Land Use Plan Map (1997) at the Hanford Site

The DOE's land-use team evaluated the existing land use, mission needs, constraints, the identified values important to land use planning, and the analysis of plausible future-use options. A proposed Comprehensive Land Use Plan map (Figure 8-2) was prepared. The definitions for the proposed land use designations are the same as those used on the existing land use map (Table 8-1). The proposed land-use map and designators serve as the basis for the land-use decisions to be made in accordance with the Final Comprehensive Plan, the Final HRA-EIS, and in the NEPA ROD.

8.3 Projected Land Use Map (2046) at the Hanford Site

The DOE's land-use team evaluated the existing land use, the proposed and anticipated mission needs, constraints, and the nature of changes to features and attributes of the natural and built environment during the next 50 years. The GIS maps and tables associated with the changes during the next 50 years were reviewed and analyzed to determine the reasonable changes in land use that could be supported over that time. A table was developed (Table 8-2) which describes anticipated changes to the affected environment and land use during a 50-year period. The projected land use was then developed for the Year 2046 and is presented in Figure 8-3. The definitions of the land-use designation are the same as those used in the existing land use map (Table 8-1).

8.4 Comparison of Proposed and Projected Future Land Use Against Values Important to Land Use Planning

As a "reality check" on the relative quality and validity of the land-use planning effort and process, the DOE's land-use team re-evaluated the proposed land use designation and maps (Figure 8-2), and the projected land-use designations and maps (Figure 8-3), against the identified values important to land use planning. For each identified value, the land-use team identified the specific way and manner to which the proposed or projected land use responds and addresses each value. The result of this analysis is provided in Table 8-2.

Table 8-2. Anticipated Changes in Land Use Over 50-Year Period (1996 -2046).

Geographic Study Area	Land Use 1996	Anticipated Changes to Affect Environment										Land Use 2046	Δ (Delta)
		1996	2046	1996	2046	1996	2046	1996	2046	1996	2046		
		Biological	Surface Water	Groundwater	Waste Sites	PSBZs	Geological	Archaeological					
100	ER OSR	+ΔShrub Steppe		-ΔGWC	-ΔWS	-ΔPSBZ					+ΔSites	ER OSR	-ΔER +ΔOSR
200	WM	+ΔShrub Steppe		-ΔGWC	-ΔWS	-ΔPSBZ					+ΔSites	WM	+ΔWM -ΔWM
300	IND	+ΔShrub Steppe		-ΔGWC	-ΔWS	-ΔPSBZ					+ΔSites	IND	+ΔIND -ΔOSR
400	IND	+ΔShrub Steppe		-ΔGWC	-ΔWS	-ΔPSBZ					+ΔSites	IND	+ΔIND -ΔOSR
North Slope	WHM CAR	+ΔShrub Steppe				-ΔPSBZ					+ΔSites	WHM CAR	+ΔWHM -ΔCAR
Arid Lands Ecology	WHM	+ΔShrub Steppe									+ΔSites	WHM CAR	+ΔWHM -ΔCAR
CORE 600	OSR	+ΔShrub Steppe		-ΔGWC	-ΔWS						+ΔSites	OSR	-ΔOSR +ΔIND +ΔWM
South 600	OSR	+ΔShrub Steppe			-ΔWS	-ΔPSBZ					+ΔSites	OSR IND PEDZ	-ΔOSR +ΔIND +ΔPEDZ
700	B											B	+ΔB
1100	IND			-ΔGWC		-ΔPSBZ					+ΔSites	IND	+ΔIND
3000	IND			-ΔGWC		-ΔPSBZ					+ΔSites	IND	+ΔIND

Magnitude of Constraint

- Major
- Moderate
- Minor/No
- Hash marks indicate presence of multiple constraints.

Legend

- B = Business
- CAR = Controlled Access & Recreation
- ER = Environmental Restoration
- GWC = Groundwater Contamination
- IND = Industrial & Commercial

- OSR = Open Space Restricted (GW & Access)
- PEDZ = Potential Economic Development Zone
- PSBZ = Protective Safety Buffer Zone
- WHM = Wildlife & Habitat Management
- WM = Waste Management
- WS = Waste Sites

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Table 8-3. Comparison of Proposed and Projected Future Land Use Against Values Important to Land Use Planning.

Values Important to Land Use Planning	How Addressed By Proposed and Projected Future Land Use
1992 Future Site Uses Working Group (HFSUWG 1992)	
Protect the River	(1) 100 Area's Environmental Restoration Designation; (2) Quarter Mile Wildlife and Habitat Management Zone Along Columbia River
Deal realistically and forcefully with groundwater contamination	(1) 100 Area's ER Designation; (2) OSR Designation in Core Area and South 600 Area
Use the Central Plateau wisely for waste management	(1) 200 Area Waste Management Designation
Do no harm during cleanup or with new development	(1) Waste Management and Industrial Designations Limited to Existing Operating Areas only
Cleanup of areas of high future use value is important	(1) 100 Area Environmental Restoration Designation; (2) North Slope and ALE Wildlife and Habitat Management Designation
Cleanup to the level necessary to enable the future use options	(1) Designations Consistent With Analysis of potential Environmental Impacts in the HRA-EIS
Transport waste safely and be prepared for emergencies	(1) Strategic Plan
Capture economic development opportunities locally.	(1) Industrial Designation in 300, 400, 1100 and 3000 Areas; (2) Potential Economic Development Zone Identification; (3) Strategic Plan
Involve the public in future decisions about the Hanford Site	(1) External and Public Involvement in this Comprehensive Plan; (2) HAB Briefings and Advice; (3) NEPA Review and Comment
1993 Tank Waste Task Force	
Get on with cleanup!	(1) Integrate this Comprehensive Plan with the Strategic Plan and the HRA-EIS
Protect the environment	(1) Strategic Plan; (2) Consistent With Analysis of potential Environmental Impacts in the HRA-EIS
Protect public and worker health and safety.	(1) Strategic Plan
Use a systems design approach that keeps end points in mind as intermediate decisions are made.	(1) Strategic Plan
Establish management practices that ensure accountability, efficiency, and allocation of funds to high priority issues.	(1) Strategic Plan
Hanford Advisory Board 1994 additional values	
Historic and cultural resources have value. They should not be degraded or destroyed. Appropriate access to those resources is a part of their value	(1) Wildlife and Habitat Management, Open Space Restricted and Special Use Designations; (2) Controlled Access and Recreation Designation; (3) Quarter Mile Wildlife and Habitat Management Zone Along Columbia River
Workforce stability and reasonable stability in the demand for public services are important in the affected communities. In decisions on projects and contractors, consideration should be given to affected workforce and population shifts.	(1) Strategic Plan; (2) Potential Economic Development Zone Identification; (3) Industrial and Commercial Designation
Cleanup and waste management decisions should be coordinated with the efforts of the affected communities to shift toward more private business activity and away from dependence on federal projects that have adverse environmental impact.	(1) Potential Economic Development Zone; (2) Waste Management, Environmental Restoration and Industrial Designations; (3) Strategic Plan; (4) External and Public Involvement
The importance of ecological diversity and recreational opportunities should be recognized; those resources should be enhanced as a result of cleanup and waste management decisions.	(1) Wildlife and Habitat Management, Open Space Restricted and Special Use Designations; (2) Controlled Access and Recreation Designation; (3) Quarter Mile Wildlife and Habitat Management Zone Along Columbia River; (4) B Reactor Area
These concerns should be considered while promoting the most effective and efficient means that will protect environmental quality and public health and safety now and for future generations.	(1) Proposed and Projected Future Land Use
Cleanup activities should protect to the maximum degree possible the integrity of all biological resources, with specific attention to rare, threatened, and endangered species and their related habitat.	(1) Wildlife and Habitat Management, Open Space Restricted and Special Use Designations; (2) Controlled Access and Recreation Designation; (3) Quarter Mile Wildlife and Habitat Management Zone Along Columbia River

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9.0 *Comprehensive Plan Implementation and Revision*

9.1 *Land Use Implementation Process*

9.1.1 *Program Integration*

A variety of government programs and associated contractor businesses operate at the Hanford Site. Future land-use management at the Hanford Site will be accomplished by an implementation strategy that tiers off of the hierarchy of policies, management directives, and integrated program documents. These documents include the following:

1. *Hanford Strategic Plan* - A top-level document that will be updated periodically to reflect the strategic thinking of the Hanford Site's leadership. It describes the vision for Hanford and the values that will guide the work. The goals and strategies that have been developed in response to formidable challenges, and a description of how the success of actions will be measured are presented in the Strategic Plan. This is carried out through the Hanford Mission Direction Document, which defines the scope requirements and interfaces for Hanford's mission, and establishes mission-level performance measures. It captures the technical mission-level direction and requirements resulting from the Hanford Site strategic planning process (DOE-RL 1994a).
2. *Hanford Remedial Action Environmental Impact Statement and Comprehensive Land Use Plan* - This document evaluates the potential environmental impacts associated with the Hanford Site remediation and develops a cost-effective, technically sound remediation strategy. Future land use will be designated as exclusive, restricted, or unrestricted (DOE 1996b).
3. "Hanford Site Comprehensive Land Use Plan " - This Comprehensive Plan guides land- and facility-use decisions onsite through the integration of natural, cultural, and socioeconomic factors. It designates existing and future land uses that are appropriate for the Hanford Site based on an analysis of land use suitability, with appropriate consideration of the DOE's responsibilities, authorities, and constraints dictated by legislation and applicable laws. This Comprehensive Plan also considers the land use values of other federal agencies, Tribes, state and local governments, business, labor, environmental, and other groups and organizations that are concerned with or affected by the Hanford Site and are participating in the future land-use planning process.

1 **9.1.2 Land-Use Planning Implementation**
2

3 After the NEPA ROD is signed for the HRA-EIS and this Comprehensive Plan, the
4 Implementation Phase of the land-use planning process will entail development of the following, which
5 will replace the Site Development Plans:
6

- 7
- 8 1. Implementation Plan for the "Hanford Site Comprehensive Land Use Plan" - An
9 Implementation Plan will be created and adopted to define the land-use management
10 process in which this Comprehensive Plan is implemented, managed, and maintained.
11 It will assist in the use of this Comprehensive Plan for management and oversight of
12 lands and facilities uses on the Hanford Site under the jurisdiction of RL. It will
13 include the documentation of the Hanford Site's land-use planning process, and its
14 relationship and integration with the Hanford Site strategic planning and the NEPA
15 process. The Implementation Plan allows for a professional, accurate interpretation of
16 management goals and objectives, which are required to (1) maintain site integrity and
17 environmental quality, and (2) sustain multiple-land uses.
 - 18 2. Land-Use Planning and Management Plans - Detailed specific land-use planning and
19 management plans for all of the operating areas at the Hanford Site will tier from this
20 Implementation Plan. These plans will address the following:
21
 - 22 • Interim and End-State Vision - RL's strategic direction for each area, and the
23 role that each area plays in accomplishing the Hanford Sitewide missions.
 - 24 • Organization Structure - The key businesses or programs operating in each
25 area, the lead facility managers, their roles and responsibilities (including
26 stewardship of land areas).
 - 27 • Process Flow - The interrelationships and communication lines to ensure
28 coordination and integration among the area activities, and to identify the
29 facility disposition process, including leases or transfer of ownership, leading to
30 the interim or end-state vision.
 - 31 3. Site Selection Application Process - Develop a streamlined application process for
32 managing day-to-day requests, reviews, and approvals for land utilization.
33
 - 34 4. Hanford Site Land Use Management Program - The entire comprehensive land-use
35 planning process will be described in new RL programmatic documentation to ensure
36 linkage between land-use planning, individual site selection activities, and land-use
37 planning and management for each operating area.
38
39
40
41
42

43 **9.1.3 Comprehensive Land Use Plan Revision**
44

45 It is anticipated that this Comprehensive Plan will be reviewed every five years with ongoing
46 stakeholder involvement. Proposals that require a redesignation of the land use at any location on the
47 Hanford Site will be thoroughly reviewed and discussed with stakeholders, as appropriate, before
48 redesignation.

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Appendix A

Appendix A. Analysis of Future Site Uses Working Group Plausible Future Use Options

The DOE land-use team prepared a GIS map identifying the geographic study areas (see Figure 3-1) of the Hanford Site. The GIS map was created using the Working Group's Six Geographic Study Areas as an initial base map.

A series of six tables, which evaluate the recommended range of "Plausible Future Use Options" identified by the Future Site Uses Working Group (HFSUWG 1992), were prepared. The Working Group did not select a preferred option or use. These future land-use options include the following: agriculture (Table A-1), waste management (Table A-2) industrial and commercial development (Table A-3), environmental restoration (Table A-4), wildlife and habitat management (Table A-5), and public access and recreation (Table A-6).

Cultural resources were not evaluated as an independent land-use option, but rather were evaluated as a factor, which must be deemed consistent and acceptable to any and all land-use designations adopted in the final land-use plan, through the formal consultation process with the Tribal governments.

Land uses are capable of causing a variety of different types of impacts to the natural and man-built environment. Usually, the adverse impacts to soils, water, and environmental features are associated with some type of surface disturbance (see Table 7-8).

For each plausible future use option, the land use team identified the presence (or absence) of identified constraints in the key geographic areas (Figure 3-1) (or sub areas, as appropriate) of the Hanford Site. This was accomplished by a visual evaluation of the GIS constraint maps and documentation of the identified constraints for each geographic study area in the tables. The acronyms associated with the six tables in this Appendix are provided below.

ALE	Fitzner/Eberhardt Arid Lands Ecology Reserve
DOL	Depending on location
FFTF	Fast Flux Test Facility
HWVP	Hanford Waste Vitrification Plant
IOA	Inside operating areas
MCL	Maximum contamination level
OOA	Outside operating areas
PFP	Plutonium Finishing Plant
RAD	Radiation adsorbed dose
TWRS	Tank Waste Remediation System
WNP2	Washington Public Power Supply System, Nuclear Plant 2.

Table A-1. Agriculture. (13 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
100 Areas - Major Constraint							
100 Area		Columbia River Corridor (within high water marks)	RAD and hazardous contamination greater than MCLs	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination		Proximity and nature of disturbance dependent upon site characteristics and review/clearance	
100-B/C	Chinook spawning habitat						
100-D	Terrestrial element occurrences				Exclusion zone		
100-N	Bald Eagle roost and nesting locations				Exclusion zone		
100-KE/KW					Exclusion zone		
South of 100-B							Geological fault
100 Areas - Moderate Constraint (DOL)							
100 Area		100-year flood plain		Unknown and suspected wastesite with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites		Proximity and nature of disturbance dependent upon site characteristics and review/clearance	
100-B/C					Protective zone	Museum Proposed	
100-H					Protective zone		
100-K	Species of concern (100-B/D area, islands, 100-F)						

Table A-1. Agriculture. (13 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 2 100 Areas between operating areas (OOA)	Ferruginous Hawk nesting sites (100-B) Riparian/Wetland (adjacent to river corridor)						
3 100 Areas - No or Minor Constraint							
4 100 Area		50% breach 1948 flood Probable maximum flood				Proximity and nature of disturbance determined through review clearance process to be minimal	
5 6 100 Area between operating areas (OOA)	West of 100-B/C, east OOA to 100-F						
7 All other areas							Little or no geological constraints
8 East of Gable Mountain			No downgradient plumes				
9 Vernita Bridge Area			No contamination				
10 200 Areas - Major Constraint							
11 200 Area			RAD and hazardous contamination greater than MCLs Upgradient of 100 Area	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
12 200 East TWRS					Exclusion zone		
13 200 West TWRS					Exclusion zone		
14 B Plant					Exclusion zone		
15 B Pond		Natural and artificial lakes and ponds					
16 Ditches and drainages							
17 Gable Mountain Pond							

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Table A-1. Agriculture. (13 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	HWVP					Exclusion zone		
2	PFP					Exclusion zone		
3	200 Areas - Moderate Constraint							
4	200 Area				Unknown and suspected wastesite with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
5	West one-half of the 200 West Area between 200 East and 200 West	Habitat of concern Shrub steppe						
6								
7								
8	West one-quarter of the 200 East Area	Species of concern Level III (plant)						
9								
10	200 Areas - No or Minor Constraint							
11	200 Area						Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints
12	East one-half of 200 West	Heavily disturbed existing operating areas						
13								
14	East three-quarters of 200 East							
15								

Table A-1. Agriculture. (13 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
300 Areas - Major Constraint							
300 Area		Columbia River Corridor (within high water marks)	RAD and hazardous contamination greater than MCLs	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
315 Building					Exclusion zone		
324 Building					Exclusion zone		
300 Areas - Moderate Constraint							
300 Area		100-year flood plain		Unknown and suspected wastesite with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
300 Area OOA	Habitat of concern Shrub steppe Wetland within high water marks along Columbia River Plant species of concern						
North and south thirds					Protective zone		

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Table A-1. Agriculture. (13 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	300 Areas - No or Minor Constraint							
2	300 Area	Heavily disturbed existing operating areas	50% breach 1948 flood Probable maximum flood				Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints
3	400 Areas - Major Constraint							
4	400 Area			RAD and hazardous contamination greater than MCLs Upgradient of 600 and 300 area plumes	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
5	FFTF					Exclusion zone		
6	400 Areas - Moderate Constraint							
7	400 Area				Unknown and suspected wastesite with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
8	400 Area (OOA)	Habitat of concern Shrub steppe (post burn) Ferruginous Hawk nesting						

Table A-1. Agriculture. (13 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	400 Areas - No or Minor Constraint							
2	400 Area						Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints
3	400 Area (IOA)	Heavily disturbed existing operating areas						
4	600 Area - Major Constraint							
5	600 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
6	ALE	Rare habitats Sand dunes Wetlands White bluffs	Springs (Rattlesnake and Snively)	Upgradient		Exclusion zone		
7	ALE							Geological faults, earthquake hazard, basalt outcrops, slope instability/mass movement, and alluvial fans
8	Rattlesnake Mountain							
9 10 11	Central Core (Sand dunes) Big sagebrush	Terrestrial element occurrence Desert streams (ALE) Rock outcrops/basalt (Gable Mountain/ Gable Butte) (Umtanum Ridge)						

Table A-1. Agriculture. (13 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 Core			RAD and hazardous contamination greater than MCLs Upgradient of 100 Area	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination	Exclusion zone		
2 3 4 5 Core North of 200 Area/ Gable Mountain, Gable Butte							Basalt outcrops
6 7 8 9 10 Core North of 200 Area/ Gable Mountain, Gable Butte Along SR-240							Sand dunes and wind erodible soils Geological faults, earthquake hazard
11 12 13 14 15 Core Area--Vernita Bridge area West bank of Columbia River South of 100-F		Columbia River Corridor (within high water marks)					
16 North Slope	Rare habitats Sand dunes Wetlands White bluffs	Columbia River Corridor (within high water marks) Natural and artificial lakes and ponds			Exclusion zone		
17 18 19 20 21 North Slope Red zone North and east of Columbia River White Bluffs							Slope instability and mass movement, active sand dunes, sand dunes, and wind erodible soils
22 Siemens					Initial isolation zone		

Table A-1. Agriculture. (13 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	South 600 Area				Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination	Exclusion zone Initial isolation zone		
2	South 600 Area--West		Columbia River Corridor					
3	bank of Columbia River		(within high water mark)					
4	WNP2					Initial isolation zone		
5	600 Area - Moderate Constraint							
6	600 Area		Yakima River 100-year flood plain Ephemeral streams				Proximity and nature of disturbance dependent on site characteristics and review/clearance	
7	ALE					Protective zone		
8	Central Core	Habitats of concern Shrub steppe						
9	Core				Unknown and suspected wastesite with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites	Protective zone		
10	Core Area--Vernita		100-year flood plain					
11	Bridge area		(Columbia River)					
12	West bank of Columbia							
13	River							
14	South of 100-F							

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Table A-1. Agriculture. (13 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 North Slope	Habitats of concern Shrub steppe	100-year flood plain (Columbia River) Ephemeral streams			Protective zone		
2 South 600 Area	Ferruginous Hawk nesting	100-year flood plain (Columbia River and Yakima River)		Unknown and suspected wastesite with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites	Protective zone Protective action zone		
3 Siemens					Protective action zone		
4 WNP2					Protective action zone		
5 600 Area - No or Minor Constraint							
6 600 Area						Proximity and nature of disturbance determined through review clearance process to be minimal	
7 ALE				Lack of hazardous chemical, radioactive, and mixed waste sites			
8 ALE (West and south 9 of Rattlesnake 10 Mountain)					No constraints		
11 Central Core	Cheatgrass						
12 Core				Lack of hazardous chemical, radioactive, and mixed waste sites. Vadose zone contaminated outside of operating areas and identified waste sites			

Table A-1. Agriculture. (13 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 2	Core Area--North of SR-240	Cold Creek Probable maximum flood						
3 4 5 6 7	Core Area--Vernita Bridge area West bank of Columbia River South of 100-F	Columbia River 50% breach Columbia River 1948 flood Columbia River Probable maximum flood						
8	Cold Creek	Probable maximum flood						
9	North Slope		50% breach 1948 flood Probable maximum flood	None	Lack of hazardous chemical, radioactive, and mixed waste sites			
10 11 12	North Slope (North and East of Columbia River)					No constraints		
13	South 600 Area		50% breach 1948 flood Probable maximum flood		Lack of hazardous chemical, radioactive, and mixed waste sites			
14	700 Area - Major Constraint							
15	700 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
16	700 Area - Moderate Constraint							
17	700 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
18 19	City of Richland Well Fields					Protective action zone		

9613159-2017

Table A-1. Agriculture. (13 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 2	City of West Richland Well Field					Protective action zone		
3	Lamb Weston					Protective action zone		
4	700 Area - No or Minor Constraint							
5	700 Area	Heavily disturbed existing operating areas			Lack of hazardous chemical, radioactive, and mixed waste sites		Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints
6	1100 Area - Major Constraint							
7	1100 Area			Radionuclide and hazardous chemical contamination greater than MCLs northwest and extending into the 1100 Area			Proximity and nature of disturbance dependent on site characteristics and review/clearance	
8 9	City of Richland Well Fields					Initial isolation zone		
10 11	City of West Richland Well Field					Initial isolation zone		
12	Lamb Weston					Initial isolation zone		
13	1100 Area - Moderate Constraint							
14	1100 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
15	1100 Area OOA	Habitat of concern Shrub steppe Plant species of concern						
16 17	City of Richland Well Fields					Protective action zone		
18 19	City of West Richland Well Field					Protective action zone		

Table A-1. Agriculture. (13 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	Lamb Weston					Protective action zone		
2	1100 Area - No or Minor Constraint							
3	1100 Area	Heavily disturbed existing operating areas			Lack of hazardous chemical, radioactive, and mixed waste sites		Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints
4	Columbia River	50% breach						
5	3000 Area - Major Constraint							
6	3000 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
7	City of Richland Well Fields					Initial isolation zone		
8	City of West Richland Well Field					Initial isolation zone		
9	City of West Richland Well Field					Initial isolation zone		
10	Lamb Weston					Initial isolation zone		
11	Lamb Weston					Initial isolation zone		
12	3000 Area - Moderate Constraint							
13	3000 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
14	City of Richland Well Fields					Protective action zone		
15	City of West Richland Well Field					Protective action zone		
16	City of West Richland Well Field					Protective action zone		
17	Lamb Weston					Protective action zone		
18	Lamb Weston					Protective action zone		

9615459-2840

Table A-1. Agriculture. (13 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 3000 Area - No or Minor Constraint							
2 3000 Area	Heavily disturbed existing operating areas			Lack of hazardous chemical, radioactive, and mixed waste sites		Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints
3 Columbia River	50% breach						
4							
5							

Table A-2. Waste Management. (11 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 100 Areas - Major Constraint							
2 100 Area		Columbia River Corridor (Within high water marks)	RAD and hazardous contamination greater than MCLs	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
3 100-B/C	Chinook spawning habitat						
4 100-D	Terrestrial element occurrences				Exclusion zone		
5 100-N	Bald Eagle roost/nesting locations				Exclusion zone		
6 100-KE/KW					Exclusion zone		
7 South of 100-B							Geological fault
8 Vernita Bridge Area			No contamination exists--no new contamination allowed				
9 100 Areas - Moderate Constraint							
10 100 Area		100-year flood plain		Unknown and suspected waste site with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
11 100 Areas OOA	Ferruginous Hawk nesting sites (100-B)						
12 Between Operating Areas	Riparian/Wetland (adj. to river corridor)						
13							
14 100-B/C					Protective zone		

Table A-2. Waste Management. (11 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	100-H					Protective zone		
2	100-K	Species of concern (100-B/D Area, Islands, 100-F)						
3	100 Areas - No or Minor Constraint							
4	100 Area		50% breach 1948 flood Probable maximum flood				Proximity and nature of disturbance determined through review clearance process to be minimal	
5	100 Area OOA	West of 100-B/C, East OOA to 100-F						
6	Between Operating Areas							
7								
8	All other areas							Little or no geological constraints
9	200 Areas - Major Constraint							
10	200 Area		Natural and artificial lakes and ponds Gable Mountain Pond Ditches and drainages	RAD and hazardous contamination greater than MCLs Upgradient of 100 Area and 200 and 300 plumes	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
11	200 East TWRS					Exclusion zone		
12	200 West TWRS					Exclusion zone		
13	B Plant					Exclusion zone		
14	HWVP					Exclusion zone		
15	PFP					Exclusion zone		

Table A-2. Waste Management. (11 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 200 Areas - Moderate Constraint							
2 200 Area				Unknown and suspected waste site with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
3 West one-half 200 West Area between 200 East/West	Habitat of concern Shrub steppe						
4 5 6 7 West one-quarter 200 East	Species of concern Level III (plant)						
8 200 Areas - No or Minor Constraint							
9 200 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	Little or no geological constraints
10 East one-half 200 West	Heavily disturbed existing operating areas						
11 12 East three quarters 200 West							
13 300 Area - Major Constraint							
14 300 Area		Columbia River Corridor (Within high water marks)	RAD and hazardous contamination greater than MCLs	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
15 315					Exclusion zone		
16 324					Exclusion zone		

9613459-2850

Table A-2. Waste Management. (11 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	300 Area - Moderate Constraint							
2	300 Area		100-year flood plain		Unknown and suspected waste with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
3	300 Area OOA	Habitat of concern Shrub steppe Wetland within high water marks along the Columbia River Plant species of concern						
4	North and south thirds					Protective zone		
5	300 Areas - No or Minor Constraint							
6	300 Area	Heavily disturbed existing operating areas	50% breach 1948 flood Probable maximum flood				Proximity and nature of clearance through review clearance process to be minimal	
7	400 Areas - Major Constraint							
8	400 Area			RAD and hazardous contamination greater than MCLs Upgradient of 600 and 300 Area plumes	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination		Proximity and nature of clearance through review clearance process to be minimal	
9	FFTF					Exclusion zone		

Table A-2. Waste Management. (11 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	400 Areas - Moderate Constraint							
2	400 Area				Unknown and suspected waste site with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites		Proximity and nature of disturbance determined through review clearance process to be minimal	
3	400 Area (OOA)	Habitat of concern Shrub steppe (post burn) Ferruginous Hawk nesting						
4	400 Areas - No or Minor Constraint							
5	400 Area						Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints
6	400 Area (OOA)	Heavily disturbed existing operating areas						
7	600 Area - Major Constraint							
8	600 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
9	ALE		Springs (Rattlesnake and Snively)	Upgradient of contaminant plumes		Exclusion zone		
10 11	ALE (Rattlesnake Mountain)							Geological faults, earthquake hazard, basalt outcrops, slope instability/mass movement, and alluvial fans

9613159-2051

Table A-2. Waste Management. (11 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 2	Central Core (Sand dunes)				Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination			
3	Core			RAD and hazardous contamination greater than MCLs Upgradient of 100 Area, 200 and 300 Area plumes		Exclusion zone		
4 5 6 7	North of 200 Area/Gable Mountain, Gable Butte, Along SR 240							Sand dunes and wind erodible soils Geological faults, earthquake hazard
8 9 10	North of 200 Area/Gable Mountain, Gable Butte							Basalt outcrops Sand dunes and wind erodible soils
11 12 13 14 15	Core Area--Vernita Bridge area West bank of Columbia River South of 100-F		Columbia River Corridor (within high water marks)					
16	North Slope		Columbia River Corridor (within high water marks) Natural and artificial lakes and ponds	Prevention of new contamination		Exclusion zone		
17 18 19 20 21	North Slope Red zone North and east of Columbia River White Bluffs							Slope instability and mass movement, active sand dunes, sand dunes, and wind erodible soils

Table A-2. Waste Management. (11 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	South 600			RAD and hazardous contamination greater than MCLs Upgradient of 100 Area, 200 and 300 Area plumes	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination	Exclusion zone Initial isolation zone		
2	South 600 Area--West bank of Columbia River		Columbia River Corridor (within high water marks)					
3								
4	Siemens					Initial isolation zone		
5	WNP2					Initial isolation zone		
6	600 Area - Moderate Constraint							
7	600 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
8	ALE		Yakima River 100-year flood plain Ephemeral streams			Protective zone		
9	Central Core	Habitats of concern Shrub Steppe			Unknown and suspected waste site with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites	Protective zone		
10	Core Area--Vernita		100-year flood plain (Columbia River)					
11	Bridge area							
12	West bank of Columbia River							
13	River							
14	South of 100-F							

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Table A-2. Waste Management. (11 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	North Slope	Habitats of concern Shrub Steppe	100-year flood plain (Columbia River) Ephemeral streams			Protective zone		
2	South 600	Ferruginous Hawk nesting			Unknown and suspected waste site with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites	Protective zone Protection Action zone		
3	South 600--West bank of Columbia River		100-year flood plain (Columbia River and Yakima River)					
4								
5	Semens					Protection Action zone		
6	WNP2					Protection Action zone		
7	600 Area - No or Minor Constraint							
8	600 Area						Proximity and nature of disturbance determined through review clearance process to be minimal	
9	ALE				Lack of hazardous chemical, radioactive, and mixed waste sites			
10	ALE (West and South of Rattlesnake Mountain)					No constraints		
11								
12								
13	Central Core	Cheatgrass			Lack of hazardous chemical, radioactive, and mixed waste sites. Vadose zone contaminated outside of operating areas and identified waste sites			

Table A-2. Waste Management. (11 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	Cold Creek		Probable maximum flood					
2	Core Area--North of SR-240		Cold Creek					
3			Probable maximum flood					
4			Columbia River					
5	Core Area--Vernita Bridge area West bank of Columbia River South of 100-F		50% breach					
6			Columbia River					
7			1948 flood					
8			Columbia River Probable maximum flood					
9	North Slope		50% breach 1948 flood Probable maximum flood		Lack of hazardous chemical, radioactive, and mixed waste sites			
10	North Slope (North and East of Columbia River)					No constraints		
11	South 600 Area				Lack of hazardous chemical, radioactive, and mixed waste sites			
12								
13	South 600 Area--West bank of Columbia River		50% breach 1948 flood Probable maximum flood					
14	700 Area - Major Constraint							
15	700 Area	Incompatible with Federal Building office use and proximity to adjacent downtown Richland					Proximity and nature of disturbance dependent on site characteristics and review/clearance	
16	700 Area - Moderate Constraint							
17	700 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
18	700 Area - Moderate Constraint							
19	700 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	

9613159-2053

Table A-2. Waste Management. (11 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 2 City of Richland Well Fields					Protective Action zone		
3 4 City of West Richland Well Field					Protective Action zone		
5 Lamb Weston					Protective Action zone		
6 700 Area - No or Minor Constraint							
7 700 Area		No known concerns		Lack of hazardous chemical, radioactive, and mixed waste sites		Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints
8 1100 Area - Major Constraint							
9 1100 Area	Incompatible with existing use of area for warehouse, light and heavy vehicle maintenance, and office use, proximity to adjacent North Richland business and residential areas		Radionuclide and hazardous chemical contamination greater than MCL's northwest and extending into the 1100 Area			Proximity and nature of disturbance dependent on site characteristics and review/clearance	
10 11 City of Richland Well Fields					Initial isolation zone		
12 13 City of West Richland Well Field					Initial isolation zone		
14 Lamb Weston					Initial isolation zone		
15 1100 Area - Moderate Constraint							
16 1100 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
17 1100 Area OOA	Habitat of concern Shrub steppe Plant species of concern						
18 19 City of Richland Well Fields					Protective Action zone		

Table A-2. Waste Management. (11 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	City of West Richland					Protective Action zone		
2	Well Field							
3	Lamb Weston					Protective Action zone		
4	1100 Area - No or Minor Constraint							
5	1100 Area				Lack of hazardous chemical, radioactive, and mixed waste sites		Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints
6	Columbia River		50% breach					
7	3000 Area - Major Constraint							
8	3000 Area	Incompatible with existing use of area for warehouse and office use and proximity to adjacent North Richland business and residential areas					Proximity and nature of disturbance dependent on site characteristics and review/clearance	
9	3000 Area - Moderate Constraint							
10							Proximity and nature of disturbance dependent on site characteristics and review/clearance	
11	3000 Area - No or Minor Constraint							
12	3000 Area				Lack of hazardous chemical, radioactive, and mixed waste sites		Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints
13	Columbia River		50% breach					

9617459-2854

Table A-3. Industrial and Commercial. (12 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 100 Areas - Major Constraint							
2 100 Area		Columbia River Corridor (within high water marks)	RAD and hazardous contamination greater than MCLs	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
3 100-B/C	Chinook spawning habitat						
4 100-D	Terrestrial element Occurrences				Exclusion zone		
5 100-KE/KW					Exclusion zone		
6 100-N	Bald Eagle roost/nesting locations				Exclusion zone		
7 South of 100-B							Geological fault
8 100 Areas - Moderate Constraint (DOL)							
9 100 Area		100-year flood plain		Unknown and suspected wastesite with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
10 100 Areas between operating areas (OOA)	Ferruginous Hawk nesting sites (100-B) Riparian/Wetland (adjacent to river corridor)						
11							

Table A-3. Industrial and Commercial. (12 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	100-B/C					Protective zone		
2	100-H					Protective zone		
3	100-K	Species of concern (100-B/D area, islands, 100-F)						
4	100 Areas - No or Minor Constraint							
5	100 Area		50% breach 1948 flood Probable maximum flood				Proximity and nature of disturbance determined through review clearance process to be minimal	
6	100 Area between operating areas (OOA)	West of 100-B/C, east OOA to 100-F						
7	All other areas							Little or no geological constraints
8	East of Gable Mountain			No downgradient plumes				
9	Vernita Bridge Area			No contamination				
10	200 Areas - Major Constraint							
11	200 Area			RAD and hazardous contamination greater than MCLs Upgradient of 100 Area	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
12	200 East TWRS					Exclusion zone		
13	200 West TWRS					Exclusion zone		
14	B Plant					Exclusion zone		
15	B Pond		Natural and artificial lakes and ponds					
16	Ditches and drainages							
17								

Table A-3. Industrial and Commercial. (12 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 Gable Mountain Pond							
2 HWVP					Exclusion zone		
3 PFP					Exclusion zone		
4 200 Areas - Moderate Constraint							
5 200 Area				Unknown and suspected wastesite with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
6 West one-half of the 7 200 West area between 8 200 East and 200 West	Habitat of concern Shrub steppe						
9 West one-quarter of 200 10 East	Species of concern Level III (plant)						
11 200 Areas - No or Minor Constraint							
12 200 Area						Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints
13 East one-half of 14 200 West	Heavily disturbed existing operating areas						
15 East three-quarters of 16 200 East							

Table A-3. Industrial and Commercial. (12 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	300 Areas - Major Constraint							
2	300 Area		Columbia River Corridor (within high water marks)	RAD and hazardous contamination greater than MCLs	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
3	315 Building					Exclusion zone		
4	324 Building					Exclusion zone		
5	300 Areas - Moderate Constraint							
6	300 Area		100-year flood plain		Unknown and suspected wastesite with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
7	300 Area OOA	Habitat of concern Shrub steppe Wetland within high water marks along Columbia River Plant species of concern						
8	North and south thirds					Protective zone		

96131539-2056

Table A-3. Industrial and Commercial. (12 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
300 Areas - No or Minor Constraint							
300 Area	Heavily disturbed existing operating areas	50% breach 1948 flood Probable maximum flood				Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints
400 Areas - Major Constraint							
400 Area			RAD and hazardous contamination greater than MCLs Upgradient of 600 and 300 area plumes	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
FFTF					Exclusion zone		
400 Areas - Moderate Constraint							
400 Area (OOA)	Habitat of concern Shrub steppe (post burn) Ferruginous Hawk nesting			Unknown and suspected wastesite with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
400 Areas - No or Minor Constraint							
400 Area (IOA)	Heavily disturbed existing operating areas					Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints

Table A-3. Industrial and Commercial. (12 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
600 Area - Major Constraint							
600 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
ALE	Rare habitats Sand dunes Wetlands White bluffs	Springs (Rattlesnake and Snively)	Upgradient		Exclusion zone		
ALE Rattlesnake Mountain							Geological faults, earthquake hazard, basalt outcrops, slope instability/mass movement, and alluvial fans
Central Core (Sand dunes)	Terrestrial element occurrence Big sagebrush Desert streams (ALE) Rock outcrops/basalt (Gable Mountain/Gable Butte) (Umtanum Ridge)						
Core Area			RAD and hazardous contamination greater than MCLs Upgradient of 100 Area, 200 and 300 plumes	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination	Exclusion zone		
Core Area--North of 200 Area/Gable Mountain, Gable Butte							Basalt outcrops

9613459 2057

Table A-3. Industrial and Commercial. (12 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 2 3 4	Core Area--North of 200 Area/Gable Mountain, Gable Butte along SR-240							Sand dunes and wind erodible soils Geological faults, earthquake hazard
5 6 7 8 9	Core Area--Vernita Bridge area West bank of Columbia River South of 100-F		Columbia River Corridor (within high water marks)					
10	North Slope	Rare habitats Sand dunes Wetlands White bluffs	Columbia River Corridor (within high water marks) Natural and artificial lakes and ponds			Exclusion zone		
11 12 13 14 15	North Slope Red zone North and east of Columbia River White Bluffs							Slope instability and mass movement, active sand dunes, sand dunes, and wind erodible soils
16	Siemens					Initial isolation zone		
17	South 600 Area				Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination	Exclusion zone Initial isolation zone		Sand dunes and wind erodible soils
18 19	South 600 Area--West bank of Columbia River		Columbia River Corridor (within high water mark)					
20	WNP2					Initial isolation zone		
21	600 Area - Moderate Constraint							
22	600 Area		Yakima River 100-year flood plain Ephemeral streams				Proximity and nature of disturbance dependent on site characteristics and review/clearance	

Table A-3. Industrial and Commercial. (12 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	ALE					Protective zone		
2	Central Core	Habitats of concern Shrub steppe						
3	Core Area				Unknown and suspected wastesite with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites	Protective zone		
4 5 6 7 8	Core Area---Vernita Bridge area West bank of Columbia River South of 100-F		100-year flood plain (Columbia River)					
9	North Slope	Habitats of concern Shrub steppe	100-year flood plain (Columbia River) Ephemeral streams			Protective zone		
10	Siemens					Protective action zone		
11	South 600 Area	Ferruginous Hawk	100-year flood plain (Columbia River and Yakima River)		Unknown and suspected wastesite with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites	Protective zone Protective action zone		

9613169-2050

Table A-3. Industrial and Commercial. (12 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	WNP2					Protective action zone		
2	600 Area - No or Minor Constraint							
3	600 Area						Proximity and nature of disturbance determined through review clearance process to be minimal	
4	ALE				Lack of hazardous chemical, radioactive, and mixed waste sites			
5	ALE (West and south of Rattlesnake Mountain)							
6								
7								
8	Central Core	Cheatgrass						
9	Cold Creek		Probable maximum flood					
10	Core Area				Lack of hazardous chemical, radioactive, and mixed waste sites. Vadose zone contaminated outside of operating areas and identified waste sites			
11	Core Area--North of SR-240		Cold Creek Probable maximum flood					
12								
13	Core Area--Vernita Bridge area		Columbia River 50% breach					
14	West bank of Columbia River		Columbia River 1948 flood					
15			Columbia River Probable maximum flood					
16	South of 100-F							
17								
18	North Slope		50% breach 1948 flood Probable maximum flood	None	Lack of hazardous chemical, radioactive, and mixed waste sites			

Table A-3. Industrial and Commercial. (12 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 2 3	North Slope (North and East of Columbia River)					No constraints		
4	South 600 Area		50% breach 1948 flood Probable maximum flood		Lack of hazardous chemical, radioactive, and mixed waste sites			
5	700 Area - Major Constraint							
6	700 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
7	700 Area - Moderate Constraint							
8	700 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
9 10	City of Richland Well Fields					Protective action zone		
11 12	City of West Richland Well Field					Protective action zone		
13	Lamb Weston					Protective action zone		
14	700 Area - No or Minor Constraint							
15	700 Area	Heavily disturbed existing operating areas			Lack of hazardous chemical, radioactive, and mixed waste sites		Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints

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Table A-3. Industrial and Commercial. (12 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	1100 Area - Major Constraint							
2	1100 Area			Radionuclide and hazardous chemical contamination greater than MCLs northwest and extending into the 1100 Area			Proximity and nature of disturbance dependent on site characteristics and review/clearance	
3	City of Richland Well Fields					Initial isolation zone		
4								
5	City of West Richland Well Field					Initial isolation zone		
6								
7	Lamb Weston					Initial isolation zone		
8	1100 Area - Moderate Constraint							
9	1100 Area OOA	Habitat of concern Shrub steppe Plant species of concern					Proximity and nature of disturbance dependent on site characteristics and review/clearance	
10	City of Richland Well Fields					Protective action zone		
11								
12	City of West Richland Well Field					Protective action zone		
13								
14	Lamb Weston					Protective action zone		
15	1100 Area - No or Minor Constraint							
16	1100 Area	Heavily disturbed existing operating areas			Lack of hazardous chemical, radioactive, and mixed waste sites		Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints
17	Columbia River		50% breach					

Table A-3. Industrial and Commercial. (12 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	3000 Area - Major Constraint							
2	3000 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
3	City of Richland Well Fields					Initial isolation zone		
4	City of West Richland Well Field					Initial isolation zone		
5	Lamb Weston					Initial isolation zone		
6	3000 Area - Moderate Constraint							
7	3000 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
8	City of Richland Well Fields					Protective action zone		
9	City of West Richland Well Field					Protective action zone		
10	Lamb Weston					Protective action zone		
11	3000 Area - No or Minor Constraint							
12	3000 Area	Heavily disturbed existing operating areas			Lack of hazardous chemical, radioactive, and mixed waste sites		Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints
13	Columbia River		50% breach					

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Table A-4. Environmental Restoration. (11 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 100 Areas - Major Constraint							
2 100 Area		Columbia River Corridor (Within high water marks)	RAD and hazardous contamination greater than MCLs	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination.		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
3 100-B/C	Chinook spawning habitat						
4 100-D	Terrestrial element occurrences				Exclusion zone		
5 100-N	Bald Eagle roost and nesting locations				Exclusion zone		
6 100-KE/KW					Exclusion zone		
7 All other areas							Little or no geological constraints
8 South of 100-B							Geological fault
9 100 Areas - Moderate Constraint							
10 100 Area		100 year flood plain		Unknown and suspected waste site with potential for chemical, radioactive and mixed waste sites, and surface, vadose zone, and groundwater contamination. Vadose zone contamination outside of operating areas and identified waste sites.		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
11 100 Areas between Operating Areas (OOA)	Ferruginous Hawk nesting sites (100-B) Riparian/Wetland (adjacent to river corridor)						
13 100-B/C					Protective zone		
14 100-H					Protective zone		
15 100-K	Species of concern (100B/D Area, Islands, and 100-F)						

Table A-4. Environmental Restoration. (11 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 100 Areas - No or Minor Constraint							
2 100 Area		50% breach 1948 flood Probable maximum flood				Proximity and nature of disturbance dependent on site characteristics and review/clearance	
3 100 Areas between 4 Operating Areas (OOA)	West of 100-B/C, east of OOA to 100-F						
5 East of Gable Mountain			No contamination				
6 Vernita Bridge Area			No down-gradient plumes				
7 200 Areas - Major Constraint							
8 200 Area			RAD and hazardous contamination greater than MCLs Upgradient of 100 Area 200 and 300 plumes	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination.		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
9 200 East TWRS					Exclusion zone		
10 200 West TWRS					Exclusion zone		
11 B Plant					Exclusion zone		
12 B Pond		Natural and artificial lakes and ponds Gable Mountain Pond Ditches and drainages					
13 HWVP					Exclusion zone		
14 PFP					Exclusion zone		
15 200 Areas - Moderate Constraint							
16 200 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	

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Table A-4. Environmental Restoration. (11 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 2 3 4 West one-half portion of 200 West Area between the 200 East and 200 West Areas	Habitat of concern Shrub steppe			Unknown and suspected waste site with potential for chemical, radioactive and mixed waste sites, and surface, vadose zone, and groundwater contamination. Vadose zone contamination outside of operating areas and identified waste sites.			
5 6 West one-quarter of 200 East Area	Species of concern Level III (plant)						
7 200 Areas - No or Minor Constraint							
8 200 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	Little or no geological constraints
9 10 East one-half of the 200 West Area	Heavily disturbed existing operating areas						
11 12 East three-quarters of the 200 East							
13 300 Area - Major Constraint							
14 300 Area		Columbia River Corridor (Within high water marks)	RAD and hazardous contamination greater than MCLs	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination.		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
15 315					Exclusion zone		
16 324					Exclusion zone		

Table A-4. Environmental Restoration. (11 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 300 Area - Moderate Constraint							
2 300 Area		100-year flood plain		Unknown and suspected waste site with potential for chemical, radioactive and mixed waste sites, and surface, vadose zone, and groundwater contamination. Vadose zone contamination outside of operating areas and identified waste sites.		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
3 300 Area OOA	Habitat of concern Shrub steppe Wetland within high water marks along Columbia River Plant species of concern						
4 North and south thirds					Protective zone		
5 300 Areas - No or Minor Constraint							
6 300 Area	Heavily disturbed existing operating areas	50% breach 1948 flood Probable maximum flood				Proximity and nature of disturbance dependent on site characteristics and review/clearance	Little or no geological constraints
7 400 Areas - Major Constraint							
8 400 Area			RAD and hazardous contamination greater than MCLs Upgradient of 600 and 300 area plumes	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination. Vadose zone contamination outside of operating areas and identified waste sites.		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
9 FFTF					Exclusion zone		

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Table A-4. Environmental Restoration. (11 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 400 Areas - Moderate Constraint							
2 400 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
3 400 Area (OOA)	Habitat of concern Shrub steppe (post burn) Ferruginous Hawk nesting						
4 400 Areas - No or Minor Constraint							
5 400 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	Little or no geological constraints
6 400 Area (OOA)	Heavily disturbed existing operating areas						
7 600 Area - Major Constraint							
8 600 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
9 ALE	Rare habitats Sand dunes Wetlands White Bluffs	Springs (Rattlesnake and Snively)	Upgradient		Exclusion zone		
10 11 ALE Rattlesnake Mountain							Geological faults, earthquake hazard, basalt outcrops, slope instability/mass movement, and alluvial fans

Table A-4. Environmental Restoration. (11 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 2 Central Core (Sand dunes)	Terrestrial element occurrences Desert streams (ALE) Rock outcrops/basalt (Gable Mountain/Gable Butte) (Umtanum Ridge)						
3 Core			Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination		Exclusion zone		
4 5 6 7 8 Core Area--Vernita Bridge area West bank of Columbia River South of 100-F		Columbia River Corridor (within high water marks)					
9 10 11 North of 200 Area/Gable Mountain, Gable Butte along SR 240							Sand dunes and wind erodible soils Geological faults, earthquake hazard
12 13 North of 200 Area/Gable Mountain, Gable Butte							Basalt outcrops Sand dunes and wind erodible soils
14 North Slope	Rare habitats Sand dunes Wetlands White Bluffs	Columbia River Corridor (within high water marks) Natural and artificial lakes and ponds			Exclusion zone		
15 16 17 18 19 North Slope Red zone North and east of Columbia River White Bluffs							Slope instability and mass movement, active sand dunes, sand dunes, and wind erodible soils

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Table A-4. Environmental Restoration. (11 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	South 600			Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination		Exclusion zone Initial isolation zone		
2	South 600--West bank of Columbia River		Columbia River Corridor (within high water marks)					
3								
4	Siemens					Initial isolation zone		
5	WNP2					Initial isolation zone		
6	600 Area - Moderate Constraint							
7	600 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
8	ALE		Yakima River 100-year flood plain Ephemeral streams			Protective zone		
9	Central Core	Habitats of concern Shrub steppe						
10	Core			Unknown and suspected waste site with potential for chemical, radioactive and mixed waste sites, and surface, vadose zone, and groundwater contamination. Vadose zone contamination outside of operating areas and identified waste sites.		Protective zone		
11	Core Area--Vernita		100-year flood plain (Columbia River)					
12	Bridge area							
13	West bank of Columbia							
14	River							
15	South of 100-F							

Table A-4. Environmental Restoration. (11 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 North Slope	Habitats of concern Shrub steppe	100-year flood plain (Columbia River) Ephemeral streams			Protective zone		
2 South 600	Ferruginous Hawk	100-year flood plain (Columbia River and Yakima River)	Unknown and suspected waste site with potential for chemical, radioactive and mixed waste sites, and surface, vadose zone, and groundwater contamination. Vadose zone contamination outside of operating areas and identified waste sites.		Protective zone Protection Action zone		
3 Siemens					Protection Action zone		
4 WNP2					Protection Action zone		
5 600 Area - No or Minor Constraint							
6 600 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
7 ALE			Lack of hazardous chemical, radioactive, and mixed waste sites				
8 ALE (West and South 9 of Rattlesnake 10 Mountain)					No constraints		
11 Central Core	Cheatgrass						
12 Cold Creek		Probable maximum flood					

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Table A-4. Environmental Restoration. (11 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	Core				Lack of hazardous chemical, radioactive, and mixed waste sites. Vadose zone contaminated outside of operating areas and identified waste sites			
2	Core Area--Vernita Bridge area West bank of Columbia River South of 100-F		Columbia River 50% breach					
3			Columbia River 1948 flood					
4			Columbia River Probable maximum flood					
5								
6								
7	Core Area--North of SR-240		Cold Creek Probable maximum flood					
8								
9	North Slope		50% breach 1948 flood Probable maximum flood	Lack of hazardous chemical, radioactive, and mixed waste sites				
10	North Slope (North and East of Columbia River)					No constraints		
11								
12								
13	South 600		50% breach 1948 flood Probable maximum flood		Lack of hazardous chemical, radioactive, and mixed waste sites.			
14	700 Area - Major Constraint							
15	700 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	

Table A-4. Environmental Restoration. (11 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 700 Area - Moderate Constraint							
2 700 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
3 City of Richland Well Fields					Protective Action zone		
5 City of West Richland Well Field					Protective Action zone		
7 Lamb Weston					Protective Action zone		
8 700 Area - No or Minor Constraint							
9 700 Area	Heavily disturbed existing operating areas			Lack of hazardous chemical, radioactive, and mixed waste sites		Proximity and nature of disturbance dependent on site characteristics and review/clearance	Little or no geological constraints
10 1100 Area - Major Constraint							
11 1100 Area			Radionuclide and hazardous chemical contamination greater than MCLs northwest and extending into the 1100 Area			Proximity and nature of disturbance dependent on site characteristics and review/clearance	
12 City of Richland Well Fields					Initial isolation zone		
14 City of West Richland Well Field					Initial isolation zone		
16 Lamb Weston					Initial isolation zone		
17 1100 Area - Moderate Constraint							
18 1100 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	

Table A-4. Environmental Restoration. (11 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	1100 Area OOA	Habitat of concern Shrub steppe Plant species of concern						
2	City of Richland Well Fields					Protective Action zone		
3								
4	City of West Richland Well Fields					Protective Action zone		
5								
6	Lamb Weston					Protective Action zone		
7	1100 Area - No or Minor Constraint							
8	1100 Area	Heavily disturbed existing operating areas			Lack of hazardous chemical, radioactive, and mixed waste sites.		Proximity and nature of disturbance dependent on site characteristics and review/clearance	Little or no geological constraints
9	Columbia River		50% breach					
10	3000 Area - Major Constraint							
11	3000 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
12	3000 Area - Moderate Constraint							
13	3000 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
14	3000 Area - No or Minor Constraint							
15	3000 Area	Heavily disturbed existing operating areas			Lack of hazardous chemical, radioactive, and mixed waste sites.		Proximity and nature of disturbance dependent on site characteristics and review/clearance	Little or no geological constraints
16	Columbia River		50% breach					
17								
18								

Table A-5. Wildlife and Habitat Management. (16 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
100 Areas - Major Opportunity							
100 Area		Columbia River Corridor (within the high-water marks)	RAD and hazardous contamination greater than MCLs			Proximity and nature of disturbance dependent on site characteristics and review/clearance	
100-B/C	Chinook spawning habitat						
100-D	Terrestrial element Occurrences				Exclusion Zone		
100-KE/KW					Exclusion Zone		
100-N	Bald Eagle roost and nesting locations				Exclusion Zone		
100 Areas - Major Constraint							
100 Area				Presence and type of hazardous chemical, radioactive, and mixed waste sites, and associated surface, vadose zone, and groundwater contamination			
100 Areas - Moderate Opportunity (DOL)							
100 Areas		100-year flood plain				Proximity and nature of disturbance dependent on site characteristics and review/clearance	
100 Areas between operating areas (OOA)	Ferruginous Hawk nesting sites (100-B) Riparian/Wetland (adjacent to river corridor)						

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Table A-5. Wildlife and Habitat Management. (16 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	100 Areas - Moderate Constraint (DOL)							
2	100 Area				Unknown and suspected waste site with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites			
3	100-B/C					Protective zone		
4	100-H					Protective zone		
5	100 Areas - No or Minor Opportunity							
6	100 Area		50% breach 1948 flood Probable maximum flood				Proximity and nature of disturbance determined through review clearance process to be minimal	
7	100 Areas - No or Minor Constraint							
8	100 Area							Little or no geological constraints
9	100 Area between operating areas (OOA)	West of 100-BC, east to 100-F (OOA)						
10	East of Gable Mountain			No down-gradient plumes				
11	Vernita Bridge Area			No contamination				

Table A-5. Wildlife and Habitat Management. (16 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 200 Areas - Major Opportunity							
2 B Pond		Natural and artificial lakes and ponds Gable Mountain Pond Ditches and drainages					
3 200 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
4 200 Areas - Major Constraint							
5 200 Area			RAD and hazardous contamination greater than MCLs Upgradient of 100 Area, 200 and 300 plumes	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination			
6 200 E TWRS					Exclusion zone		
7 200 W TWRS					Exclusion zone		
8 HWVP					Exclusion zone		
9 PFP					Exclusion zone		
10 B Plant					Exclusion zone		
11 200 Areas - Moderate Opportunity							
12 200 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
13 West one-half of 14 200 West Area 15 between 200 East and 16 200 West	Habitat of concern Shrub-steppe						

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Table A-5. Wildlife and Habitat Management. (16 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	West 1/4 200 East Area	Species of concern Level III (plant)						
2	200 Areas - Moderate Constraint							
3	200 Area				Unknown and suspected waste site with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites			
4	200 Areas - No or Minor Opportunity							
5	200 Area						Proximity and nature of disturbance determined through review clearance process to be minimal	
6	200 Areas - No or Minor Constraint							
7	200 Area							Little or no geological constraints
8	East one-half of 200 West	Heavily disturbed existing operating areas						
9								
10	East three-fourths of 200 East							
11								
12	300 Areas - Major Opportunity							
13	300 Area		Columbia River Corridor (within the high-water marks)				Proximity and nature of disturbance dependent on site characteristics and review/clearance	

Table A-5. Wildlife and Habitat Management. (16 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
300 Areas - Major Constraint							
300 Area			RAD and hazardous contamination greater than MCLs	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associates surface, vadose zone, and groundwater contamination.			
315 Building					Exclusion zone		
324 Building					Exclusion zone		
300 Areas - Moderate Opportunity							
300 Area		100-year flood plain				Proximity and nature of disturbance dependent on site characteristics and review/clearance	
300 Area (OOA)	Habitat of concern Shrub steppe Wetland within high water marks along Columbia River Plant species of concern						
300 Areas - Moderate Constraint							
300 Area				Unknown and suspected waste site with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites			

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Table A-5. Wildlife and Habitat Management. (16 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 2	300 Area - North and south thirds					Protective zone		
3	300 Areas - No or Minor Opportunity							
4	300 Area	Heavily disturbed existing operating areas	50% breach 1948 flood Probable maximum flood				Proximity and nature of disturbance determined through review clearance process to be minimal	
5	300 Areas - No or Minor Constraint							
6	300 Area							Little or no geological constraints
7	400 Areas - Major Opportunity							
8	400 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
9	400 Areas - Major Constraint							
10	400 Area			RAD and hazardous contamination greater than MCLs Upgradient of 600 and 300 Area plumes	Presence and type of hazardous chemical, radioactive, and mixed waste sites, and associated surface, vadose zone, and groundwater contamination			
11	FFTF					Exclusion zone		
12	400 Areas - Moderate Opportunity							
13	400 Area (OOA)	Habitat of concern Shrub-steppe (post burn) Ferruginous Hawk nesting					Proximity and nature of disturbance dependent on site characteristics and review/clearance	

Table A-5. Wildlife and Habitat Management. (16 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 400 Areas - Moderate Constraint							
2 400 Area				Unknown and suspected waste site with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites			
3 400 Areas - No or Minor Opportunity							
4 400 Area (IOA)	Heavily disturbed existing operating areas					Proximity and nature of disturbance determined through review clearance process to be minimal	
5 400 Areas - No or Minor Constraint							
6 400 Area							Little or no geological constraints
7 600 Area - Major Opportunity							
8 600 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
9 ALE	Rare Habitats Sand dunes Wetlands White Bluffs						Geological faults, earthquake hazard, basalt outcrops, slope instability/mass movement, and alluvial fans
10 Core							Sand dunes and wind erodible soils

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Table A-5. Wildlife and Habitat Management. (16 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 2 Central Core (Sand Dunes)	Terrestrial element occurrence Big Sage Desert streams (ALE) Rock outcrops/basalt (Gable Mountain/Gable Butte) (Umtanum Ridge)						
3 4 5 6 7 Core Area--Vernita Bridge area West bank of Columbia River South of 100-F		Columbia River Corridor (within high-water marks)					
8 South 600							Sand dunes and wind erodible soils
9 10 11 South 600 Area - West bank of the Columbia River		Columbia River Corridor (within high-water marks)					
12 13 14 15 North of 200 Area/Gable Mountain, Gable Butte, Along SR 240							Geological faults, earthquake hazard
16 17 18 North of 200 Area/Gable Mountain, Gable Butte							Basalt outcrops
19 North Slope	Rare Habitats Sand dunes Wetlands White Bluffs	Columbia River corridor (within high-water marks) Natural and artificial lakes and ponds					
20 21 22 23 24 North Slope Red Zone North and east of Columbia River White Bluffs							Slope instability and mass movement, active sand dunes, sand dunes, and wind erodible soils

Table A-5. Wildlife and Habitat Management. (16 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
600 Area - Major Constraint							
ALE			Upgradient		Exclusion zone		
Central Core			RAD hazardous contamination greater than MCLs Upgradient of 100 Area, 200 and 300 plumes	Presence and type of hazardous chemical, radioactive, and mixed waste sites, and associated surface, vadose zone, and groundwater contamination	Exclusion zone		
North Slope					Exclusion zone		
Siemens					Initial isolation zone		
South 600			RAD hazardous contamination greater than MCLs Upgradient of 100 Area, 200 and 300 plumes	Presence and type of hazardous chemical, radioactive, and mixed waste sites, and associated surface, vadose zone, and groundwater contamination	Exclusion zone Initial isolation zone		
WNP2					Initial isolation zone		
600 Area - Moderate Opportunity							
600 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
ALE		Yakima River 100-year floodplain Ephemeral streams					
Central Core	Habitats of concern Shrub-steppe						
Core Area--Vernita Bridge area West bank of Columbia River South of 100-F		100-year floodplain (Columbia River)					

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Table A-5. Wildlife and Habitat Management. (16 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 North Slope	Habitats of concern Shrub-steppe	100-year floodplain (Columbia River) Ephemeral streams					
2 South 600 Area - West 3 bank of the Columbia 4 River		100-year floodplain (Columbia and Yakima rivers)					
5 South 600	Ferruginous Hawk						
6 600 Area - Moderate Constraint							
7 ALE					Protective zone		
8 Central Core				Unknown and suspected waste site with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites	Protective zone		
9 North Slope					Protective zone		
10 Siemens					Protection action zone		

Table A-5. Wildlife and Habitat Management. (16 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 South 600				Unknown and suspected waste site with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites	Protective zone Protection action zone		
2 WNP2					Protection action zone		
3 600 Area - No or Minor Opportunity							
4 600 Area						Proximity and nature of disturbance determined through review clearance process to be minimal	
5 Central Core	Cheatgrass						
6 Cold Creek		Probable maximum flood					
7 Core Area--Vernita 8 Bridge area 9 West bank of Columbia 10 River 11 South of 100-F		Columbia River 50% breach Columbia River 1948 flood Columbia River Probable maximum flood					
12 Core Area - North of 13 SR-240		Cold Creek Probable maximum flood					
14 North Slope		50% breach 1948 flood Probable maximum flood					

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Table A-5. Wildlife and Habitat Management. (16 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 2 3 South 600 Area - West bank of the Columbia River		50% breach 1948 flood Probable maximum flood					
4 600 Area - No or Minor Constraint							
5 ALE				Lack of hazardous chemical, radioactive, and mixed waste sites			
6 7 ALE - west and south of Rattlesnake Mountain					No constraints		
8 Central Core				Lack of hazardous chemical, radioactive, and mixed waste sites Vadose zone contaminated outside of operating areas and identified waste sites			
9 North Slope			None	Lack of hazardous chemical, radioactive, and mixed waste sites			
10 11 North Slope - north and east of Columbia river					No constraints		
12 South 600				Lack of hazardous chemical, radioactive, and mixed waste sites			
13 700 Area - Major Opportunity							
14 700 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	

Table A-5. Wildlife and Habitat Management. (16 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 700 Area - Moderate Opportunity							
2 700 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
3 700 Area - Moderate Constraint							
4 City of Richland Well Fields					Protective action zone		
6 City of West Richland Well Field					Protective action zone		
8 Lamb Weston					Protective action zone		
9 700 Area - No or Minor Opportunity							
10 700 Area	Heavily disturbed existing operating areas					Proximity and nature of disturbance determined through review clearance process to be minimal	
11 700 Area - No or Minor Constraint							
12 700 Area				Lack of hazardous chemical, radioactive, and mixed waste sites			Little or no geological constraints
13 1100 Area - Major Opportunity							
14 1100 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
15 1100 Area - Major Constraint							
16 City of Richland Well Fields			Radionuclide and hazardous chemical contamination greater than MCLs northwest and extending into the 1100 Area		Initial isolation zone		

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Table A-5. Wildlife and Habitat Management. (16 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 2 City of West Richland Well Field					Initial isolation zone		
3 Lamb Weston					Initial isolation zone		
4 1100 Area - Moderate Opportunity							
5 1100 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
6 1100 Area (OOA)	Habitat of concern Shrub-steppe Plant species of concern						
7 1100 Area - Moderate Constraint							
8 9 City of Richland Well Fields					Protective action zone		
10 11 City of West Richland Well Field					Protective action zone		
12 Lamb Weston					Protective action zone		
13 1100 Area - No or Minor Opportunity							
14 1100 Area	Heavily disturbed existing operating areas					Proximity and nature of disturbance determined through review clearance process to be minimal	
15 Columbia River		50% breach					
16 1100 Area - No or Minor Constraint							
17 1100 Area				Lack of hazardous chemical, radioactive, and mixed waste sites			Little or no geological constraints

Table A-5. Wildlife and Habitat Management. (16 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 3000 Area - Major Opportunity							
2 3000 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
3 3000 Area - Major Constraint							
4 City of Richland Well Fields					Initial isolation zone		
6 City of West Richland Well Field					Initial isolation zone		
8 Lamb Weston					Initial isolation zone		
9 3000 Area - Moderate Opportunity							
10 3000 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
11 3000 Area - Moderate Constraint							
12 City of Richland Well Fields					Protective action zone		
14 City of West Richland Well Field					Protective action zone		
16 Lamb Weston					Protective action zone		
17 3000 Area - No or Minor Opportunity							
18 3000 Area	Heavily disturbed existing operating areas					Proximity and nature of disturbance determined through review clearance process to be minimal	
19 Columbia River		50% breach					

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Table A-5. Wildlife and Habitat Management. (16 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
3000 Area - No or Minor Constraint							
3000 Area				Lack of hazardous chemical, radioactive, and mixed waste sites			Little or no geological constraints

Table A-6. Public Access and Recreation. (14 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 100 Areas - Major Opportunities							
2 100-B/C	Chinook spawning habitat						
3 100-N	Bald Eagle roost and nesting locations						
4 100-D	Terrestrial element occurrences						
5 100 Area		Columbia River Corridor (within high water marks)					
6 100 Areas - Major Constraint							
7 100 Area			RAD and hazardous contamination greater than MCLs	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
8 100-D					Exclusion zone		
9 100-N					Exclusion zone		
10 100-KE/KW					Exclusion zone		
11 100 Areas - Moderate Opportunities (DOL)							
12 100-K	Species of concern (100-B/D Area, Islands, and 100-F)						
13 100 Areas between Operating Areas (OOA)	Ferruginous Hawk nesting sites (100-B) Riparian/Wetland (adjacent to river corridor)						
14							
15 100 Area		100-year flood plain					

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Table A-6. Public Access and Recreation. (14 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	100 Areas - Moderate Constraint							
2	100 Areas				Unknown and suspected waste site with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
3	100-B/C					Protective zone		
4	100-H					Protective zone		
5	100 Areas - No or Minor Opportunities							
6	100 Areas between Operating Areas (OOA)	West of 100-B/C, east OOA to 100-F						
7								
8	100 Area		50% breach 1948 flood Probable maximum flood					
9	100 Areas - No or Minor Constraint							
10	Vernita Bridge Area			No contamination				
11	East of Gable Mountain			No downgradient plumes				
12	100 Area						Proximity and nature of disturbance determined through review clearance process to be minimal	
13	All other areas							Little or no geological constraints

Table A-6. Public Access and Recreation. (14 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	200 Areas - Major Constraint							
2	B Pond		Natural and artificial lakes and ponds					
3	Gable Mountain Pond							
4	Ditches and drainages							
5	200 Area			RAD and hazardous contamination greater than MCLs Upgradient of 100 Area, 200 and 300 plumes	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
6	200 East TWRS					Exclusion zone		
7	200 West TWRS					Exclusion zone		
8	HWVP					Exclusion zone		
9	PFP					Exclusion zone		
10	B Plant					Exclusion zone		
11	200 Areas - Moderate Opportunities							
12	West one-half portion of 200 West	Habitat of concern						
13	Area between the 200	Shrub steppe						
14	East and 200 West							
15	Areas							
16								
17	West one-quarter of 200 East Area	Species of concern						
18		Level III (plant)						

9613459-2075

Table A-6. Public Access and Recreation. (14 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	200 Areas - Moderate Constraint							
2	200 Area				Unknown and suspected waste site with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
3	200 Areas - No or Minor Opportunities							
4	East one-half of the 200 West Area	Heavily disturbed existing operating areas						
5								
6	East three-quarters of the 200 East							
7								
8	200 Areas - No or Minor Constraint							
9	200 Area						Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints
10	300 Area - Major Constraint							
11	300 Area		Columbia River Corridor (within high water marks)	RAD and hazardous contamination greater than MCLs	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
12	324					Exclusion zone		
13	315					Exclusion zone		

Table A-6. Public Access and Recreation. (14 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 300 Areas - Moderate Opportunities							
2 300 Area OOA	Habitat of concern Shrub steppe Wetland within high water marks along Columbia River Plant species of concern						
3 300 Area - Moderate Constraint							
4 300 Area		100-year flood plain		Unknown and suspected waste site with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
5 North and south thirds					Protective zone		
6 300 Areas - No or Minor Opportunities							
7 300 Area	Heavily disturbed existing operating areas						
8 300 Areas - No or Minor Constraint							
9 300 Area		50% breach 1948 flood Probable maximum flood				Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints

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Table A-6. Public Access and Recreation. (14 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	400 Areas - Major Constraint							
2	400 Area			RAD and hazardous contamination greater than MCLs Upgradient of 600 and 300 area plumes	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
3	FFTF				Exclusion zone			
4	400 Areas - Moderate Opportunities							
5	400 Area (OOA)	Habitat of concern Shrub steppe (post burn) Ferruginous Hawk nesting						
6	400 Areas - Moderate Constraint							
7	400 Area				Unknown and suspected waste site with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites		Proximity and nature of disturbance dependent on site characteristics and review/clearance	
8	400 Area - No or Minor Opportunities							
9	400 Area (IOA)	Heavily disturbed existing operating areas						

Table A-6. Public Access and Recreation. (14 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 400 Areas - No or Minor Constraint							
2 400 Area						Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints
3 600 Areas - Major Opportunities							
4 North Slope	Rare habitats Sand dunes Wetlands White bluffs	Columbia River Corridor (within high water marks) Natural and artificial lakes and ponds					
5 ALE	Rare habitats Sand dunes Wetlands White bluffs	Springs (Rattlesnake and Snively)					
6 Central Core (Sand dunes) 7 Big sagebrush	Terrestrial element occurrence Desert streams (ALE) Rock outcrops/basalt (Gable Mountain/ Gable Butte) (Umtanum Ridge)						
8 Core Area--Vernita 9 Bridge area 10 West bank of Columbia 11 River 12 South of 100-F		Columbia River Corridor (within high water marks)					
13 South 600 Area--West 14 bank of Columbia River		Columbia River Corridor (within high water mark)					
15 600 Area - Major Constraint							
16 ALE			Upgradient		Exclusion zone		

06/13/09-2077

Table A-6. Public Access and Recreation. (14 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	Core			RAD and hazardous contamination greater than MCLs Upgradient of 100 Area, 200 and 300 plumes	Presence and type of hazardous chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination	Exclusion zone		Sand dunes and wind erodible soils
2	600 South					Exclusion zone Initial isolation zone		Sand dunes and wind erodible soils
3	North Slope					Exclusion zone		
4	WNP2					Initial isolation zone		
5	Siemens					Initial isolation zone		
6	600 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
7	North Slope							Slope instability and mass movement, active sand dunes, sand dunes, and wind erodible soils
8	Red zone							
9	North and east of Columbia River							
10	White Bluffs							
11								
12	ALE							Geological faults, earthquake hazard, basalt outcrops, slope instability/mass movement, and alluvial fans
13	Rattlesnake Mountain							
14	North of 200 Area/							Geological faults, earthquake hazard
15	Gable Mountain, Gable							
16	Butte along SR 240							
17	North of 200 Area/							Basalt outcrops
18	Gable Mountain, Gable							
19	Butte							

Table A-6. Public Access and Recreation. (14 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	600 Area - Moderate Opportunities							
2	Central Core	Habitats of concern Shrub steppe						
3	North Slope	Habitats of concern Shrub steppe	100-year flood plan (Columbia River) Ephemeral streams					
4	South 600	Ferruginous Hawk	100-year flood plain (Columbia River and Yakima River)					
5	600 Area		Yakima River 100-year flood plain Ephemeral streams					
6	Core Area--Vernita		100-year flood plain (Columbia River)					
7	Bridge area							
8	West bank of Columbia							
9	River							
10	South of 100-F							
11	600 Area - Moderate Constraint							
12	Core				Unknown and suspected waste site with potential for chemical, radioactive and mixed waste sites, and associated surface, vadose zone, and groundwater contamination Vadose zone contamination outside of operating areas and identified waste sites	Protective zone		
13	ALE					Protective zone		
14	North Slope					Protective zone		

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Table A-6. Public Access and Recreation. (14 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	South 600					Protective zone Protective action zone		
2	WNP2					Protective action zone		
3	Siemens					Protective action zone		
4	600 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
5	600 Area - No or Minor Opportunities							
6	Central Core	Cheatgrass						
7	South 600		50% breach 1948 flood Probable maximum flood					
8	Cold Creek		Probable maximum flood					
9	North Slope		50% breach 1948 flood Probable maximum flood					
10	Core Area--Vernita Bridge area West bank of Columbia River South of 100-F		Columbia River 50% breach					
11			Columbia River 1948 flood					
12			Columbia River Probable maximum flood					
13								
14								
15	Core Area--North of SR-240		Cold Creek Probable maximum flood					
16								

Table A-6. Public Access and Recreation. (14 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 600 Area - No or Minor Constraint							
2 North Slope			None	Lack of hazardous chemical, radioactive, and mixed waste sites			
3 ALE				Lack of hazardous chemical, radioactive, and mixed waste sites			
4 Core				Lack of hazardous chemical, radioactive, and mixed waste sites. Vadose zone contaminated outside of operating areas and identified waste sites			
5 South 600				Lack of hazardous chemical, radioactive, and mixed waste sites			
6 North Slope					No constraints		
7 North and east of							
8 Columbia River							
9 ALE							
10 West and south of							
11 Rattlesnake Mountain							
12 600 Area						Proximity and nature of disturbance determined through review clearance process to be minimal	
13 700 Area - Major Constraint							
14 700 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
15 700 Area - Moderate Constraint							
16 City of Richland Well					Protective action zone		
17 Fields							

06/13/50 2079

Table A-6. Public Access and Recreation. (14 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 2	City of West Richland Well Field					Protective action zone		
3	Lamb Weston					Protective action zone		
4	700 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
5	700 Area - No or Minor Opportunities							
6	700 Area	Heavily disturbed existing operating areas						
7	700 Area - No or Minor Constraint							
8	700 Area				Lack of hazardous chemical, radioactive, and mixed waste sites		Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints
9	1100 Area - Major Constraint							
10 11	City of Richland Well Fields			Radionuclide and hazardous chemical contamination greater than MCLs northwest and extending into the 1100 Area		Initial isolation zone		
12 13	City of West Richland Well Field					Initial isolation zone		
14	Lamb Weston					Initial isolation zone		
15	700 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	

Table A-6. Public Access and Recreation. (14 sheets)

Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1 1100 Area - Moderate Opportunities							
2 1100 Area (OOA)	Habitat of concern Shrub steppe Plant species of concern						
3 1100 Area - Moderate Constraint							
4 City of Richland Well 5 Fields					Protective action zone		
6 City of West Richland 7 Well Field					Protective action zone		
8 Lamb Weston					Protective action zone		
9 700 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
10 1100 Area - No or Minor Opportunities							
11 1100 Area	Heavily disturbed existing operating areas						
12 1100 Area - No or Minor Constraint							
13 1100 Area				Lack of hazardous chemical, radioactive, and mixed waste sites		Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints
14 1100 Area - No or Minor Constraint or Opportunities							
15 Columbia River		50% breach					
16 3000 Area - Major Constraint							
17 City of Richland Well 18 Fields					Initial isolation zone		
19 City of West Richland 20 Well Field					Initial isolation zone		
21 Lamb Weston					Initial isolation zone		

Table A-6. Public Access and Recreation. (14 sheets)

	Areas	Biological	Surface Water	Groundwater Contamination	Waste Sites	Protective Safety Buffer Zones	Cultural	Geological
1	3000 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
2	3000 Area - Moderate Constraint							
3	City of Richland Well Fields					Protective action zone		
4								
5	City of West Richland Well Field					Protective action zone		
6								
7	Lamb Weston					Protective action zone		
8	3000 Area						Proximity and nature of disturbance dependent on site characteristics and review/clearance	
9	3000 Area - No or Minor Opportunities							
10	3000 Area	Heavily disturbed existing operating areas						
11	3000 Area - No or Minor Constraint							
12	3000 Area				Lack of hazardous chemical, radioactive, and mixed waste sites		Proximity and nature of disturbance determined through review clearance process to be minimal	Little or no geological constraints
13	3000 Area - No or Minor Constraint or Opportunities							
14	Columbia River		50% breach					
15								
16								