



# Final Environmental Assessment

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**Proposed Conveyance of Land at the Hanford Site,  
Richland, Washington  
September 2015**

U.S. Department of Energy  
Richland Operations Office  
Richland, Washington 99352

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## Foreword

DOE held a 30-day public comment period on the Draft EA from July 13 through August 12, 2015. DOE considered all comments received during the comment period. The comments and DOE's responses are included in Appendix L.

Revisions were made to the Final EA based on comments received and also to reflect the outcome of consultation under the *National Historic Preservation Act*; completion of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); process for transfer of federal lands, and compliance with DOE Order 458.1, Radiation Protection of the Public and the Environment.

Revisions made to the Final EA include:

- **Water Resources**: Narrative was updated and additional analysis has been included regarding potential impacts from stormwater runoff. Pending additional quantitative analysis, a deed restriction was identified to limit the locations where stormwater drainage facilities are permissible to avoid potential for elevated groundwater levels to mobilize contaminants in the vicinity of the FSA.
- **Air Quality**: Narrative was added regarding climate change.
- **Ecological Resources**: Narrative was added regarding national emphasis to promote the health of pollinators and potential impacts from wildfire.
- **Cultural Resources**: Narrative was updated to reflect the outcome of the National Historic Preservation Act Section 106 process, including identification of historic properties and resolution of adverse effects through avoidance, mitigation and minimization. The resultant Memorandum of Agreement (MOA) was included as Appendix K.
- **Human Health and Safety**: Narrative was added regarding Intentional Destructive Acts.
- **Applicable Laws, Regulations, and Other Requirements**: Narrative regarding completion of the CERCLA, NHPA, and DOE Order 458.1 processes was added.
- **Conveyance by Deed**: A table was added that includes deed restrictions and covenants for land that may be conveyed.
- **General**: Edits were made to correct errors and provide clarification and additional information based on input received during the public comment period.

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**TABLE OF CONTENTS**

**S. SUMMARY..... S-1**

S.1 Introduction..... S-1

S.2 Purpose and Need for Agency Action..... S-1

S.3 Proposed Action..... S-1

S.4 No Action Alternative..... S-2

S.5 Scoping Process ..... S-2

S.6 Land Suitable for Transfer ..... S-3

S.7 Environmental Consequences..... S-5

**LIST OF FIGURES**

Figure S-1. TRIDEC’s Request Map “Attachment 2–Revised Map” Included in the October 13, 2011, Letter and Referred to in NDAA ..... S-2

Figure S-2. Project Area, Focused Study Area, Potential Access Agreement Land, and Land Not Suitable for Conveyance ..... S-4

## S. SUMMARY

### S.1 Introduction

The *Final Environmental Assessment for the Proposed Conveyance of Land at the Hanford Site, Richland, Washington* (EA) analyzes the potential environmental impacts of conveying Hanford Site land to the Tri-City Development Council (TRIDEC) for the purpose of economic development. The EA is prepared in accordance with the Council on Environmental Quality (CEQ) and the U.S. Department of Energy (DOE) regulations implementing the *National Environmental Policy Act* (NEPA), and the CEQ and the Advisory Council on Historic Preservation (ACHP) guidance on integrating NEPA and Section 106 of the *National Historic Preservation Act* (NHPA).

A cultural resources report has been prepared and a Memorandum of Agreement (MOA) has been signed to comply with NHPA Section 106 requirements. The NHPA Section 106 process is integrated with the implementation of the NEPA process (CEQ and ACHP 2013). The cultural resources report is not available to the public because of the sensitive nature of its content but the evaluation is summarized in the EA. DOE has completed the NHPA Section 106 process, and the MOA has been incorporated into this EA as **Appendix K**, “Memorandum of Agreement.”

### S.2 Purpose and Need for Agency Action

This EA has been prepared to evaluate potential environmental impacts regarding TRIDEC’s land request under 10 CFR 770 and a mandate established by the *National Defense Authorization Act of 2015* (NDAA; Public Law 113-291), Section 3013, directing:

Not later than September 30, 2015, the Secretary of Energy shall convey to the Community Reuse Organization of the Hanford Site (in this section referred to as the ‘Organization’) all right, title, and interest of the United States in and to two parcels of real property, including any improvements thereon, consisting of approximately 1,341 acres and 300 acres, respectively, of the Hanford Reservation, as requested by the Organization on May 31, 2011, and October 13, 2011, and as depicted within the proposed boundaries on the map titled “Attachment 2–Revised Map” included in the October 13, 2011, letter.

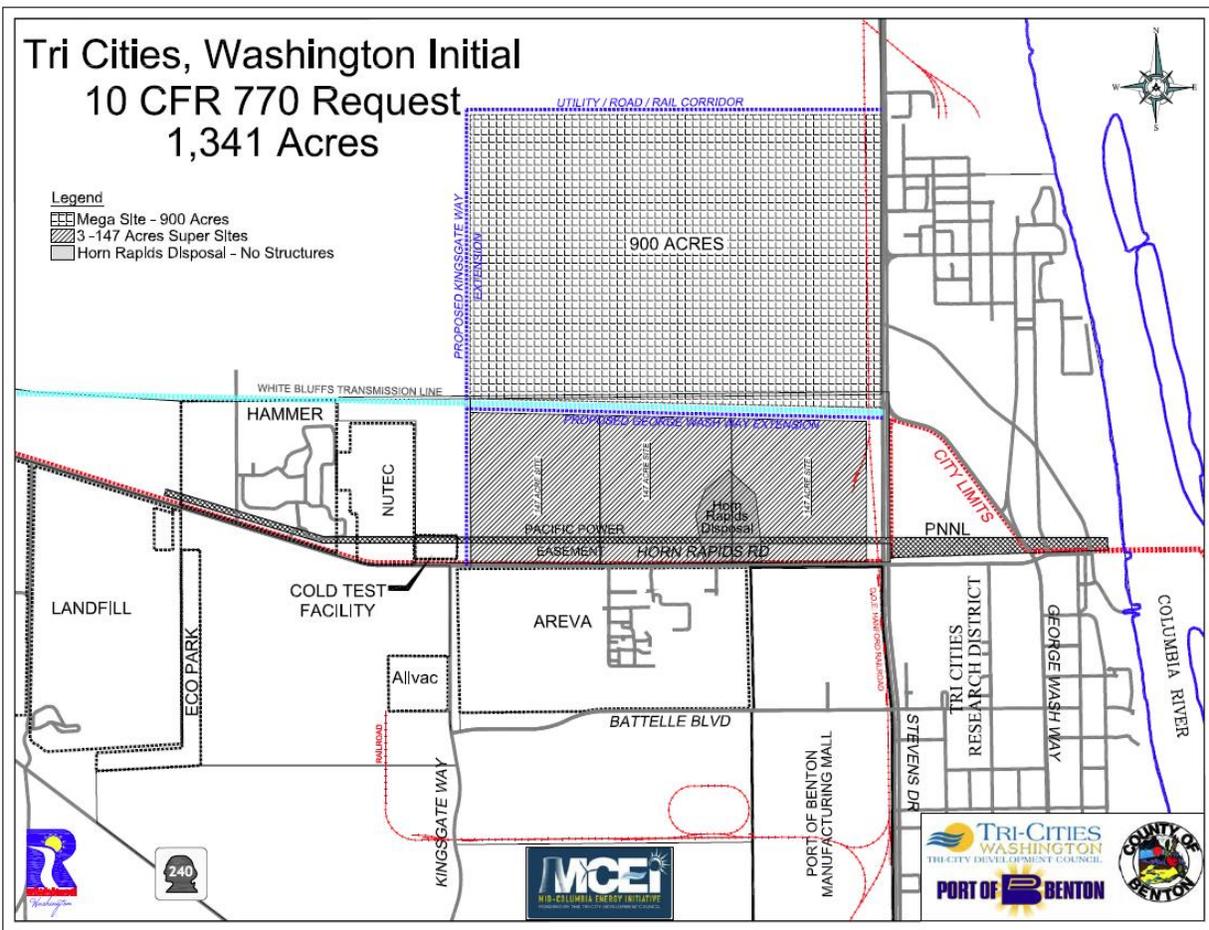
As stated in 40 CFR 1508.9, an environmental assessment: “Means a concise public document for which a Federal agency is responsible that serves to: (1) Briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact ...”

### S.3 Proposed Action

The Proposed Action is to convey the lands requested by TRIDEC, or approximately equivalent acreage, in response to their land request (under 10 CFR 770) for community economic development (TRIDEC 2011a). **Figure S-1** is cited in the NDAA (TRIDEC 2011b).

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40

**Figure S-1. TRIDEC’s Request Map “Attachment 2–Revised Map” Included in the October 13, 2011, Letter and Referred to in NDAA**



41 **Source:** TRIDEC 2011b.

42  
43 **S.4 No Action Alternative**

44 Under the No Action Alternative, DOE would not convey land in response to TRIDEC’s land request  
45 (TRIDEC 2011a, 2011b). DOE would then not meet the NDAA Section 3013 requirement to transfer  
46 land to the Hanford Site Community Reuse Organization not later than September 30, 2015. The No  
47 Action Alternative would not meet the purpose and need for action, but is analyzed as required by  
48 DOE’s NEPA-implementing procedures (10 CFR 1021.321).

49 **S.5 Scoping Process**

50 DOE published a Notice of Intent in the *Federal Register* on September 19, 2012, that announced its  
51 intention to prepare an EA to assess the potential environmental effects of conveying approximately  
52 1,641 acres of Hanford Site land to the local community reuse organization (DOE 2012c). Following  
53 the Notice of Intent, DOE held a public scoping meeting for the EA on October 10, 2012, for which  
54 notification was published in the Tri-City Herald on October 5, 7, and 10, 2012. During the scoping  
55 period, DOE received comments from members of the public, agencies, and tribes. The majority of  
56 the comments addressed the biological environment, the NEPA process, water resources,

57 socioeconomic, tribal concerns, and cultural resources. See Chapter 6 for additional information on  
58 the scoping process.

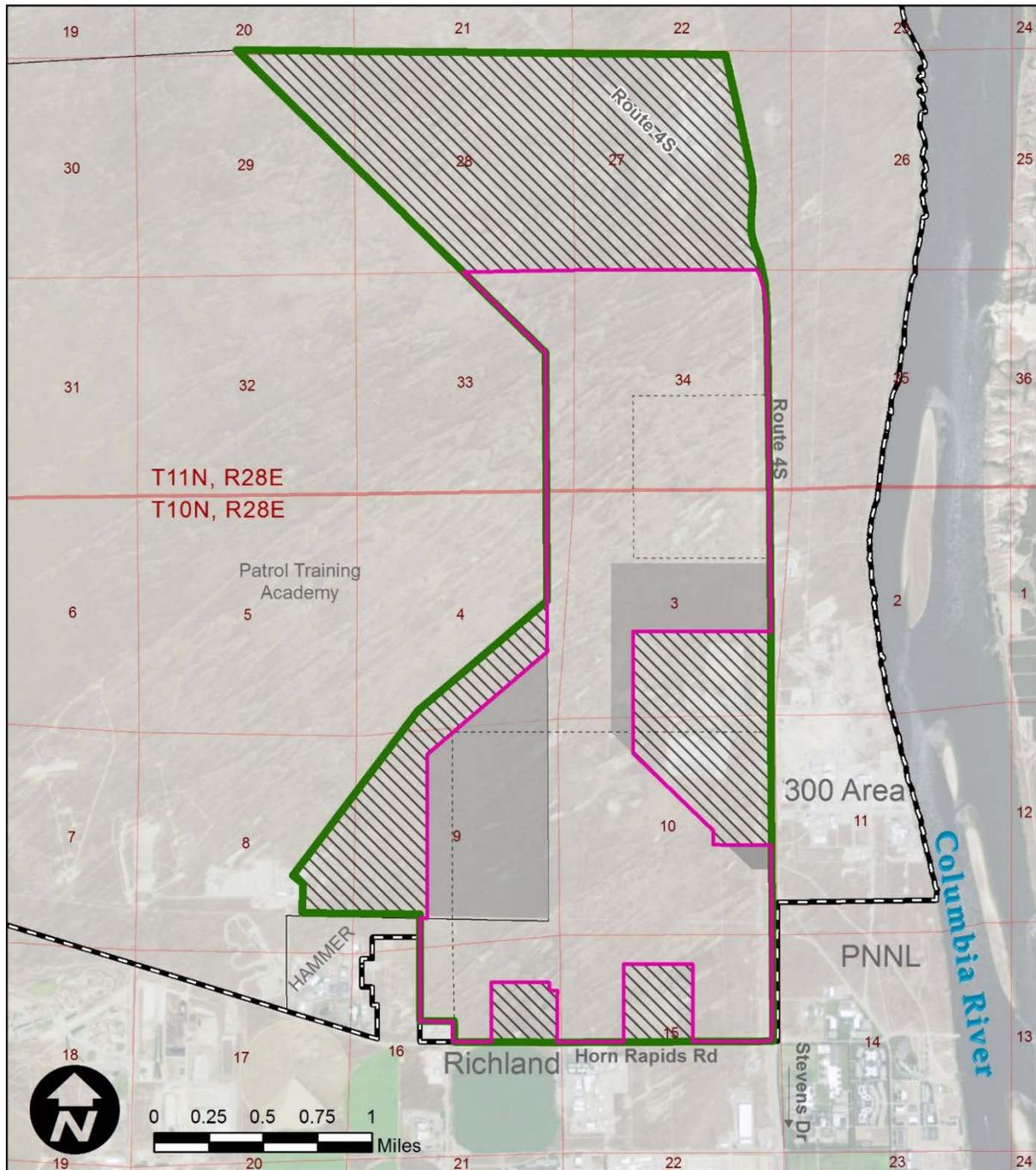
## 59 **S.6 Land Suitable for Transfer**

60 DOE recognized that there were continuing mission needs on some of the requested lands, such as an  
61 active borrow area and a safety buffer zone, making them unsuitable for conveyance. Therefore, DOE  
62 conducted a land suitability review process (see **Appendix A**, “The Hanford Site Land Suitability  
63 Review”) that started with the 4,413-acre Initial Hanford Site Land Conveyance Project Area (PA)  
64 identified in the Notice of Intent. Through this review process DOE identified and documented  
65 continuing mission or operational needs on the PA. **Figure S-2**, “Project Area, Focused Study Area,  
66 Potential Access Agreement Land, and Land Not Suitable for Conveyance,” shows the PA and 2,474  
67 acres of land referred to as the focused study area (FSA), or lands that have the least encumbrances.  
68 The FSA is made up of a 1,635-acre “main” FSA, a 300-acre “solar farm” FSA, and a 539-acre  
69 Potential Access Agreement Land (PAAL).

70 The approximately 1,641 acres of land that DOE would convey as required by the NDAA would be  
71 selected from the 1,935 acres (the acreage of the FSA minus the acreage of the PAAL  
72 [see **Figure S-2**]) that make up the main and solar farm FSAs. The 1,341 acres TRIDEC requested  
73 would be selected from the main FSA, and the 300 acres TRIDEC requested would be the 300-acre  
74 solar farm FSA land. Portions of the 539-acre PAAL could be conveyed but only for utilities  
75 providing services for transferred FSA lands. PAAL acreage would only be conveyed, if necessary,  
76 by a realty instrument other than a deed and would stay under the administrative jurisdiction of DOE.

77  
78

**Figure S-2. Project Area, Focused Study Area, Potential Access Agreement Land, and Land Not Suitable for Conveyance**



**Legend**

-  Project Area – 4,413 acres
-  Focused Study Area – 2,474 acres
-  Land Not Suitable For Conveyance
-  TRIDEC Land Request – 1,641 acres
-  Potential Access Agreement Land – 539 acres
-  Hanford Site

79

## 80 **S.7 Environmental Consequences**

81 This EA analyzes the potential environmental effects associated with the reasonably foreseeable  
82 future uses of FSA land, based on industry targets described in TRIDEC's proposal (TRIDEC 2011a)  
83 and target marketing industries (TMI) (TRIDEC 2014a), including warehousing and distribution,  
84 research and development, technology manufacturing, food processing and agriculture, "back office"  
85 (i.e., business services), and energy. In addition to information in the TRIDEC proposal and  
86 marketing studies, DOE used assumptions in the EA for its analysis based on full development of  
87 representative facilities (examples of the TMI) that would tend to maximize estimates (overestimates  
88 impacts) of potential environmental impacts associated with footprint, infrastructure, utilities,  
89 emissions, construction of buildings, projected workforce and traffic, water usage, and similar  
90 requirements.

91 This EA addresses the environmental consequences to geology; water resources; air quality;  
92 ecological resources; wetlands and floodplains; cultural resources; land use; visual resources; noise,  
93 vibration, and electromagnetic fields (EMF); utilities and infrastructure; transportation; waste  
94 management; socioeconomics and environmental justice; and human health and safety.

95 The analysis identifies the potential environmental consequences to the local region and ongoing  
96 federal missions and activities at the Hanford Site. This EA also discusses potential mitigation  
97 measures, including potential deed restrictions aimed at precluding or minimizing environmental  
98 consequences.

99 Construction and operation of the representative facilities are evaluated on all 1,635 acres of the main  
100 FSA; however, only about 1,341 acres would be transferred and developed. The Draft EA evaluated  
101 two solar technologies (photovoltaic and concentrating solar power) on the 300-acre solar farm FSA.  
102 Public comments indicating a high level of environmental, safety, and visual impact concerns resulted  
103 in the concentrated solar power technology being prohibited by a deed restriction.

104 It is assumed that about 10 percent of the PAAL (a conservative estimate) would be used for utility  
105 corridors. The most likely location for the utility corridor would be on PAAL just south of the solar  
106 farm FSA, which is an area of about 100 acres. DOE would retain ownership of the PAAL.

### 107 ***Common No Action Alternative assumptions:***

108 For the No Action Alternative (i.e., no conveyance of lands), existing activities would continue  
109 (including the two borrow pits, Navy Storage Area and Load Test [SALT] Site, well monitoring, and  
110 others). Assumptions for these include:

- 111 • Lands stay under federal ownership with restricted access and federal oversight of activities.
- 112 • Lands remain largely undeveloped and undisturbed as described in the affected environment  
113 sections regarding ambient noise, air quality, and vibration, with minimal artificial light.
- 114 • Minimal changes to the natural and cultural resources except those caused by nature  
115 (e.g., weather and burrowing animals).

### 116 ***Important assumptions for the 1,635-acre main FSA environmental consequence analysis:***

- 117 • The 1,341-acre parcel of land requested by the TRIDEC would be selected, to the extent  
118 possible, from the 1,635-acre main FSA.

- 119 • Future landowners would construct and operate facilities within the TMI categories and  
120 subareas identified by TRIDEC (see **Figure 2-3**).
- 121 • Construction and operation characteristics for each selected facility example are indicative of  
122 the TMI category and subareas they represent.
- 123 • To evaluate location-specific environmental sensitivities, the multi-phase and single-phase  
124 representative industry examples could be built anywhere on the main FSA.
- 125 • To evaluate short-term construction impacts, the first phase of the multi-phased development  
126 and all the single-phase development representative examples would begin construction  
127 simultaneously for up to 18 months (although some could take a few months longer to  
128 complete than others).
- 129 • To evaluate the impacts associated with longer-term construction, the multi-phased  
130 development would be constructed and developed in phases over a 20-year period.
- 131 • Future landowners would construct and operate their facilities in compliance with applicable  
132 federal, state (e.g., the *State Environmental Policy Act*<sup>1</sup>), and local laws, regulations, and  
133 other legal requirements.
- 134 • Future landowners would comply with any deed restrictions and covenants accompanying the  
135 land transfer action.
- 136 • Any development of these lands would be in accordance with local comprehensive land use  
137 plans, zoning and ordinances.

138 ***Important assumptions for the 300-acre solar farm FSA environmental consequence analysis:***

- 139 • The 300-acre parcel requested by TRIDEC is the solar farm FSA analyzed in this chapter.
- 140 • The single-axis photovoltaic solar technology is considered for construction and operation on  
141 the solar farm FSA.
- 142 • The solar technology example facility is much larger than the 300 acres proposed for transfer  
143 in the Proposed Action; therefore, its construction characteristics are linearly proportioned to  
144 the 300 acres of land.
- 145 • The entire solar farm FSA would be populated with photovoltaic arrays to a maximum  
146 reasonable density, avoiding the “infrastructure corridor” so as not to interfere with the  
147 operation, repair, or maintenance of the railroad, power lines, and similar systems.
- 148 • Future landowners would comply with any deed restrictions and covenants accompanying the  
149 land transfer action.
- 150 • Future landowners would construct and operate their facilities in compliance with the federal,  
151 state, and local laws, regulations, and other legal requirements.

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<sup>1</sup> *State Environmental Policy Act* (SEPA) (RCW 43.21C) is implemented by the SEPA rules (WAC 197-11-704) and applies to state agencies, municipal and public corporations, and counties. Much like *National Environmental Policy Act* (NEPA), after which SEPA is patterned, the SEPA process includes evaluation of a proposed action’s potential effects on the environment, mitigation measures, consideration of alternatives, documentation, and public notification. For further information about the SEPA process, please see <http://www.ecy.wa.gov/programs/sea/sepa/e-review.html>. If the FSA lands were transferred from federal ownership, SEPA responsibilities could be carried out by, for example, the City of Richland, Benton County, or the Port of Benton, depending on which organization is determined to be the lead agency for a proposed action.

- 152 • Any development of these lands would be in accordance with local comprehensive land use  
153 plans, zoning and ordinances.

154 ***Important assumptions for the 539-acre PAAL environmental consequence analysis:***

- 155 • These 539 acres would remain under DOE ownership.
- 156 • The PAAL includes two separate areas described in **Appendix A** (see **Figure A-6**).
- 157 – The Patrol Training Academy Range 10 and related lands
- 158 – A DOE-controlled area
- 159 • Access to PAAL would only be for the purpose of construction or maintenance of utilities on  
160 these lands.
- 161 • No public access would be allowed onto or across these lands.
- 162 • Use of this land would be subject to applicable federal laws and DOE orders, regulations, and  
163 oversight.

164 ***Construction assumptions:***

165 Construction of the representative facilities on the main and solar farm FSAs would involve extensive  
166 land disturbing activities necessary for buildings, equipment, roads, parking areas, and utilities and  
167 infrastructure. These activities would include site clearing, grading, land contouring, adding aggregate  
168 fill, soil compacting, and excavating for footings and trenches or pilings. These activities would  
169 remove vegetation, surface soil, natural and manmade surface features, and any associated objects  
170 and materials, changing the landscape from one sculpted by wind and weather to one characterized by  
171 industrial development.

172 The use of heavy machinery to effect these changes would introduce machine noise and vibration.  
173 Noise and vibration levels would be within *Richland Municipal Code* (RMC) requirements at the  
174 representative facility site boundary<sup>2</sup>. Odors associated with diesel engines, lubricants, and other  
175 sources could also be noticeable but are expected to be within the RMC limits (the regulatory  
176 compliance point for odor is at the industrial use district boundary, RMC 23.26.020). The sight of  
177 large construction equipment moving across the landscape would be readily discernable. During the  
178 part of the year with fewer daylight hours, temporary lighting would flood the construction sites so  
179 that operations could be conducted safely. Lighting would be visible from the construction sites but  
180 within the “uplight” shielding requirements of the RMC (RMC 23.58.030).

181 After site clearing activities have concluded, construction materials would be brought onsite by heavy  
182 trucks driving across unimproved surfaces. Cranes and boom-trucks would be brought onsite for  
183 building erection, sized to the task for “tilt-up” warehouses or multistory buildings. Utility services  
184 could be extended from existing lines at Horn Rapids Road before or in sequence with these activities  
185 requiring erection of power poles or buried cable, water and sewer lines, and gas lines. During  
186 construction, pneumatic tools using air compressors are often used that create higher noise levels but  
187 must still be within the RMC at the site boundary.  
188

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<sup>2</sup> RMC Chapter 23.22, “Commercial Zoning Districts,” Section 23.22.020, “Performance standards and special requirements”; and Chapter 9.16, “Public Nuisance Noise – Prohibited.”

189 **Facility operation assumptions:**

- 190 • Future landowners would operate their facilities in accordance with all applicable federal,  
191 state, and local laws, regulations, and ordinances.
- 192 • Future landowners or parties to a PAAL agreement would comply with any restrictions and  
193 covenants or requirements in other realty instruments that would be conveyed to them.

194 **Table 3-29** provides a summary of environmental consequences that are common to all representative  
195 facilities and their location; unique to certain representative facilities or their location; and specific to  
196 the photovoltaic solar technology, and utilities on the PAAL.

197 Potential mitigation measures for environmental consequences are listed at the end of each resource  
198 area discussion in **Chapter 3.0**. Many of the potential environmental consequences would be reduced  
199 by compliance with federal, state, and local laws and regulations (e.g., dust generation, lighting at  
200 night), although additional mitigation could be warranted depending on the circumstances. DOE has  
201 developed deed restrictions and covenants as mitigation measures. As described in the land suitability  
202 discussion (see **Section 2.2.3** and **Appendix A**), some PA lands were removed from consideration for  
203 transfer to avoid potential environmental consequences to cultural resources and ongoing federal  
204 missions.

205 Environmental consequences for ecological resources; noise, vibration, and EMF; utilities and  
206 infrastructure; and transportation may differ depending on specific characteristics of certain  
207 representative facilities or their location.

- 208 • For ecological resources, no species are known to occur within the FSA or the larger PA that  
209 are listed as threatened or endangered under the *Endangered Species Act* (see **Appendix H**,  
210 “Wildlife Survey”). Development within the FSA would result in habitat loss and wildlife  
211 displacement on 1,641 acres of shrub-steppe habitat. The environmental consequences can  
212 differ depending on the amount of land disturbed and whether a representative facility  
213 operates at night. Larger facilities disturb more land and nighttime operations (noise and  
214 light) can cause greater disturbance to wildlife. Of the representative facilities, warehousing  
215 facilities have both of these characteristics. The FSA, however, makes up approximately  
216 one-half of one percent of lands on the surrounding Hanford Site, including the Hanford  
217 Reach National Monument. Mitigation approaches that could be considered by future  
218 landowners and local jurisdictions include avoiding a potential impact (location), limiting the  
219 degree of an action (the intensity of the facility operation), and compensating for a potential  
220 impact (protecting the same resource at another location in lieu of this location). Mitigation  
221 that would be undertaken by DOE includes compensating for the loss of habitat within the  
222 FSA by completing habitat enhancements on the Hanford Site (see General Response #9a in  
223 **Appendix L**, “Responses to Public Comments”).
- 224 • For cultural resources, the cultural resource report identified 28 sites and 9 isolated finds  
225 within the FSA. Two of these sites (Richland Irrigation Canal and Hanford Site Plant  
226 Railroad) had been previously found eligible for the National Register of Historic Places  
227 (NRHP). **Section 3.6.1.2**, “Identification of Cultural Resources and Historic Properties”  
228 describes the process used for identifying cultural resources and historic properties including  
229 archival research, literature research, and field investigations. DOE funded four tribes – the  
230 Confederated Tribes of the Umatilla Indian Reservation, Confederated Tribes and Bands of  
231 the Yakama Nation, the Nez Perce Tribe, and the Wanapum – to provide traditional cultural  
232 property studies, the summaries of which are included in **Appendix G**, “Tribal Studies  
233 Executive Summaries.”

- 234 • The tribal summaries contain information about areas of religious and cultural significance  
235 (see **Appendix G**) to the tribes. The tribal summaries describe potential effects that would  
236 occur from the Proposed Action to three properties previously identified as eligible for  
237 listing in the NRHP: Laliik, Wanawish, and Gable Mountain. All three properties are outside  
238 of the FSA and this EA describes effects to these properties in **Section 3.8**, “Visual  
239 Resources.” The tribal summaries also contain information about other named and unnamed  
240 places and traditional resources (e.g., plants) of importance to the tribes. Additional  
241 information about areas of importance and potential effects has been provided through  
242 consultation. As a result of consultation and information received, five additional  
243 NRHP-eligible properties have been identified.  
244
- 245 NRHP-eligible properties identified are as described in the MOA and in **Section 3.6.3**,  
246 “Mitigation Measures.” Those properties include the Hanford Site Plant Railroad, the  
247 Richland Irrigation Canal, four traditional cultural properties, and contributing elements of  
248 an archeological district. **Section 3.6.3** also describes a historic homestead.
- 249 • DOE has completed the NHPA Section 106 process. The MOA was developed to resolve  
250 adverse effects and has been incorporated into this EA as **Appendix K**. See **Section 3.6**.
- 251 • Land conveyance and subsequent development activities could result in adverse impacts to  
252 archeological sites or affect cultural resources located on the FSA. Heavy machinery used  
253 during construction is known to generate noise and vibration well above the current ambient  
254 background levels. Since construction activities include the removal of surface vegetation,  
255 the change in the surface characteristics would also mean that development would foreclose  
256 opportunities for tribal use of traditional plant species. The Hanford Site includes large tracts  
257 of lands with similar plant communities with the potential to support tribal uses.
- 258 • For noise, vibration, and EMF, environmental consequences can differ depending on  
259 location and type of facilities. For construction, the closer to Pacific Northwest National  
260 Laboratory (PNNL) and Laser Interferometer Gravitational-wave Observatory (LIGO), the  
261 greater the impact. The representative facilities with the most potential to impact the  
262 sensitive receptors at PNNL and LIGO are industrial facilities (biofuels manufacturing and  
263 the rail distribution center with trains and trucks). DOE has prepared deed restriction  
264 language to limit noise, vibration, and EMF levels on parts of the FSA nearest to PNNL and  
265 to limit vibrations that could impact LIGO.
- 266 • For utilities and infrastructure, construction of the representative facilities would require the  
267 phased introduction of new infrastructure (e.g., water lines, sewer lines, and natural gas  
268 pipelines) to service the FSA where these utilities do not currently exist. Certain  
269 representative facilities, specifically the biofuels manufacturing facility, the multi-phase  
270 commerce center, and the wine warehouse, would have higher utility demands. The City of  
271 Richland has long-range plans to improve the electrical infrastructure to service the area that  
272 could include the construction of one or more additional electrical substations. The Proposed  
273 Action would result in new, long-term demand for utility services. New infrastructure and  
274 services would be provided and maintained by the City of Richland, Port of Benton,  
275 Bonneville Power Administration, and Cascade Natural Gas, as applicable. Environmental  
276 consequences for constructing infrastructure are addressed in **Chapter 3.0** for each  
277 applicable resource area.
- 278 • For transportation, the construction of the representative facilities would result in an increase  
279 in traffic on local roads and highways for the duration of construction. Operation of the  
280 representative facilities would also increase traffic and congestion on local roadways  
281 particularly during peak commuting times. The amount of traffic and degree of congestion

282 would vary depending on the type and number of facilities. The warehouse representative  
283 facility that involves a rail-based receiving and distribution facility could result in trains  
284 blocking Horn Rapids Road and potentially cause road blockage and vehicle delays.  
285 Mitigation measures identified by the applicable local jurisdiction could require the  
286 developer to conduct a project- and site-specific traffic impact analysis for planned  
287 developments and identify access and capacity improvements that would be required.  
288 Although not obligatory or within the control of DOE, commuter traffic could be mitigated  
289 by using mass transit, car-pooling, and other ride-sharing measures.

290 For the other resource areas, there are no appreciable differences in the types of environmental  
291 consequences that would result from a given representative facility or its location. The environmental  
292 consequences for the other resource areas discussed in this EA are summarized below:

- 293 • For geology, partial or complete removal, redistribution, mixing of soil horizons, and soil  
294 compaction would affect soil permeability and porosity. Exposed surface areas are  
295 susceptible to soil erosion from wind and precipitation. Topography would be altered by  
296 grading land for buildings, roads, and parking lots. Disturbance of one acre or more may  
297 require a National Pollutant Discharge Elimination Permit, which requires erosion, sediment,  
298 and stormwater management controls to minimize the potential for soil removal.
- 299 • For water resources, construction of buildings and parking lots would create impervious  
300 surfaces that would lead to stormwater runoff during precipitation (rain or snow) events,  
301 which could result in soil erosion. Development plans would include stormwater retention  
302 features required by state stormwater pollution control regulations to provide the appropriate  
303 controls for mitigating water quality and quantity impacts. Pending additional quantitative  
304 analysis, a deed restriction limits the locations where stormwater drainage facilities are  
305 permissible to avoid potential for elevated groundwater levels to mobilize contaminants  
306 from groundwater plumes.
- 307 • For air quality, construction activities would generate particulate emissions as fugitive dust  
308 from ground-disturbing activities and from the combustion of fuels in construction  
309 equipment. Fugitive dust can be mitigated by application of water to areas of disturbance.  
310 Although not obligatory or within the control of DOE, during operation of built facilities,  
311 potential mitigation measures could be undertaken by future landowners. Air emissions by  
312 commuter vehicles could be mitigated by using mass transit or car-pooling. Air emissions by  
313 commercial haul trucks could be mitigated by encouraging facility owners to minimize truck  
314 idling, using yard-trucks (efficient slow-speed vehicles) to move trailers around a facility,  
315 and designing roads and traffic patterns to minimize truck idling situations (e.g., having few  
316 stop signs and maximizing one-way truck movement). Long-term, moderate effects on air  
317 quality would result from the operation of the various representative facilities that could be  
318 on the main FSA.
- 319 • Climate change is a global phenomenon that the proposed land transfer would not alter.  
320 However, climate change would result in a new affected environment in the future. DOE  
321 considered if this new future environmental baseline would be impacted differently by the  
322 Proposed Action than the current baseline environment would be impacted. While climate  
323 change would affect the region, DOE identified no plausible nexuses between the Proposed  
324 Action and global climate change that would alter its impact determinations for the affected  
325 environment.
- 326 • There would be no effects on wetlands or floodplains from construction or operation of the  
327 representative facilities because neither of these resources has been identified within the PA  
328 nor within close enough proximity to the PA to experience effects.

- 329       • For land use, the construction of any of the representative facilities would be in accordance  
330       with local comprehensive land use plans, zoning, and ordinances. The land conveyance  
331       would result in a change in current land use from essentially undeveloped to developed  
332       industrial land uses. The proposed uses would be consistent with land use plans; however,  
333       opportunities for other future land uses would be foreclosed.
- 334       • For visual resources, development of the FSA would result in a change in the visual resource  
335       management classification of the conveyed lands from Class III to Class IV, as defined by  
336       the Bureau of Land Management. The buildings and infrastructure on the built-out site  
337       would be consistent with the existing development in the 300 Area to the east of the analysis  
338       area and the City of Richland development to the south. However, in the western and  
339       northern areas of the PA, where the existing setting is primarily undeveloped, construction  
340       of the representative facilities would change the landscape setting to industrial.
- 341       • For waste management, solid nonhazardous waste generated during construction and  
342       operation of the representative facilities would most likely be recycled or transported to the  
343       Horn Rapids Sanitary Landfill for disposal. The projected waste volumes represent less than  
344       15 percent of the current disposal rate at the landfill. Although not obligatory or within the  
345       control of DOE, potential mitigation measures could be undertaken by a future landowner  
346       and local jurisdictions such as providing public recognition or economic development  
347       incentives to design, construct, and operate their facilities to minimize waste production and  
348       maximize waste recycling, and, thereby reduce demand on city and county waste  
349       management facilities. The Proposed Action would generate solid and liquid wastes that  
350       would add to existing waste streams. The amount of wastes that would be generated is not  
351       expected to exceed the capabilities of existing waste management systems.
- 352       • For socioeconomic, development of the FSA would result in a long-term economic benefit  
353       to the Tri-Cities area by the creation of new jobs within the local labor force. For  
354       Environmental Justice, U.S. Census Bureau data were used to identify minority populations  
355       in the Tri-Cities area. The closest census block group had a minority population relatively  
356       greater (over 29 percent) than that of the PA and the immediately surrounding area. The  
357       majority of this block group, however, does not include residences. The nearest residences  
358       (minority or not) are located within the southern part of the census tract, almost 2 miles  
359       southeast of the PA. There would not be disproportionately high and adverse human health  
360       or environmental effects to minority or low-income populations as a result of the Proposed  
361       Action.
- 362       • For human health and safety, soil sampling, gamma scanning surveys, land feature surveys,  
363       and an ALARA (as low as reasonably achievable) assessment were completed in compliance  
364       with the requirements in DOE O 458.1, *Radiation Protection of the Public and the*  
365       *Environment*, Change 3 (DOE 2011), for the control, clearance, and release of DOE property  
366       containing potential residual radioactivity. These activities have demonstrated that there are  
367       no radiological sources within the property. Radiological dose consequences from accidents  
368       for Buildings 324 and 325, located approximately 600 meters east of the FSA, are minimal  
369       and would not require additional mitigation measures beyond safety measures normally  
370       provided to ensure the adequate protection of the public health, safety, and the environment.  
371       Following land conveyance, DOE and the local and state agencies responsible for  
372       performing the function of emergency management would apply the same emergency  
373       planning and response actions to members of the public in the conveyed lands as applied to  
374       the population at large.

## Table of Contents

<b>1.0 INTRODUCTION.....</b>	<b>1-1</b>
1.1 Background.....	1-4
1.2 Purpose and Need for Agency Action .....	1-5
1.3 U.S. Department of Energy Decisions to be Made.....	1-5
1.4 Scoping Process and Comments Received .....	1-6
1.5 Environmental Assessment Scope .....	1-6
1.5.1 Uncertainties and Limitations in the Environmental Assessment Analysis.....	1-7
<b>2.0 ALTERNATIVES CONSIDERED IN THIS ENVIRONMENTAL ASSESSMENT.....</b>	<b>2-1</b>
2.1 No Action Alternative.....	2-1
2.2 Proposed Action.....	2-2
2.2.1 Tri-City Development Council’s Land Transfer Proposal.....	2-5
2.2.2 Tri-City Development Council’s Addendum to Their Land Transfer Proposal.....	2-6
2.2.3 Lands Considered for Conveyance .....	2-7
2.2.4 Probable Intended Uses .....	2-15
2.2.5 The Bounding-Case Analysis for the Main Focused Study Area .....	2-17
<b>3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES .....</b>	<b>3-1</b>
3.1 Geology .....	3-4
3.1.1 Affected Environment.....	3-4
3.1.1.1 Geology and Mineral Resources .....	3-4
3.1.1.2 Soils.....	3-5
3.1.1.3 Topography .....	3-6
3.1.2 Environmental Consequences.....	3-7
3.1.2.1 No Action Alternative .....	3-7
3.1.2.2 Proposed Action .....	3-7
3.1.3 Mitigation Measures .....	3-8
3.1.4 Unavoidable Adverse Impacts .....	3-8
3.2 Water Resources .....	3-8
3.2.1 Affected Environment.....	3-8
3.2.1.1 Surface Water.....	3-8
3.2.1.2 Flooding .....	3-8
3.2.1.3 Groundwater.....	3-9
3.2.1.4 Vadose Zone.....	3-12
3.2.2 Environmental Consequences.....	3-12
3.2.2.1 No Action Alternative .....	3-12
3.2.2.2 Proposed Action .....	3-12
3.2.3 Mitigation Measures .....	3-14

3.2.4	Unavoidable Adverse Impacts .....	3-15
3.3	Air Quality .....	3-15
3.3.1	Affected Environment.....	3-15
3.3.2	Environmental Consequences.....	3-18
3.3.2.1	No Action Alternative .....	3-18
3.3.2.2	Proposed Action .....	3-18
3.3.3	Mitigation Measures .....	3-22
3.3.4	Unavoidable Adverse Impacts .....	3-22
3.3.5	Climate Change .....	3-22
3.4	Ecological Resources.....	3-23
3.4.1	Affected Environment.....	3-23
3.4.1.1	Vegetation .....	3-24
3.4.1.2	Wildlife .....	3-26
3.4.1.3	Birds .....	3-26
3.4.1.4	Mammals.....	3-27
3.4.1.5	Reptiles and Amphibians.....	3-28
3.4.1.6	Threatened and Endangered Species .....	3-28
3.4.2	Environmental Consequences.....	3-29
3.4.2.1	No Action Alternative .....	3-29
3.4.2.2	Proposed Action .....	3-29
3.4.3	Mitigation Measures .....	3-31
3.4.4	Unavoidable Adverse Impacts .....	3-31
3.5	Wetlands and Floodplains.....	3-32
3.5.1	Affected Environment.....	3-32
3.5.1.1	Wetlands.....	3-32
3.5.1.2	Floodplains .....	3-33
3.5.2	Environmental Consequences.....	3-33
3.5.2.1	No Action Alternative .....	3-33
3.5.2.2	Proposed Action .....	3-33
3.5.3	Mitigation Measures .....	3-34
3.5.4	Unavoidable Adverse Impacts .....	3-34
3.6	Cultural Resources.....	3-34
3.6.1	Affected Environment.....	3-36
3.6.1.1	Background .....	3-36
3.6.1.2	Identification of Cultural Resources and Historic Properties .....	3-37
3.6.2	Environmental Consequences.....	3-41
3.6.2.1	No Action Alternative .....	3-41

3.6.2.2	Proposed Action .....	3-41
3.6.3	Mitigation Measures .....	3-43
3.6.4	Unavoidable Adverse Impacts .....	3-43
3.7	Land Use .....	3-43
3.7.1	Affected Environment.....	3-44
3.7.1.1	Hanford Site .....	3-44
3.7.1.2	Benton County.....	3-46
3.7.1.3	City of Richland .....	3-48
3.7.1.4	Pacific Northwest National Laboratory .....	3-48
3.7.2	Environmental Consequences.....	3-48
3.7.2.1	No Action Alternative .....	3-48
3.7.2.2	Proposed Action .....	3-48
3.7.3	Mitigation Measures .....	3-49
3.7.4	Unavoidable Adverse Impacts .....	3-49
3.8	Visual Resources .....	3-49
3.8.1	Affected Environment.....	3-51
3.8.2	Environmental Consequences.....	3-54
3.8.2.1	No Action Alternative .....	3-54
3.8.2.2	Proposed Action .....	3-54
3.8.3	Mitigation Measures .....	3-55
3.8.4	Unavoidable Adverse Impacts .....	3-55
3.9	Noise, Vibration, and Electromagnetic Fields .....	3-55
3.9.1	Affected Environment.....	3-55
3.9.1.1	Acoustic Noise .....	3-56
3.9.1.2	Vibration.....	3-57
3.9.1.3	Electromagnetic Fields .....	3-60
3.9.2	Environmental Consequences.....	3-60
3.9.2.1	No Action Alternative .....	3-61
3.9.2.2	Proposed Action .....	3-61
3.9.3	Mitigation Measures .....	3-63
3.9.4	Unavoidable Adverse Impacts .....	3-63
3.10	Utilities and Infrastructure .....	3-64
3.10.1	Affected Environment.....	3-64
3.10.1.1	Hanford Site.....	3-64
3.10.1.2	City of Richland .....	3-64
3.10.2	Environmental Consequences.....	3-66
3.10.2.1	No Action Alternative .....	3-66

3.10.2.2	Proposed Action .....	3-66
3.10.3	Mitigation Measures .....	3-69
3.10.4	Unavoidable Adverse Impacts .....	3-69
3.11	Transportation.....	3-69
3.11.1	Affected Environment.....	3-69
3.11.2	Environmental Consequences.....	3-72
3.11.2.1	No Action Alternative .....	3-73
3.11.2.2	Proposed Action .....	3-73
3.11.3	Mitigation Measures .....	3-74
3.11.4	Unavoidable Adverse Impacts .....	3-74
3.12	Waste Management .....	3-74
3.12.1	Affected Environment.....	3-74
3.12.2	Environmental Consequences.....	3-75
3.12.2.1	No Action Alternative .....	3-75
3.12.2.2	Proposed Action .....	3-75
3.12.3	Mitigation Measures .....	3-76
3.12.4	Unavoidable Adverse Impacts .....	3-76
3.13	Socioeconomics and Environmental Justice .....	3-76
3.13.1	Affected Environment.....	3-78
3.13.1.1	Employment and Income .....	3-78
3.13.1.2	Population.....	3-79
3.13.1.3	Environmental Justice.....	3-80
3.13.1.4	Housing.....	3-85
3.13.1.5	Community Services.....	3-85
3.13.2	Environmental Consequences.....	3-85
3.13.2.1	No Action Alternative .....	3-85
3.13.2.2	Proposed Action .....	3-86
3.13.3	Mitigation Measures .....	3-87
3.13.4	Unavoidable Adverse Impacts .....	3-87
3.14	Human Health and Safety .....	3-87
3.14.1	Affected Environment.....	3-87
3.14.1.1	Radiological.....	3-87
3.14.1.2	Chemical.....	3-91
3.14.2	Environmental Consequences.....	3-91
3.14.2.1	No Action Alternative .....	3-91
3.14.2.2	Proposed Action .....	3-92
3.14.3	Emergency Preparedness .....	3-96

3.14.4 Mitigation Measures ..... 3-97

3.14.5 Unavoidable Adverse Impacts ..... 3-97

3.14.6 Intentional Destructive Acts ..... 3-97

3.15 Summary of Environmental Consequences ..... 3-97

**4.0 CUMULATIVE EFFECTS ..... 4-1**

4.1 Potential Cumulative Impacts ..... 4-2

4.1.1 Geology ..... 4-2

4.1.2 Water Resources ..... 4-3

4.1.3 Air Quality ..... 4-4

4.1.3.1 Emissions of Greenhouse Gases ..... 4-5

4.1.3.2 Climate Change ..... 4-6

4.1.4 Ecological Resources ..... 4-6

4.1.5 Wetlands and Floodplains ..... 4-7

4.1.6 Cultural Resources ..... 4-7

4.1.7 Land Use ..... 4-8

4.1.8 Visual Resources ..... 4-8

4.1.9 Noise, Vibration, and Electromagnetic Fields ..... 4-9

4.1.9.1 Background Environment ..... 4-10

4.1.9.2 Future Sources ..... 4-10

4.1.10 Utilities and Infrastructure ..... 4-11

4.1.11 Transportation ..... 4-11

4.1.12 Waste Management ..... 4-12

4.1.13 Socioeconomics and Environmental Justice ..... 4-13

4.1.14 Human Health and Safety ..... 4-13

**5.0 APPLICABLE LAWS, REGULATIONS, AND OTHER REQUIREMENTS ..... 5-1**

5.1 10 CFR 770, Transfer of Real Property at Defense Nuclear Facilities for Economic Development .. 5-1

5.2 National Defense Authorization Act for Fiscal Year 2015 ..... 5-2

5.3 U.S. Department Of Energy Real Property Conveyance Authority ..... 5-3

5.4 Environmental and Health and Safety Requirements for Real Property Conveyance ..... 5-3

5.5 Realty Instruments for Hanford Site Land Conveyance ..... 5-6

5.5.1 Conveyance by Deed ..... 5-6

5.5.2 Conveyance by Realty Instrument Other Than a Deed ..... 5-9

**6.0 CONSULTATION AND COORDINATION ..... 6-11**

6.1 Scoping ..... 6-11

6.2 Agencies and Persons Consulted ..... 6-13

6.3 Draft Environmental Assessment Public Review ..... 6-15

**7.0 REFERENCES ..... 7-1**

## List of Figures

Figure 1-1. Hanford Site Location Map .....	1-2
Figure 1-2. TRIDEC Land Transfer Request Parcels .....	1-3
Figure 2-1. Project Location .....	2-3
Figure 2-2. Project Area, Focused Study Area, Potential Access Agreement Land, and Land Not Suitable for Conveyance .....	2-4
Figure 2-3. TRIDEC’s General Current and Projected Target Marketing Industries .....	2-5
Figure 2-4. TRIDEC’s Proposed Use for the 1,341 Acres .....	2-6
Figure 2-5. TRIDEC’s Addendum “Attachment 2–Revised Map” Showing the Original 300-Acre Solar Energy Park Request .....	2-7
Figure 2-6. TRIDEC’s Initial Land Request Areas Total 1,641 Acres .....	2-8
Figure 2-7. DOE Identified 4,413 Acres as the PA .....	2-9
Figure 2-8. DOE Removed 1,327 Acres Needing Radiological Clearance Leaving 3,086 Acres of the PA Potentially Suitable for Transfer .....	2-10
Figure 2-9. TRIDEC Moves 300-Acre Request Location South, and DOE Removes 251 Acres Not Preferred by TRIDEC Leaving 2,835 Acres of the PA Potentially Suitable for Transfer .....	2-11
Figure 2-10. DOE Removed 308-Acre Buffer Zone for Hanford Patrol Firing Range Leaving 2,527 Acres of the PA Potentially Suitable for Transfer .....	2-12
Figure 2-11. DOE Removed 53 Acres for Containing Unremediated Waste and a Cultural Site Leaving 2,474 Acres of the PA Potentially Suitable for Transfer .....	2-13
Figure 2-12. DOE Removed 188 Acres for a Radiological Safety Buffer, and 351 Acres of the Patrol Firing Range that for Regulatory Reasons Could Not Be Available in Time for Transfer Leaving 1,935 Acres of the PA Potentially Suitable for Transfer .....	2-14
Figure 3-1. General Lithology of the Local Area .....	3-5
Figure 3-2. Groundwater Levels and Contaminated Plumes Near the 300 Area .....	3-11
Figure 3-3. Facilities on the Hanford Site Adjacent to the Project Area .....	3-17
Figure 3-4. Vegetation and Wildlife Survey Map Showing the Location of the FSA .....	3-25
Figure 3-5. Land Use: Hanford Site and Richland .....	3-45
Figure 3-6. Land Use: Benton County .....	3-47
Figure 3-7. Viewshed as Seen from the Approximate Center of the PA from a 5-Foot Elevation .....	3-50
Figure 3-8. Viewshed as Seen from the Approximate Center of the FSA from a 115-Foot Elevation .....	3-52
Figure 3-9. Location of the PA, Johnson Island, and Horn Rapids Dam .....	3-59
Figure 3-10. Types of Radiation in the Electromagnetic Spectrum .....	3-60
Figure 3-11. Transportation .....	3-71
Figure 3-12. Socioeconomics and Environmental Justice Region of Influence .....	3-77
Figure 3-13. Minority Population .....	3-82
Figure 3-14. Populations Living at or Below Poverty Level .....	3-84
Figure 3-15. DOE-Controlled Area and the Maximally Exposed Individual Boundary .....	3-95
Figure 5-1. Overview of the 10 CFR 770 Process .....	5-2

## List of Tables

Table 2-1. Representative Target Marketing Industry and Solar Technology Example Facilities .....	2-16
Table 3-1. Calculated Impervious Land Area, Bioinfiltration Swale Sizing, and Paved Areas .....	3-13
Table 3-2. Estimated Annual Air Emissions from Hypothetical Construction on the Main FSA .....	3-19
Table 3-3. Estimated Annual Air Emissions from Constructing the Solar Farm FSA .....	3-19
Table 3-4. Estimated Air Emissions from Constructing Utilities and Infrastructure on the PAAL.....	3-20
Table 3-5. Estimated Annual Air Emissions from Operational Activities .....	3-21
Table 3-6. Vegetation Community Types and Cover in the PA and FSA .....	3-26
Table 3-7. Bird Species Observed During Surveys of the Hanford Land Conveyance Property in late May and early June 2013.....	3-27
Table 3-8. Mammal Species Observed during Surveys of the Hanford Land Conveyance Property in late May and early June 2013.....	3-28
Table 3-9. Reptile Species Observed during surveys of the Hanford Land Conveyance Property in late May and early June 2013.....	3-28
Table 3-10. Mitigation Measures for Impacts to Ecological Resources.....	3-31
Table 3-11. Meaning of “Effects” Under NEPA and NHPA.....	3-35
Table 3-12. Archeological Sites and Isolates Identified on the PA .....	3-38
Table 3-13. Predicted Natural Ambient Sound Levels within the PA and Two Offsite Locations .....	3-57
Table 3-14. Rough Estimate of the Projected Utility Usage by Representative Facility .....	3-67
Table 3-15. Projected Utility Usage for Solar Facilities within the Solar Farm FSA.....	3-69
Table 3-16. 2010–2011 Average Daily Traffic at Principal Access Route Intersections .....	3-72
Table 3-17. Average Daily and Peak Hour Traffic for Principal Access Roads.....	3-72
Table 3-18. Employment and Income .....	3-78
Table 3-19. Tri-Cities Area Employment by Industry.....	3-79
Table 3-20. Population .....	3-80
Table 3-21. Minority Population .....	3-81
Table 3-22. Population Below Poverty Level.....	3-83
Table 3-23. Housing .....	3-85
Table 3-24. Natural Background and Other Radiological Doses Unrelated to Hanford Operations .....	3-87
Table 3-25. Background Soil Activity Concentrations.....	3-88
Table 3-26. Background Vadose Zone Activity Concentrations .....	3-89
Table 3-27. RESRAD-Modeled Doses Derived from Background Concentrations.....	3-90
Table 3-28. Administrative (Authorized) Activity Concentration Limits to Assure Compliance with DOE O 458.1 .....	3-91
Table 3-29. Summary of Environmental Consequences.....	3-98
Table 5-1. Comparison of the CERCLA Requirements for Sections 120(h)(1), (3), (4), and (5) .....	5-5
Table 5-2. Deed Restrictions and Covenants.....	5-7

## List of Appendices

APPENDIX A	THE HANFORD SITE LAND SUITABILITY REVIEW
APPENDIX B	ACOUSTIC NOISE AND VIBRATION FROM CONSTRUCTION
APPENDIX C	ACOUSTIC NOISE AND VIBRATION FROM FACILITY OPERATIONS
APPENDIX D	ELECTROMAGNETIC FIELDS FROM CONSTRUCTION AND FACILITY OPERATION
APPENDIX E	REPRESENTATIVE FACILITIES
APPENDIX F	RADIOLOGICAL ACCIDENTS
APPENDIX G	TRIBAL STUDIES EXECUTIVE SUMMARIES
APPENDIX H	WILDLIFE SURVEY
APPENDIX I	SALSTROM AND EASTERLY, VEGETATION SURVEY OF THE PROPOSED LAND CONVEYANCE, CENTRAL HANFORD, WASHINGTON
APPENDIX J	AIR EMISSIONS ESTIMATES
APPENDIX K	MEMORANDUM OF AGREEMENT
APPENDIX L	RESPONSES TO PUBLIC COMMENTS

## Abbreviations and Acronyms

μT	microtesla
AC	alternating current
ACGIH	American Conference of Governmental Industrial Hygienists
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey
ALARA	as low as reasonably achievable
AMSL	above mean sea level
ANSI	American National Standards Institute
APE	area of potential effect
BLM	Bureau of Land Management
BMP	best management practice
BPA	Bonneville Power Administration
Bq	becquerel
BRMP	Biological Resources Management Plan
CA/T	Central Artery/Tunnel Project
CEQ	Council on Environmental Quality
CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act</i>
CFR	Code of Federal Regulations
Ci	curie
CLUP	Comprehensive Land-Use Plan
CO	carbon monoxide
CO <sub>2</sub>	carbon dioxide
D&D	decontamination and decommissioning
DAHP	Washington State Department of Archaeology and Historic Preservation
dB	decibel
dBA	A-weighted decibel
dBAI	A-weighted impulse decibel
DC	direct current
DOE	U.S. Department of Energy
DOE/RL	DOE Richland, WA
EA	environmental assessment
EDNA	environmental designation for noise abatement
EIS	environmental impact statement
ELF	extremely low frequency
EMA	elevated measurement area
EMF	electromagnetic field
EMI	electromagnetic interference
EMSL	Environmental Molecular Sciences Laboratory
EPA	U.S. Environmental Protection Agency
EPZ	Emergency planning zone
FHWA	U.S. Federal Highway Administration
FRA	Federal Railroad Administration
FSA	focused study area

ft	foot
ft <sup>3</sup> /sec	cubic feet per second
FTA	Federal Transit Administration
g	gram
G	gauss
gal	gallon
GCRP	U.S. Global Change Research Program
GHG	greenhouse gas
GHz	gigahertz
GIS	geographic information system
H-3E	tritium equivalence
HAMMER	Hazardous Materials Management and Emergency Response
HCP	Hanford Comprehensive Land-Use Plan
HEIS	Hanford Environmental Information System
HEMP	<i>Hanford Emergency Management Plan</i>
HFB	heterogeneous feed biorefinery
HRD	Horn Rapids Disposal
HRNM	Hanford Reach National Monument
HST	high speed train
HVAC	heating, ventilation, and air conditioning
Hz	Hertz
ICNIRP	International Commission on Non-Ionizing Radiation Protection
in	inch
ISO	International Standards Organization
JDES	John Deere Electronics Solutions Inc.
kg	kilogram
kHz	kilohertz
km	kilometer
KOP	key observation point
kV	kilovolt
kVA	kilo volt-ampere
kW	kilowatt
lb	pound
LCF	latent cancer fatality
LEED	Leadership in Energy and Environmental Design
LIGO	Laser Interferometer Gravitational-wave Observatory
LLW	low-level radioactive waste
L <sub>max</sub>	maximum sound pressure level
m	meter
m <sup>3</sup>	cubic meter
m <sup>3</sup> /sec	cubic meter per second
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MBTA	<i>Migratory Bird Treaty Act</i>
MEI	maximally exposed individual
mG	milligauss

mgd	million gallons per day
MHz	megahertz
mm	millimeter
MOA	Memorandum of Agreement
MRF	Materials Recovery Facility
MSA	metropolitan statistical area
MW	megawatt
NAAQS	National Ambient Air Quality Standard
NCRP	National Council on Radiation Protection and Measurements
NDAA	<i>National Defense Authorization Act of 2015</i>
NEPA	<i>National Environmental Policy Act</i>
NHPA	<i>National Historic Preservation Act</i>
NO <sub>x</sub>	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
nT	nanotesla
OSHA	Occupational Safety and Health Administration
PA	project area
PAAL	Potential Access Agreement Land
pCi	picocurie
PM <sub>10</sub>	particulate matter less than 10 micrometers in diameter
PM <sub>2.5</sub>	particulate matter less than 2.5 micrometers in diameter
PNNL	Pacific Northwest National Laboratory
PNSO	Pacific Northwest Site Office
PPV	peak particle velocity
PSD	prevention of significant deterioration
PSF	Physical Sciences Facility
PTA	Patrol Training Academy
Pu-239E	plutonium equivalence
PV	photovoltaic
Q-Wing	Quiet Wing
R&D	research and development
RC	reactor compartment
RCRA	<i>Resource Conservation and Recovery Act</i>
RCW	Revised Code of Washington
RESRAD	Residual Radioactivity
RMC	Richland Municipal Code
RMS	root mean square
ROI	region of influence
ROW	right-of-way
RPL	Radiochemical Processing Laboratory
rpm	revolutions per minute
RQ	reportable quantity
RSF	Research Support Facility

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RTI	Rainsville Technology Inc.
SALT	Storage Area and Load Test
sec	second
SEPA	<i>State Environmental Policy Act</i>
SHPO	State Historic Preservation Officer
SO <sub>2</sub>	sulfur dioxide
SPL	sound pressure level
T	tesla
TCE	trichlorethylene
TCP	traditional cultural property
TLV	threshold limit value
TMI	target marketing industry
TNM	Traffic Noise Model
TRIDEC	Tri-City Development Council
U.S.C.	United States Code
ULF	ultra low frequency
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
V	volt
VdB	vibration velocity decibel
VLF	very low frequency
VRM	Visual Resource Management
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WIDS	Waste Information Data System

1

## 1.0 INTRODUCTION

2 The U.S. Department of Energy (DOE) Hanford Site encompasses 586 square miles in southeastern  
3 Washington State just north of Richland (see **Figure 1-1**, “Hanford Site Location Map”). Over half of  
4 the 586 square miles is included within the Hanford Reach National Monument (HRNM) created by  
5 Presidential Proclamation 7319 on June 9, 2000, under the authority of the *Antiquities Act of 1906*  
6 (16 USC 432). Most of the Monument lands are managed by the U.S. Fish and Wildlife Service  
7 (USFWS). Plutonium was produced at Hanford from 1943 to 1987, when its last reactor ceased  
8 operation. Over the years, activities shifted from plutonium production to nuclear power generation,  
9 advanced reactor design, basic scientific research, and research related to the development of nuclear  
10 weapons. Waste management and environmental remediation are now the largest part of the  
11 remaining Hanford Site’s activities.

12 The acreage being considered in this environmental assessment (EA) is part of approximately  
13 59 square miles of Hanford Site lands previously designated by DOE for industrial uses under the  
14 Hanford Comprehensive Land-Use Plan, based on analyses presented in the *Final Hanford*  
15 *Comprehensive Land-Use Plan Environmental Impact Statement* (DOE 1999a) and its Record of  
16 Decision (DOE 1999b).

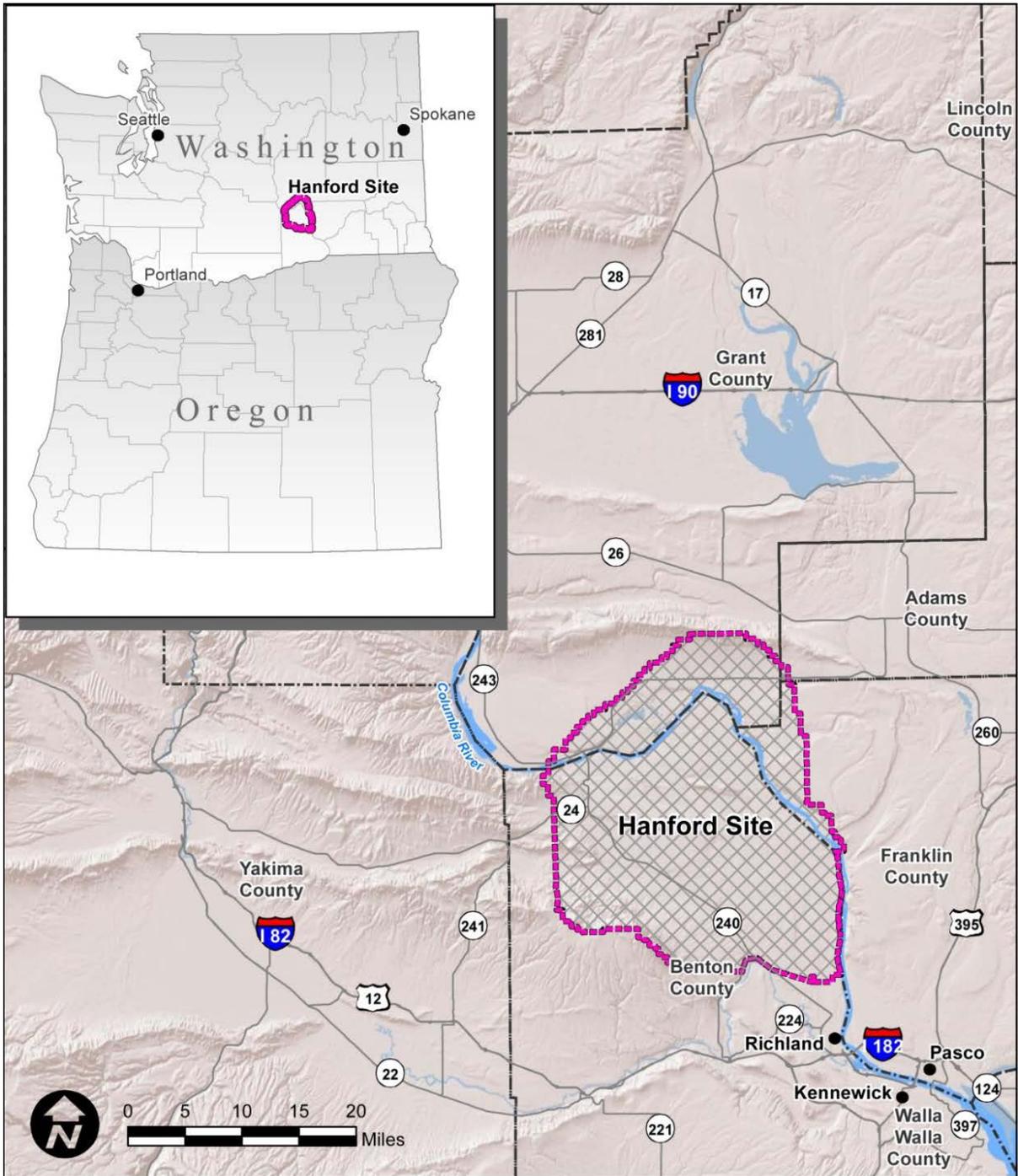
17 In accordance with 10 CFR 770, “Transfer of Real Property at Defense Nuclear Facilities for  
18 Economic Development,” the Tri-City Development Council (TRIDEC), a DOE designated  
19 Community Reuse Organization for the Hanford Site and 501(c)(6) nonprofit corporation, submitted a  
20 proposal to DOE in May 2011 (amended October 2011)<sup>3</sup> requesting the transfer of approximately  
21 1,641 acres of land located in the southeastern corner of the Hanford Site near the City of Richland in  
22 Benton County, Washington, for economic development purposes.<sup>4</sup> This proposal, *10 CFR 770,*  
23 *“Proposal to Transfer Tract 1 at Department of Energy Hanford Site to the Community Reuse*  
24 *Organization Tri-City Development Council (TRIDEC) for Economic Development”*  
25 (TRIDEC 2011a), was submitted by TRIDEC in cooperation with the City of Richland, Port of  
26 Benton, and Benton County. The proposal states that after transfer of lands to TRIDEC, they will  
27 subsequently transfer ownership either to a private user or to one of its public agency partners, such  
28 as the City of Richland. On August 24, 2011, DOE responded to TRIDEC’s request notifying  
29 TRIDEC that the proposal was complete and that DOE would begin the necessary regulatory reviews  
30 and actions related to transfer of property (see **Chapter 5.0**). **Figure 1-2**, “TRIDEC Land Transfer  
31 Request Parcels,” shows the 1,341-acre parcel (“main parcel”) request and two additional 300-acre  
32 parcel (“small parcel”) locations. After making the initial land request, TRIDEC modified that request  
33 to include a 300-acre parcel (the “Original TRIDEC Land Transfer Request 300 Acres” in  
34 **Figure 1-2**). Subsequently, TRIDEC determined that a better location for the parcel that was farther  
35 south (the “Revised TRIDEC Land Transfer Request 300 Acres” [Howard 2014]) as shown on  
36 **Figure 1-2**.

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<sup>3</sup> TRIDEC’s original proposal submitted in May 2011 (TRIDEC 2011a) included a request for approximately 1,341 acres. The proposal was amended on October 13, 2011 (TRIDEC 2011b), to include an additional 300 acres (approximately 0.47 square miles) bringing the total requested acreage to approximately 1,641 acres.

<sup>4</sup> “Economic development” means the use of transferred DOE real property in a way that enhances the production, distribution, or consumption of goods and services in the surrounding region(s) and furthers the public policy objectives of the laws governing the downsizing of DOE’s defense nuclear facilities” (65 FR 10689).

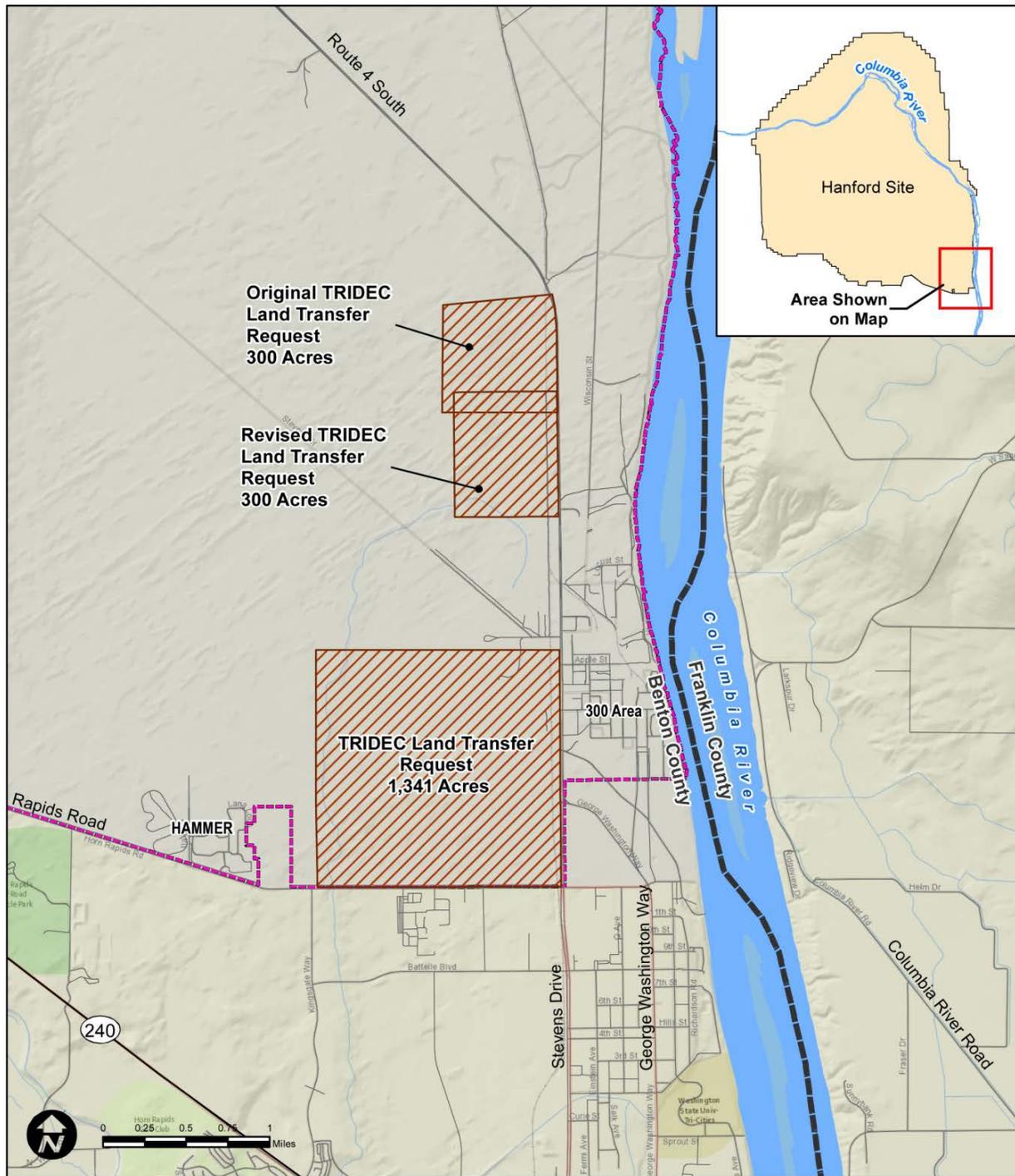
Figure 1-1. Hanford Site Location Map



Legend

- Hanford Site
- River
- County Boundary
- Road

Figure 1-2. TRIDEC Land Transfer Request Parcels



**Legend**

-  TRIDEC Land Transfer Request
-  County Boundary
-  Highway
-  Hanford Site
-  River
-  Road

## 41 1.1 Background

42 The *Atomic Energy Community Act of 1955* (42 USC 2301 et seq.) provided the authority for the  
43 federal government to support municipalities that had been established as wholly government-owned  
44 communities while these communities transitioned to self-sufficiency. Under the Act, national  
45 policies were established regarding the obligations of the United States to the three “Atomic Energy  
46 Communities,” of which Hanford is one. These policies were directed at terminating federal  
47 government ownership and management of the communities by facilitating the establishment of local  
48 self-government, providing for the orderly transfer to local entities of municipal functions, and  
49 providing for the orderly sale to private purchasers of property within these communities with a  
50 minimum of dislocation. The establishment of self-government and transfer of infrastructure and land  
51 were intended to encourage self-sufficiency of the communities like those in the Hanford Site area  
52 through the establishment of a broad base for economic development.

53 The primary mission at Hanford for more than 40 years was associated with the production of nuclear  
54 materials for national defense. Land management and development practices at the Hanford Site were  
55 driven by resource needs for nuclear production, chemical processing, waste management, and  
56 research and development activities. DOE developed infrastructure and facility complexes to  
57 accomplish this work, but large tracts of land used as protective buffer zones for safety and security  
58 purposes remained largely undisturbed. These buffer zones now contain biological and cultural  
59 resource settings that are unique in the Columbia Basin region, and much of the area is now part of  
60 the HRNM.

61 In the late 1980s, the primary DOE mission for the Hanford Site changed from defense materials  
62 production to environmental remediation. In 1989, DOE entered into the *Hanford Federal Facility*  
63 *Agreement and Consent Order* (Tri-Party Agreement) with the U.S. Environmental Protection  
64 Agency and the Washington State Department of Ecology (Ecology et al. 2015). Accordingly  
65 extensive efforts are underway at Hanford to cleanup contamination resulting from past nuclear  
66 defense research and development activities dating back to World War II.

67 With remediation and cleanup progress in recent years, the local community is focusing on the need  
68 to transition from an economy focused largely on DOE and Hanford Site activities to one based on  
69 private sector or other non-DOE federal agencies. TRIDEC, as the DOE-designated Community  
70 Reuse Organization for the Hanford Site, is chartered with establishing and promoting economic  
71 development in the community to effect this transition.

72 Beginning in 1996 and continuing through 2014 (TRIDEC 2004, 2005a, 2005b, 2005c, 2006, 2014a),  
73 TRIDEC commissioned private firms and consultants to conduct economic development studies with  
74 the intent to develop business development marketing strategies and identify target industries for  
75 future economic development. TRIDEC engaged in marketing and business recruitment activities to  
76 identify development opportunities. Through these approaches, “clusters” of general industries were  
77 identified as “target market areas.” The studies did not use the same terminology or group their  
78 targeted areas into the same “cluster” categories, but they can be grouped generally as follows:

- 79 • Warehousing and distribution (manufactured parts and materials distribution, food and  
80 agriculture, refrigerated warehousing and storage, material handling, packaging and crating,  
81 and logistics)
- 82 • Research and development (scientific research, software, data security, computation, energy  
83 technology, environmental, and biotechnology)

- 84 • Technology manufacturing (defense manufacturing, sensor manufacturing, medical device  
85 manufacturing, food processing, machinery manufacturing, advanced materials  
86 manufacturing, and carbon fiber manufacturing)
- 87 • Food processing and agriculture (wine processing, food processing, agricultural products, and  
88 craft beer production)
- 89 • Back office (call centers, administrative processing, data processing, information technology,  
90 remote sensing, professional services, and training).

91 The more recent TRIDEC marketing studies (TRIDEC 2014a) also included the energy sector  
92 (i.e., solar energy production, smart grid, and biofuels manufacturing). DOE considers these areas of  
93 business the reasonably foreseeable land uses that this EA should evaluate for potential environmental  
94 consequences. There is no development plan or specific projects to analyze, therefore representative  
95 examples of each of these land use business development types are presented in **Chapter 2.0**, and  
96 described in more detail in **Appendix E**, “Representative Facilities.”

## 97 **1.2 Purpose and Need for Agency Action**

98 The purpose and need for DOE action is to consider the TRIDEC land request under 10 CFR 770  
99 (TRIDEC 2011a, 2011b).

100 Moreover, conveyance of land to TRIDEC is required by the *National Defense Authorization Act of*  
101 *FY 2015* (Public Law 113-291). Section 3013 of the Act is entitled “Land Conveyance, Hanford Site,  
102 Washington,” and states that:

103 ...not later than September 30, 2015, the Secretary of Energy shall convey to the  
104 Community Reuse Organization of the Hanford Site (in this section referred to as the  
105 ‘Organization’) all right, title, and interest of the United States in and to two parcels  
106 of real property, including any improvements thereon, consisting of approximately  
107 1,341 acres and 300 acres, respectively, of the Hanford Reservation, as requested by  
108 the Organization on May 31, 2011 and October 13, 2011, and as depicted within the  
109 proposed boundaries on the map titled ‘Attachment 2-Revised Map’ included in the  
110 October 13, 2011, letter.

## 111 **1.3 U.S. Department of Energy Decisions to be Made**

112 Under the laws and regulations giving DOE the authority to dispose of property (including the *Atomic*  
113 *Energy Act of 1955*, Section 161; regulations for “Transfer of Real Property at Defense Nuclear  
114 Facilities for Economic Development” [10 CFR 770]), and the *National Defense Authorization Act*  
115 *for FY 2015*), DOE must decide on the acreage determined to be suitable by DOE for conveyance for  
116 the intended use, and by TRIDEC for economic development. To be suitable for conveyance, DOE  
117 must (1) determine whether there are any continuing mission needs, such as security and safety buffer  
118 zones on some of the requested lands; (2) determine whether property easements, deed restrictions, or  
119 institutional controls<sup>5</sup> will be required; and (3) ensure that any requirements for remediation of the  
120 property for conveyance has been identified and completed where required prior to conveyance.

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<sup>5</sup> Institutional controls are those methods that can be used to “...appropriately limit access to, or uses of, land, facilities and other real and personal properties; protect the environment (including cultural and natural resources); maintain the physical safety and security of DOE facilities; and prevent or limit inadvertent human and environmental exposure to residual contaminants and other hazards.” (DOE 2003a).

#### 121 1.4 Scoping Process and Comments Received

122 DOE published a Notice of Intent in the *Federal Register* on September 19, 2012, that an EA would  
123 be prepared to assess the potential environmental impacts of conveying certain land tracts located at  
124 the Hanford Site in Benton, County, Washington (77 FR 58112).

125 DOE held a public scoping meeting for the EA on October 10, 2012, for which notification was  
126 published in the *Tri-City Herald*. See **Chapter 6.0** for a description of public scoping for this EA.

#### 127 1.5 Environmental Assessment Scope

128 DOE has prepared this EA to assess the reasonably foreseeable environmental effects associated with  
129 the Proposed Action and No Action Alternative in accordance with the Council on Environmental  
130 Quality (CEQ) *National Environmental Policy Act* (NEPA) regulations and DOE's  
131 NEPA-implementing regulations (40 CFR 1500-1508 and 10 CFR 1021, respectively). This EA  
132 describes the affected (i.e., existing) environment of the Initial Hanford Site Land Conveyance  
133 Project Area (4,413 acres) as a baseline for evaluating impacts from the alternatives.

134 This EA analyzes the reasonably foreseeable environmental effects associated with the probable  
135 future uses of lands within an area referred to in this EA as the Focused Study Area (FSA)<sup>6</sup>, based  
136 upon industry targets described in the TRIDEC proposal, including warehousing and distribution,  
137 research and development, technology manufacturing, food processing and agriculture, and back  
138 office. A recent TRIDEC marketing study (TRIDEC 2014a) added another reasonably foreseeable  
139 category, energy, which included biofuels manufacturing. TRIDEC's amended request  
140 (TRIDEC 2011b) for the 300-acre parcel added solar energy to the analysis. In addition to data and  
141 information available in the TRIDEC proposal and marketing studies, DOE used analytical  
142 assumptions in this EA based upon representative facilities that would tend to maximize estimates of  
143 reasonably foreseeable environmental impacts associated with footprint, infrastructure, utilities,  
144 emissions, construction of buildings, projected workforce and traffic, water usage, and similar  
145 requirements.

146 Environmental effects addressed in the analysis in this EA include the reasonably foreseeable effects  
147 associated with geology and soils, water resources, air quality, ecological resources, wetlands and  
148 floodplains, historic properties and cultural resources, land use, visual resources, noise, utilities and  
149 infrastructure, transportation, waste management, socioeconomics and Environmental Justice, and  
150 human health and safety.

151 The analyses identify the environmental effects that are reasonably foreseeable to the local region as  
152 well as to ongoing DOE missions and activities at the Hanford Site. This EA explores mitigation  
153 measures, as appropriate, including deed restrictions aimed at precluding or minimizing  
154 environmental consequences. Mitigation measures are presented at the end of each resource area  
155 analysis in **Chapter 3.0**.

156 Other regulatory compliance actions and information needed for the land conveyance process include:

- 157 • Completion of requirements under Section 106 of the *National Historic Preservation Act*  
158 (NHPA) (16 USC 470 et seq.) and its implementing regulations (36 CFR 800). The NEPA

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<sup>6</sup> For simplicity, throughout this EA, the 1,341-acre and 300-acre lands (or their equivalent acreage) are referred to as the "main FSA" and the "solar farm FSA," respectively.

159 process associated with this EA has been coordinated with NHPA Section 106 requirements to  
160 the greatest extent possible and a summary of the NHPA studies is included.

- 161 • Completion of requirements for “Compliance with Floodplains/Wetlands Environmental  
162 Review Requirements” (10 CFR 1022). No floodplains or wetlands are located on the FSA or  
163 surrounding area, therefore there would be no effect to floodplains and wetlands by the  
164 Proposed Action.

### 165 **1.5.1 Uncertainties and Limitations in the Environmental Assessment Analysis**

166 At this time, no specific end users or development proposals have been identified or proposed. This  
167 uncertainty, as well as those related to the suitability of the originally requested lands, affect the EA  
168 analysis. The suitability limitations have the effect of both reducing the amount of land that can be  
169 considered for conveyance, and determining the specific location(s) of the land that could be available  
170 for conveyance – see further discussion at the end of this section.

171 This EA uses a “sliding-scale” approach to analysis. The CEQ regulations require agencies to “focus  
172 on significant environmental issues and alternatives” (40 CFR 1502.1) and discuss impacts “in  
173 proportion to their significance” (40 CFR 1502.2(b)). CEQ and DOE refer to this as the “sliding  
174 scale” approach so that those actions with greater potential effect can be discussed in greater detail in  
175 NEPA documents than those that have little potential for impact.

176 The assessment approach for the lands considered for the main FSA includes a bounding analysis  
177 approach. Neither the CEQ NEPA-implementing regulations (40 CFR 1500-1508) nor the DOE  
178 NEPA regulations (10 CFR 1021) specifically address bounding analyses in NEPA documents.  
179 However, DOE provides guidance on when a bounding approach is useful (DOE 2005a). Such an  
180 approach is useful to simplify assumptions and address uncertainty because needed information on  
181 the activities to be evaluated is unknown. A bounding analysis is designed to identify a range of  
182 potential impacts. As a practical matter, a bounding analysis provides conservatism  
183 (i.e., overestimates impacts) because of the uncertainty in the available data. The probable future uses  
184 were provided in the TRIDEC proposal and are used in the EA as the basis for the bounding analysis.

185 Two important aspects of the land considered potentially suitable for the “main parcel” are known or  
186 can be reasonably assumed. First, the total land area requested by TRIDEC for development is given.  
187 Second, the business development categories listed in **Section 1.1**, “Background” cited by TRIDEC,  
188 can reasonably be assumed to represent the types of development for this land. This EA requires  
189 bounding analysis for this land largely because of uncertainties that affect the ability to evaluate  
190 environmental consequences. These include, for example:

- 191 • Whether any or all of the parcel would be developed
- 192 • The ultimate land uses of the parcel once conveyed
- 193 • Which areas of the parcel would be developed and when
- 194 • The order of development for the different parts of the parcel
- 195 • Where on this parcel any specific land use would be located.

196 The assessment of the “small parcel” (solar farm) does not need a bounding analysis approach  
197 because the uncertainties mentioned above do not apply. The total land area requested by TRIDEC  
198 for this development of the small parcel is provided along with the specific land use. TRIDEC in their  
199 10 CFR 770 request, designated this land specifically for solar technology development. Some  
200 uncertainties still exist for this parcel but they can be addressed based on a set of reasonable  
201 assumptions without a bounding approach. The key assumptions are explained in **Chapter 3.0**.

202 The other uncertainty, land suitability limitations, was the reason for identifying a 4,413-acre project  
203 area as the total EA analysis area from which DOE could convey approximately 1,641 acres of  
204 suitable land. The suitability limitations are for reasons such as safety, security, and potential  
205 interference from or to existing federal and non-federal facility operations, as well as the need to  
206 avoid potential cultural and ecological impacts. The land suitability limitations are discussed in  
207 **Chapter 2.0** and described in detail in **Appendix A**, “The Hanford Site Land Suitability Review.”

208 The lands being considered for conveyance in the FSA are comprised of land that was in non-federal  
209 ownership prior to acquisition by the federal government for the Hanford nuclear facility.

## 210 2.0 ALTERNATIVES CONSIDERED IN THIS ENVIRONMENTAL ASSESSMENT

211 This chapter evaluates two alternatives, the Proposed Action and the No Action Alternative. The No  
212 Action Alternative provides a baseline for comparison with the environmental impacts that could  
213 result from development after the land is conveyed. Under the No Action Alternative, the  
214 U.S. Department of Energy (DOE) would retain all right, title, and interest to the lands within the  
215 analysis area and no property conveyance would occur.

216 The Proposed Action is to convey the lands requested by Tri-City Development Council (TRIDEC),  
217 or approximately equivalent acreage, in response to their land request (under 10 CFR Part 770) for  
218 community economic development (see **Figure 2-1**, “Project Location,” and **Sections 2.2.1** and  
219 **2.2.2**). Relevant to the Proposed Action, DOE’s statutory mission and responsibilities are:

- 220 • Responding to TRIDEC’s land request under the procedural/implementing DOE regulations  
221 in 10 CFR 770.7. The regulatory requirements of paragraph 770.7(d)(2) require that the DOE  
222 Field Office Manager “Ensures that any required environmental reviews have been  
223 completed.”
- 224 • Conveying lands to TRIDEC as required by the *National Defense Authorization Act* (NDAA)  
225 (Public Law 113-291). Section 3013 of this Act addresses the Proposed Action: “Land  
226 Conveyance, Hanford Site, Washington.” The Act states that “not later than September 30,  
227 2015, the Secretary of Energy shall convey to the Community Reuse Organization of the  
228 Hanford Site ... all right, title, and interest of the United States in and to two parcels of real  
229 property, including any improvements thereon, consisting of approximately 1,341 acres and  
230 300 acres, respectively, of the Hanford Reservation, as requested by the Organization on  
231 May 31, 2011 and October 13, 2011...”

232 TRIDEC requested specific tracts of land that are close to existing community infrastructure;  
233 however, the suitability of this land for transfer had not been determined at the time of the request.  
234 DOE decided to establish a larger study area that encompassed the requested lands and additional  
235 surrounding areas, referred to as the project area (PA). **Section 2.2.3** explains the process that was  
236 undertaken to determine which of these lands would be suitable for conveyance. Of the 4,413 acres  
237 initially considered, there are 2,474 acres potentially suitable for conveyance and 1,935 of those acres  
238 could be transferred by deed. Any alternative based on the transfer of 1,641 acres of land would  
239 therefore differ only by 294 acres (i.e., 1,935 acres minus 1,641 acres), which is not an appreciable  
240 enough difference to identify additional alternatives. DOE is not aware of any other alternatives to the  
241 Proposed Action that would reasonably meet the purpose and need for the Proposed Action described  
242 in **Chapter 1.0**.

### 243 2.1 No Action Alternative

244 Under the No Action Alternative, DOE would not convey any land in response to TRIDEC’s land  
245 request (TRIDEC 2011a, 2011b). DOE would then not meet the intent of the NDAA Section 3013  
246 requirement to transfer approximately 1,641 acres of land to TRIDEC not later than September 30,  
247 2015.

248 The No Action Alternative would not meet the stated purpose and need for action, but is still analyzed  
249 as required by DOE *National Environmental Policy Act* (NEPA)-implementing procedures<sup>7</sup> (10 CFR  
250 1021.321). In this alternative, the federal government would retain ownership of the requested lands

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<sup>7</sup> “...DOE shall assess the no action alternative in an EA, even when the proposed action is specifically required by legislation or a court order.” (10 CFR 1021.321).

251 and there would be no change in land use caused by the Proposed Action. Existing activities, such as  
252 environmental monitoring, utility corridor uses, and other administrative functions would continue.

## 253 2.2 Proposed Action

254 The Proposed Action is for DOE to convey approximately 1,641 acres of land to TRIDEC. TRIDEC  
255 would subsequently convey these lands, in whole or part, to a public entity partner (e.g., City of  
256 Richland) or private ownership for purposes of economic development (Section 770.7(a)(1)(ii)  
257 [TRIDEC 2011a]).

258 DOE may convey the specific land requested by TRIDEC or adjust boundaries upon agreement  
259 between DOE and TRIDEC in accordance with the NDAA (see **Section 5.3**). As stated in the Notice  
260 of Intent, DOE recognized that there were continuing mission needs on some of the requested lands,  
261 such as an active borrow area and a safety buffer zone, making them unsuitable for conveyance.  
262 Therefore, DOE conducted a land suitability review process (see **Appendix A**, “The Hanford Site  
263 Land Suitability Review”) that started with the 4,413-acre Initial Hanford Site Land Conveyance PA  
264 identified in the Notice of Intent. Through this review process DOE identified and documented  
265 continuing mission or operational needs on the PA. **Figure 2-2**, “Project Area, Focused Study Area,  
266 Potential Access Agreement Land, and Land Not Suitable for Conveyance,” shows the PA and 2,474  
267 acres of land referred to as the Focused Study Area (FSA) lands that have the least encumbrances.  
268 The FSA is made up of a 1,635-acre “main” FSA, a 300-acre “solar farm” FSA, and a 539-acre  
269 Potential Access Agreement Land (PAAL).

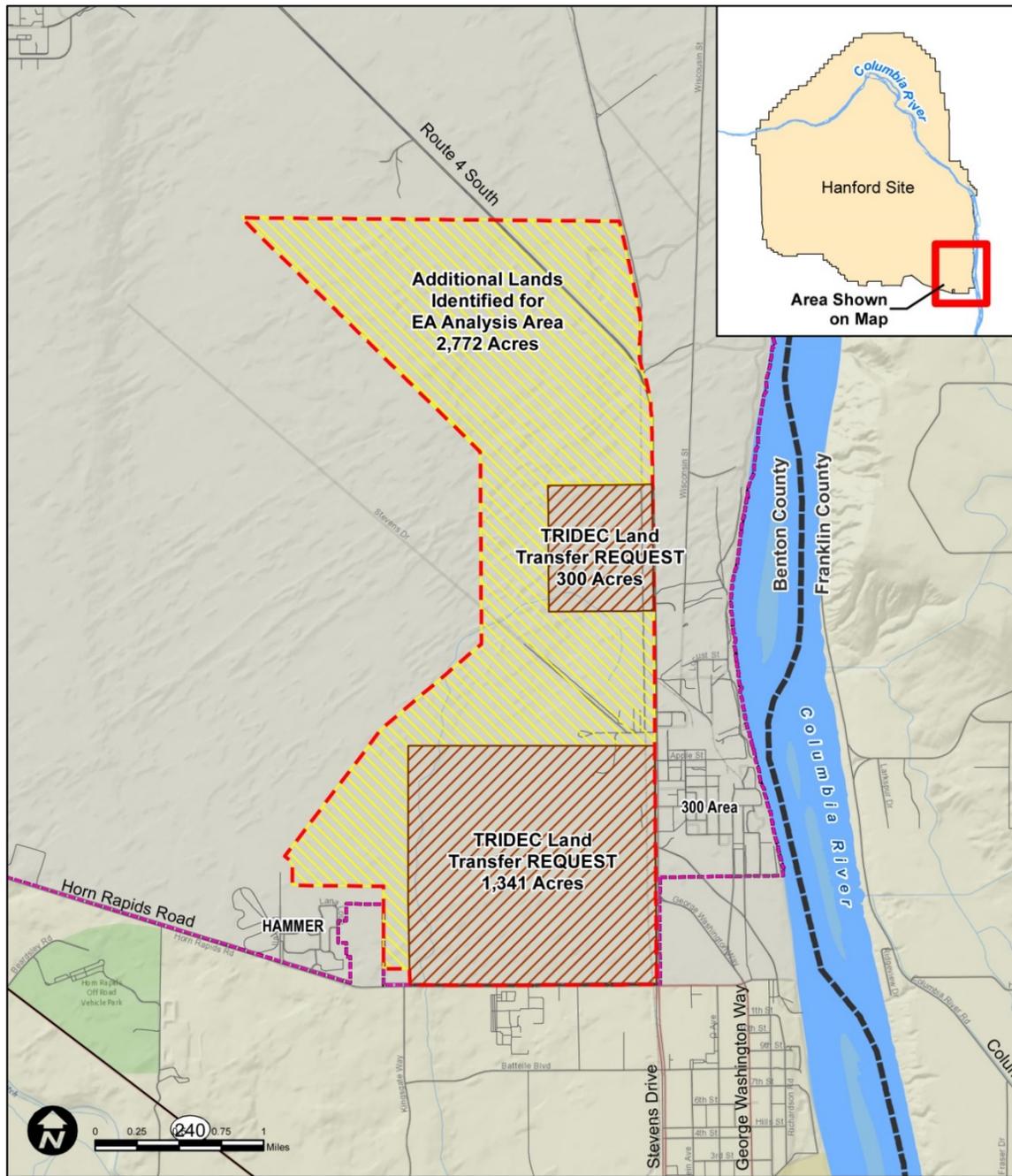
270 The approximately 1,641 acres of land that DOE would convey as required by the NDAA would be  
271 selected from the 1,935 acres (the acreage of the FSA minus the acreage of the PAAL [see  
272 **Figure 2-2**]) that make up the main and solar farm FSAs. The 1,341 acres TRIDEC requested would  
273 be selected from the main FSA, and the 300 acres TRIDEC requested would be the 300-acre solar  
274 farm FSA land. Portions of the 539-acre PAAL could be conveyed but only for utilities and  
275 infrastructure to provide services for transferred FSA lands. PAAL acreage would only be conveyed,  
276 if necessary, by a realty instrument other than a deed and would stay under the administrative  
277 jurisdiction of DOE.

278 TRIDEC plans to use, market, lease, sell, or otherwise develop the land to conduct industrial  
279 development and commercial activities that are consistent with local zoning and comprehensive land  
280 use plans. DOE assumes for this environmental assessment (EA) that once conveyed to an end user,  
281 the land will be used for one or more of the “target marketing industries” (TMI) that TRIDEC  
282 envisioned in its proposal to DOE (TRIDEC 2011a, 2011b).

283 This EA analyzes the potential environmental effects associated with the reasonably foreseeable  
284 future uses of FSA land, based on industry targets described in TRIDEC’s proposal (TRIDEC 2004,  
285 2005a, 2005b, 2005c, 2006, 2011a, 2011b, 2014a, 2014b) and TMI (TRIDEC 2014a), including  
286 warehousing and distribution, research and development, technology manufacturing, food processing  
287 and agriculture, “back office” (i.e., business services), and energy. The TMI categories and subareas  
288 identified are shown in **Figure 2-3**, “TRIDEC’s General Current and Projected Target Marketing  
289 Industries.” In addition to information in the TRIDEC proposal and marketing studies, DOE used  
290 assumptions in this EA for its analysis based on full development of representative facilities  
291 (examples of the TMI) that would tend to maximize estimates (overestimates impacts) of potential  
292 environmental impacts associated with footprint, infrastructure, utilities, emissions, construction of  
293 buildings, projected workforce and traffic, water usage, and similar requirements.

294 This EA uses a representative solar farm example for the 300-acre parcel on which to base analysis of  
295 the types and intensity of impacts associated with a solar farm.

Figure 2-1. Project Location

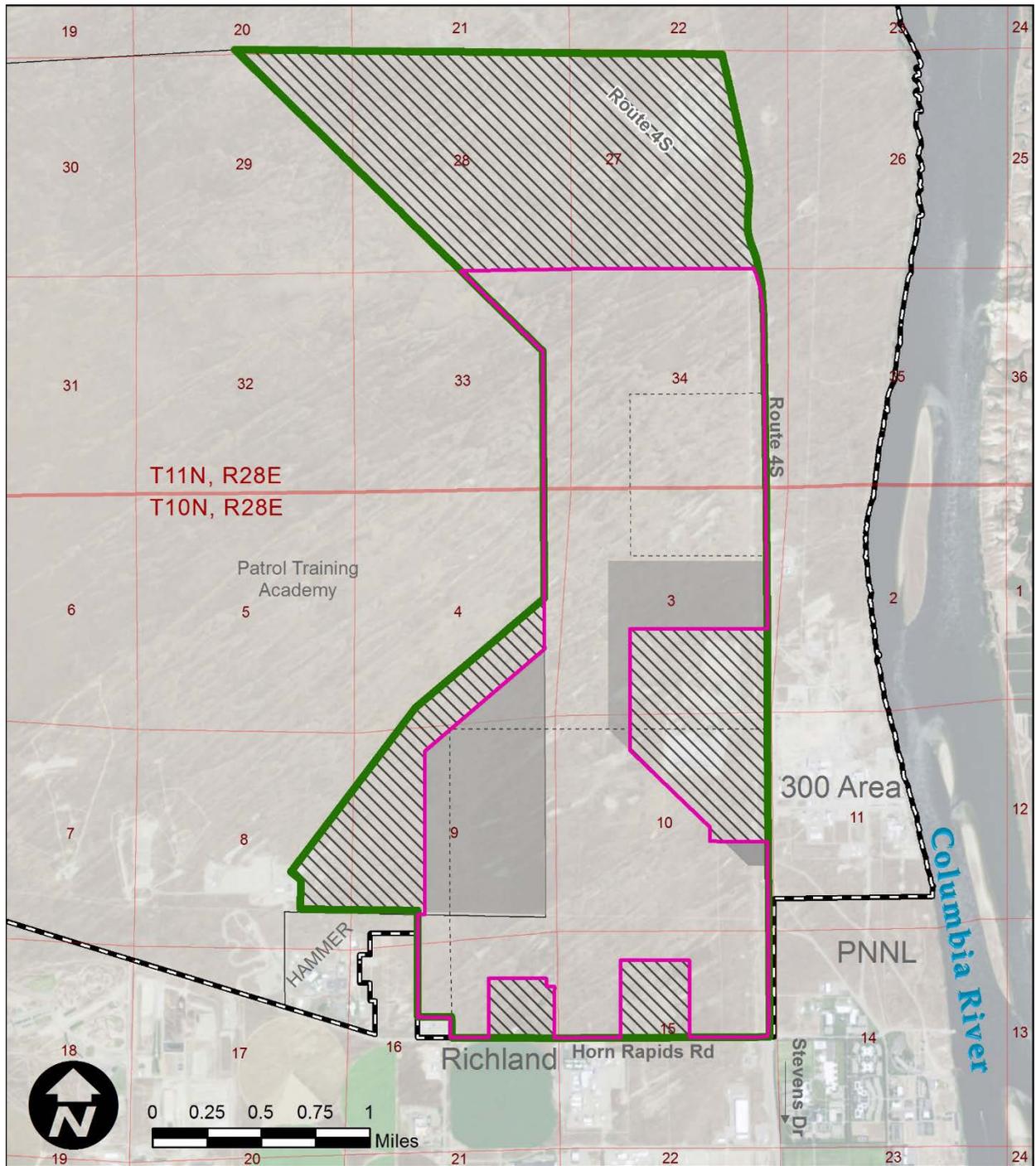


Legend

- Initial Hanford Site Land Conveyance Project Area
- TRIDEC Land Conveyance Request
- Additional Adjacent Land
- Hanford Site
- County Boundary
- River
- Highway
- Road

298  
299

**Figure 2-2. Project Area, Focused Study Area, Potential Access Agreement Land, and Land Not Suitable for Conveyance**



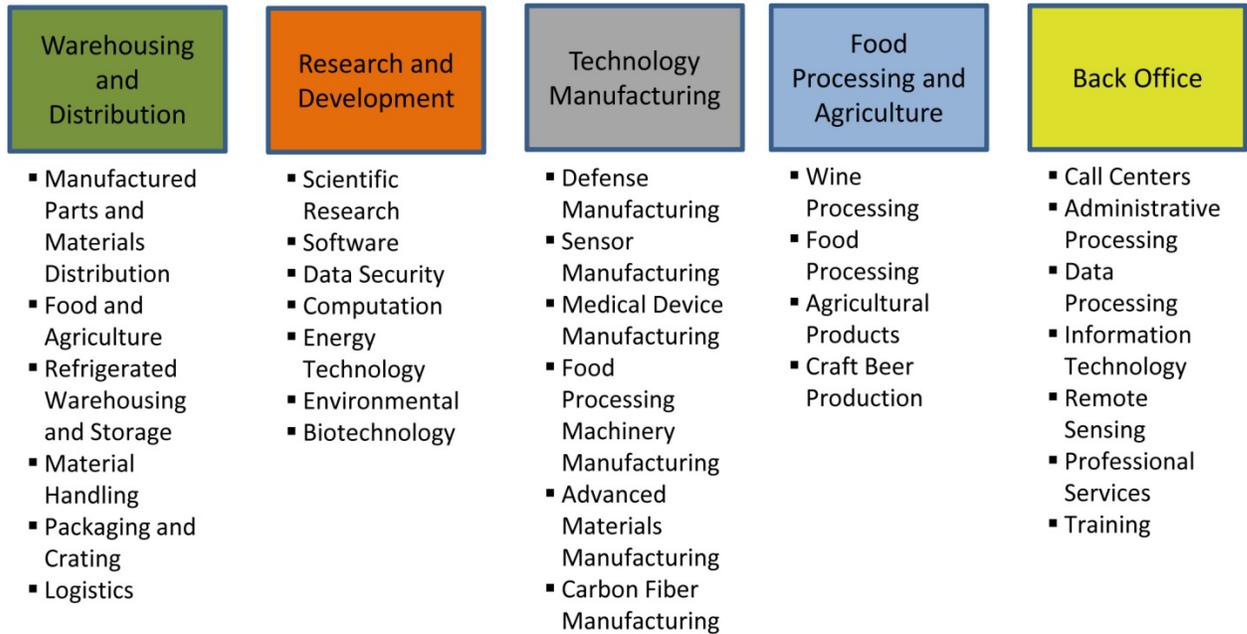
**Legend**

- Project Area – 4,413 acres
- Focused Study Area – 2,474 acres
- TRIDEC Land Request – 1,641 acres
- Potential Access Agreement Land – 539 acres
- Land Not Suitable For Conveyance
- Hanford Site

300

301

**Figure 2-3. TRIDEC’s General Current and Projected Target Marketing Industries**



302  
303

**Source:** TRIDEC 2004, 2005a, 2005b, 2005c, 2006, 2011a, 2014a.

304  
305  
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This analysis approach and these representative land use examples for both the main FSA and the solar farm FSA are presented and discussed in **Section 2.2.4**. Details of the representative examples are provided in **Appendix E**, “Representative Facilities.”

307

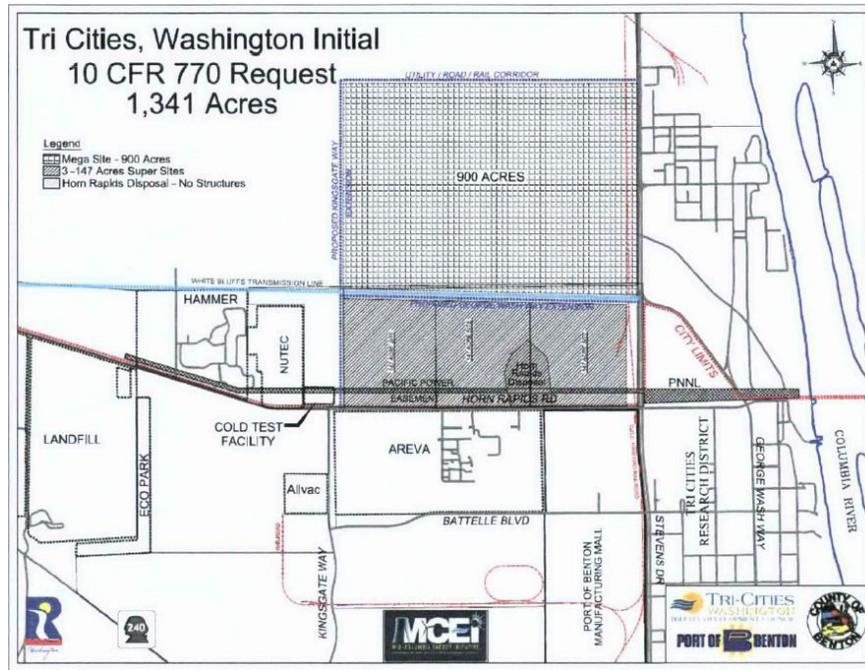
**2.2.1 Tri-City Development Council’s Land Transfer Proposal**

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309  
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312

TRIDEC’s May 2011 land transfer proposal is for a 1,341-acre tract (see **Figure 2-4**, “TRIDEC’s Proposed Use for the 1,341 Acres”), close to the intersection of Horn Rapids Road and Stevens Drive. TRIDEC indicated that they would potentially extend Kingsgate Way into the conveyed land. On the north side of the 1,341-acre parcel, TRIDEC indicated that a utility road/rail corridor would also potentially be constructed that would connect with the northern extension of Kingsgate Way.

313

**Figure 2-4. TRIDEC’s Proposed Use for the 1,341 Acres**



Source: TRIDEC 2011a.

314  
315  
316  
317

**2.2.2 Tri-City Development Council’s Addendum to Their Land Transfer Proposal**

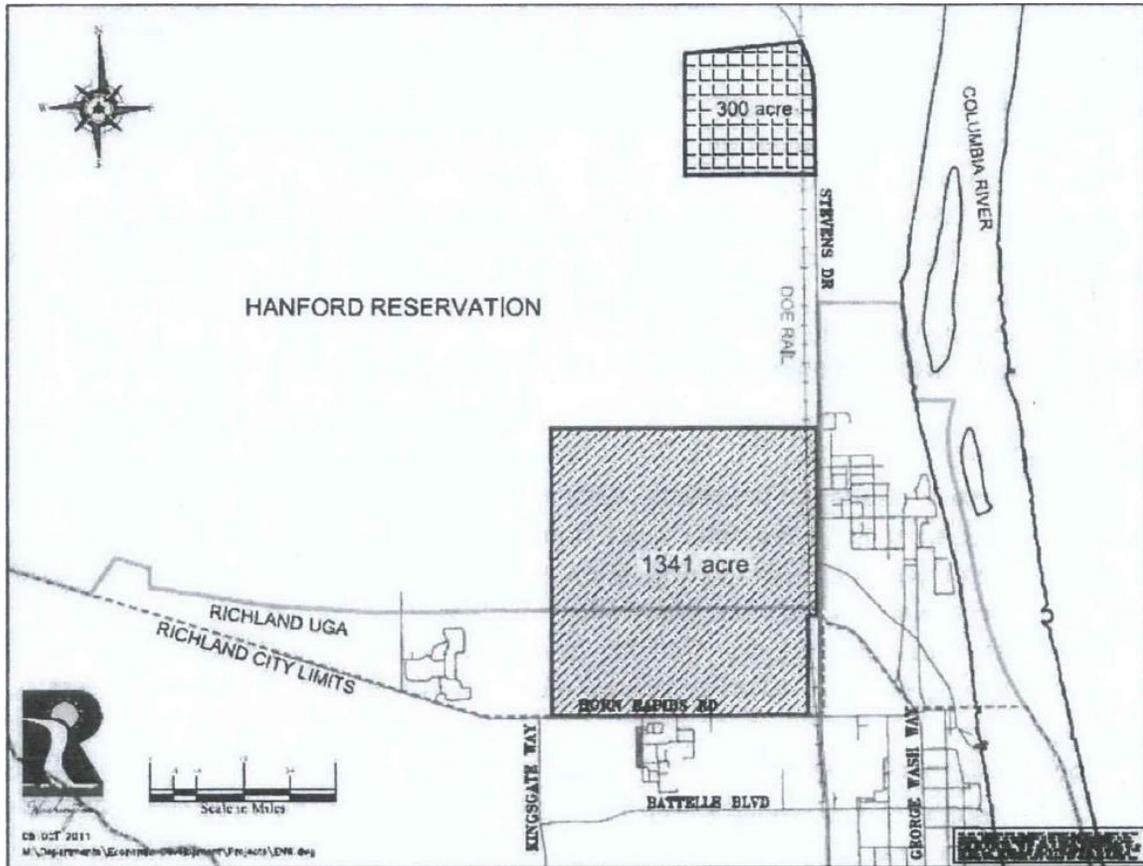
318 TRIDEC submitted an addendum (TRIDEC 2011b) to their original proposal in October 2011 –  
319 adding a 300-acre parcel for an energy park. TRIDEC identified this acreage as an initial step toward  
320 creation of the Mid-Columbia Energy Initiative Energy Park for uses “specific to solar powered  
321 applications.” TRIDEC described this addendum as an “envelope because it sets some overall  
322 parameters for how the land could be utilized, while not being overly specific to one particular  
323 application.” The addendum identified three specific solar technology applications:

- 324 1. Fixed tilt photovoltaic (PV)
- 325 2. Single axis tracking PV
- 326 3. Two-axis tracking PV or thermal electric (“dish” style)

327 The third technology application represents two very different types of two-axis tracking. The first  
328 uses PV panels and the second thermal electric parabolic dishes. Therefore there are a total of four  
329 solar technologies to consider. The first three types are PVs that rely directly on the conversion of  
330 light (photons) from the sun into electricity using flat-panel arrays. They are designed to absorb rather  
331 than reflect light. The difference among them is that one is set in a fixed position, the second rotates  
332 on one axis to generally follow the sun’s travel, and the third rotates on two axes to directly follow  
333 the sun’s travel. The two-axis tracking thermal electric parabolic dish depends entirely upon the  
334 reflectivity of mirrors to concentrate as much light as possible and focus it on a receiver, and is  
335 known as a concentrating solar power system. The dish’s receiver contains a fluid or gas that expands  
336 upon heating, thus driving a turbine converting its motion into electricity. The concentrating power  
337 system was evaluated in the Draft EA and public comments indicating a high level of environmental,  
338 safety, and visual impact concerns resulted in the concentrating solar power technology being  
339 prohibited by the deed.

340 **Figure 2-5**, “TRIDEC’s Addendum “Attachment 2 – Revised Map” Showing the Original 300-Acre  
 341 Solar Energy Park Request,” is TRIDEC’s map from their proposal addendum (TRIDEC 2011b)  
 342 showing the proposed location of the proposed “solar farm.” Subsequently TRIDEC determined that a  
 343 better location for the 300-acre parcel was farther south to the location shown on **Figure 2-1**.  
 344 **Figure 2-5** is the map referenced in Section 3013 of the NDAA.

345 **Figure 2-5. TRIDEC’s Addendum “Attachment 2–Revised Map” Showing the Original**  
 346 **300-Acre Solar Energy Park Request**



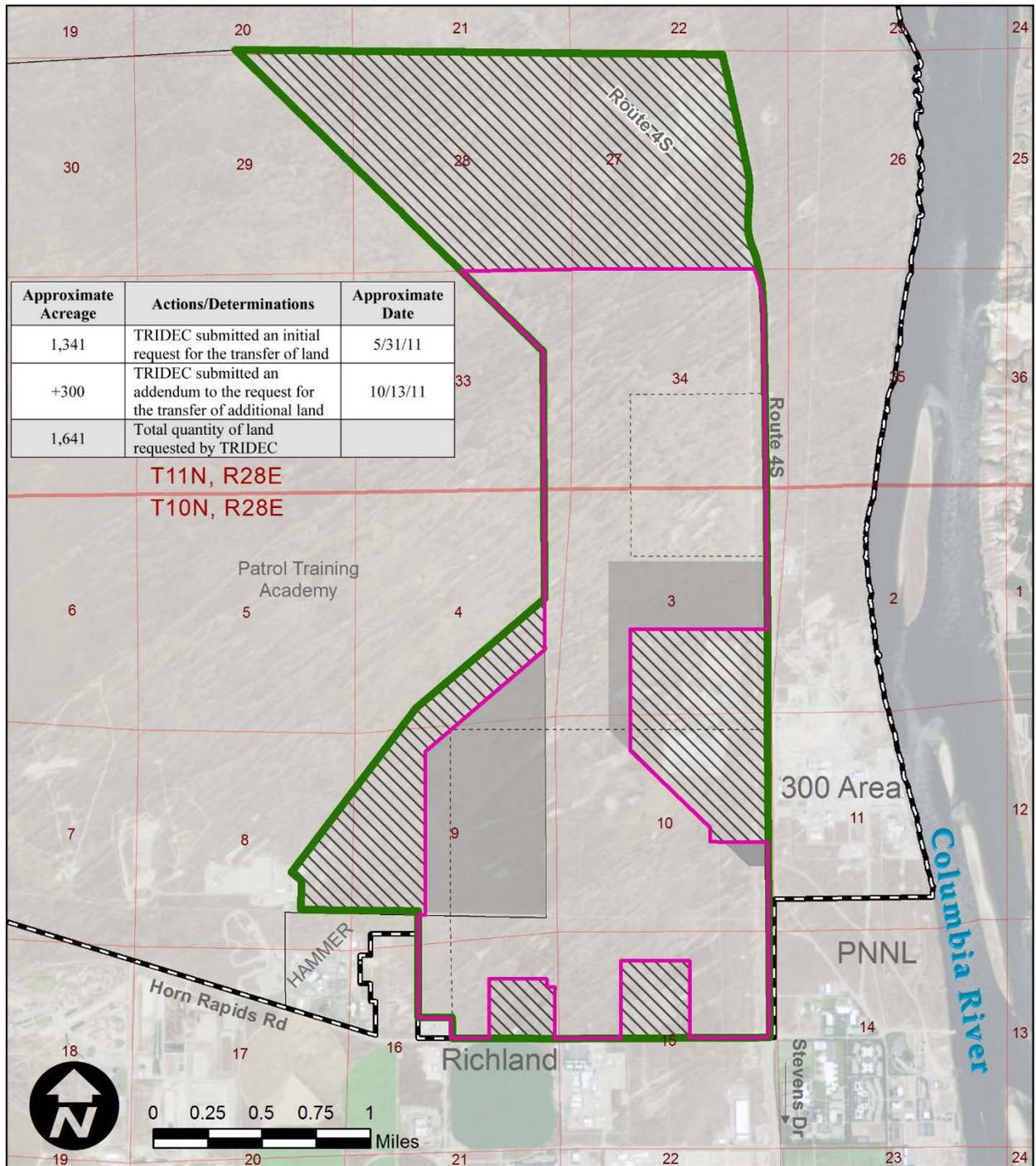
347 **Source:** TRIDEC 2011b.  
 348

349 **2.2.3 Lands Considered for Conveyance**

350 DOE identified 4,413 acres from which 1,641 acres could be identified for conveyance to TRIDEC.  
 351 The 4,413 acres are referred to as the PA. Since the project began, DOE has conducted research and  
 352 evaluations on these lands to determine their potential suitability for conveyance. The chronology of  
 353 the suitability review process to identify land potentially suitable for conveyance is shown on  
 354 **Figure 2-6** through **Figure 2-12**. The reduction in potentially suitable land from the initial 4,413  
 355 acres begins with **Figure 2-7** and proceeds sequentially. Each map includes a small table that  
 356 identifies the approximate acreage, the actions or determinations and approximate dates, and the  
 357 potentially suitable land acreage after the action or determination. The TRIDEC-requested acreages  
 358 (i.e., 1,341 and 300 acres) are shown on each map for context. The acreage value shown in bold at the  
 359 center of each figure is the remaining potentially suitable land after the action or determination was  
 360 taken.

361

**Figure 2-6. TRIDEC's Initial Land Request Areas Total 1,641 Acres**



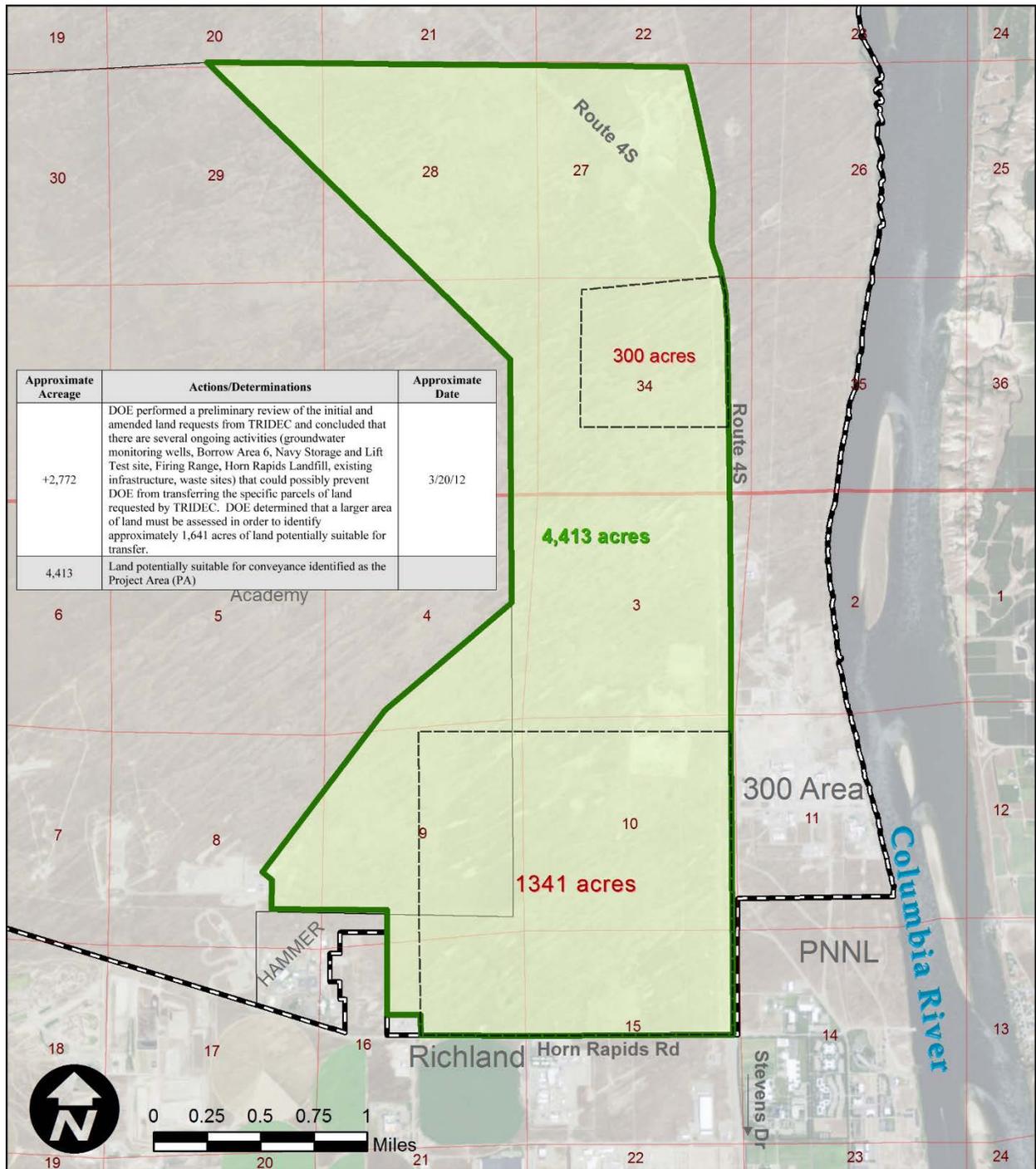
362

**Legend**

- Project Area – 4,413 acres
- Focused Study Area – 2,474 acres
- TRIDEC Land Request – 1,641 acres
- Potential Access Agreement Land – 539 acres
- Land Not Suitable For Conveyance
- Hanford Site

363

Figure 2-7. DOE Identified 4,413 Acres as the PA



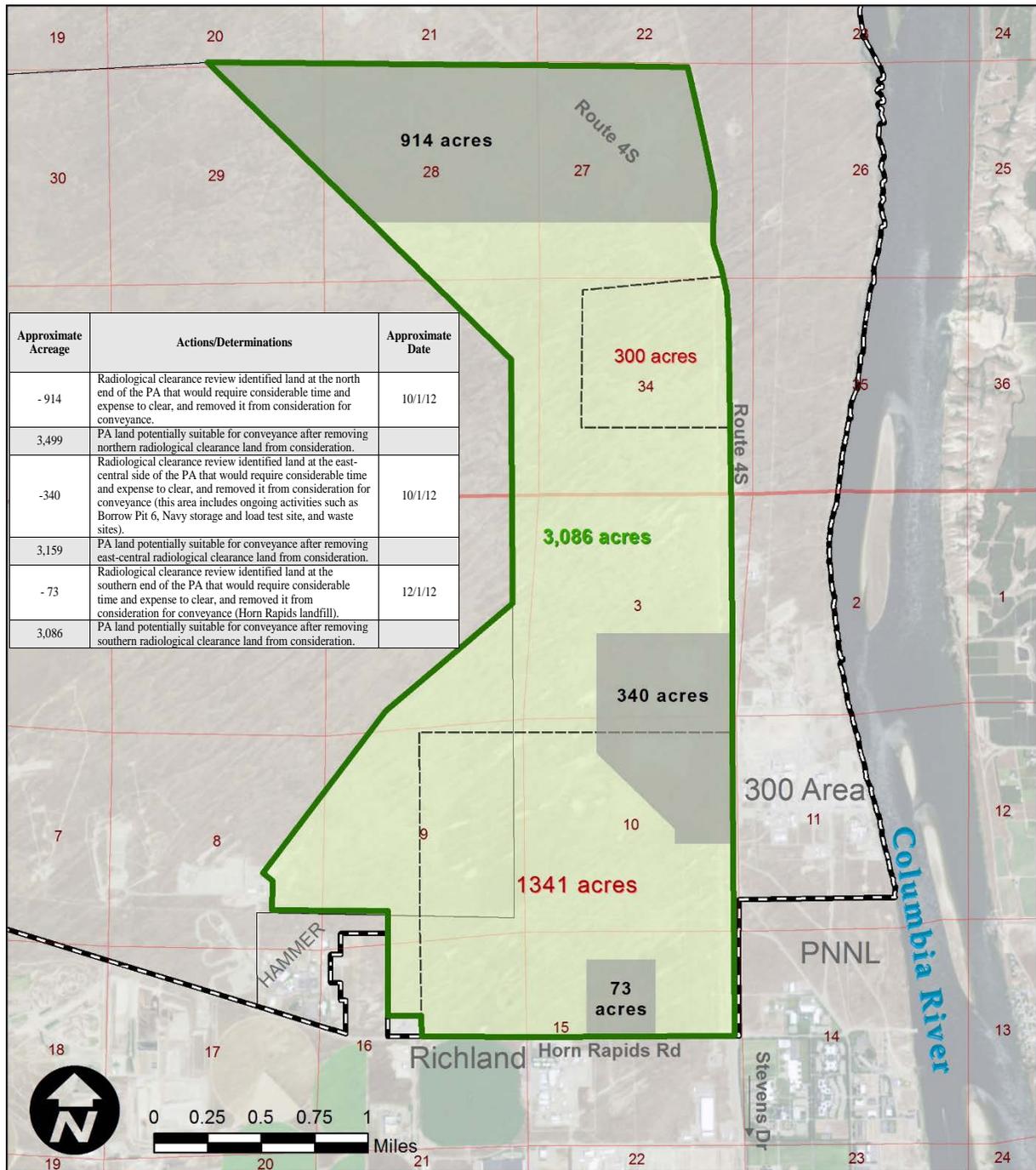
Legend

- TRIDEC Request
- Project Area
- Hanford Site
- Township, Range, Sections

364

365  
366

**Figure 2-8. DOE Removed 1,327 Acres Needing Radiological Clearance Leaving 3,086 Acres of the PA Potentially Suitable for Transfer**



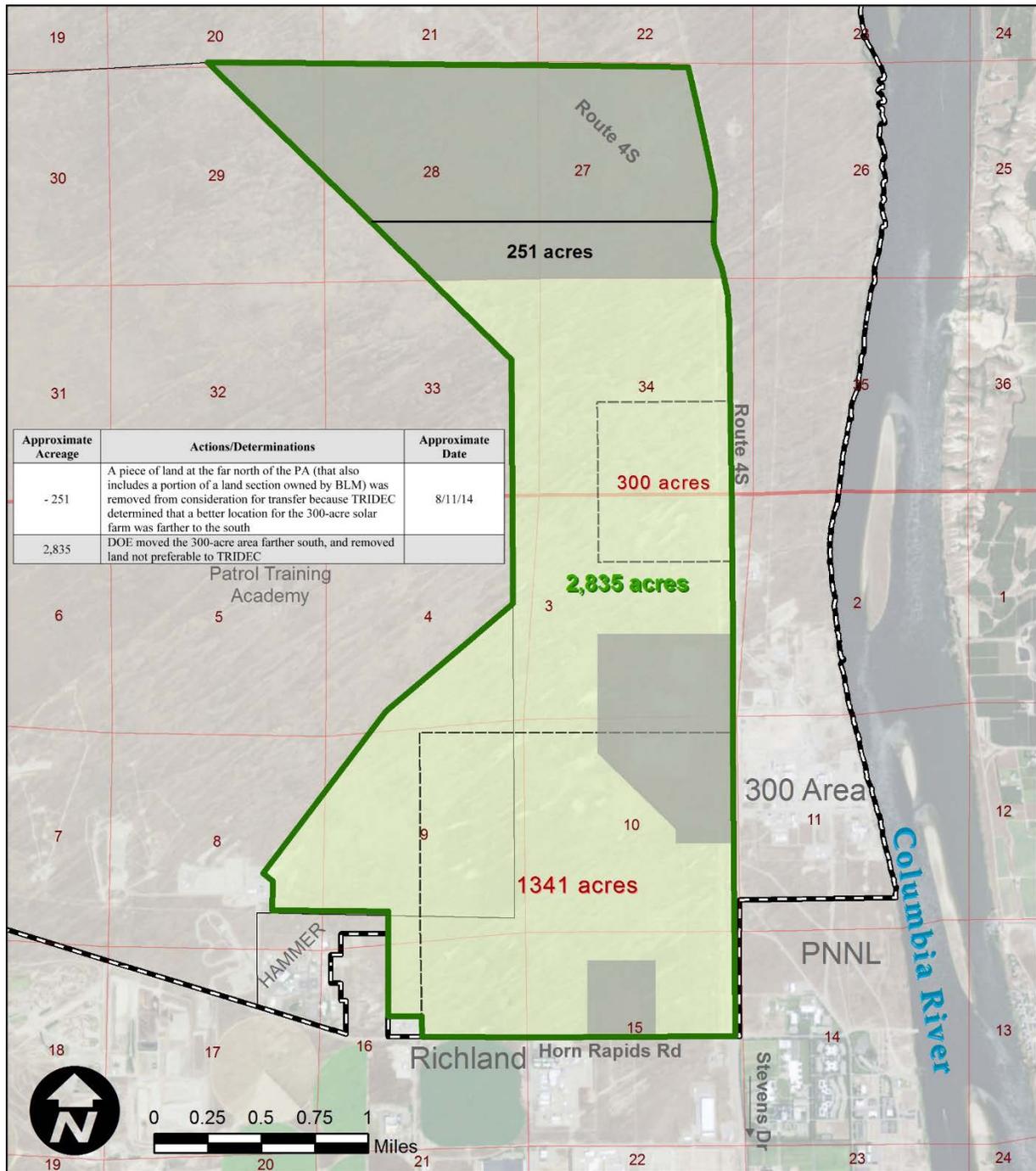
**Legend**

- TRIDEC Request
- Project Area
- Hanford Site
- Township, Range, Sections
- Constrained Areas

367

368  
369

**Figure 2-9. TRIDEC Moves 300-Acre Request Location South, and DOE Removes 251 Acres Not Preferred by TRIDEC Leaving 2,835 Acres of the PA Potentially Suitable for Transfer**



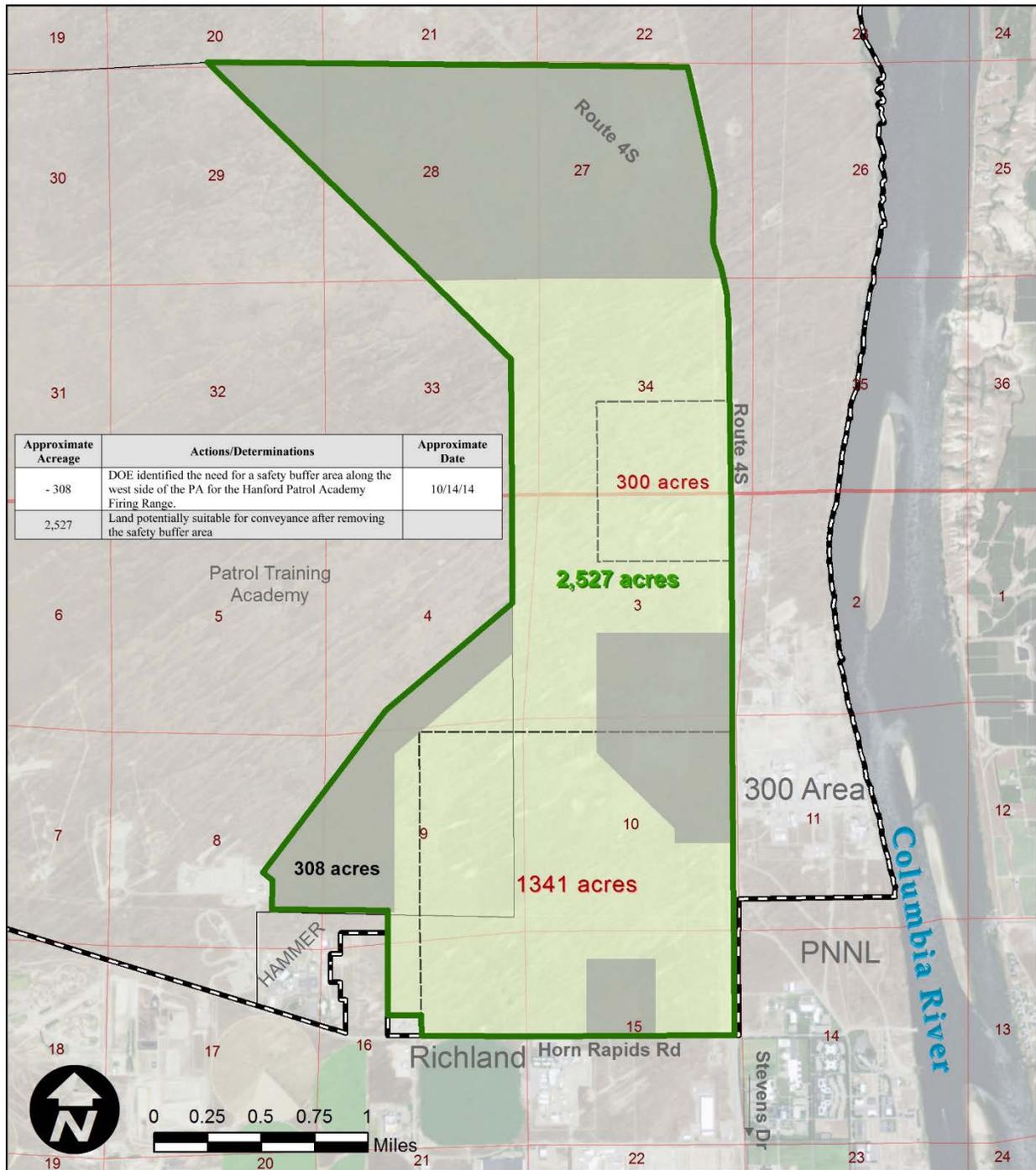
370

**Legend**

- TRIDEC Request
- Project Area
- Constrained Areas
- Hanford Site
- Township, Range, Sections

371  
372

**Figure 2-10. DOE Removed 308-Acre Buffer Zone for Hanford Patrol Firing Range Leaving 2,527 Acres of the PA Potentially Suitable for Transfer**



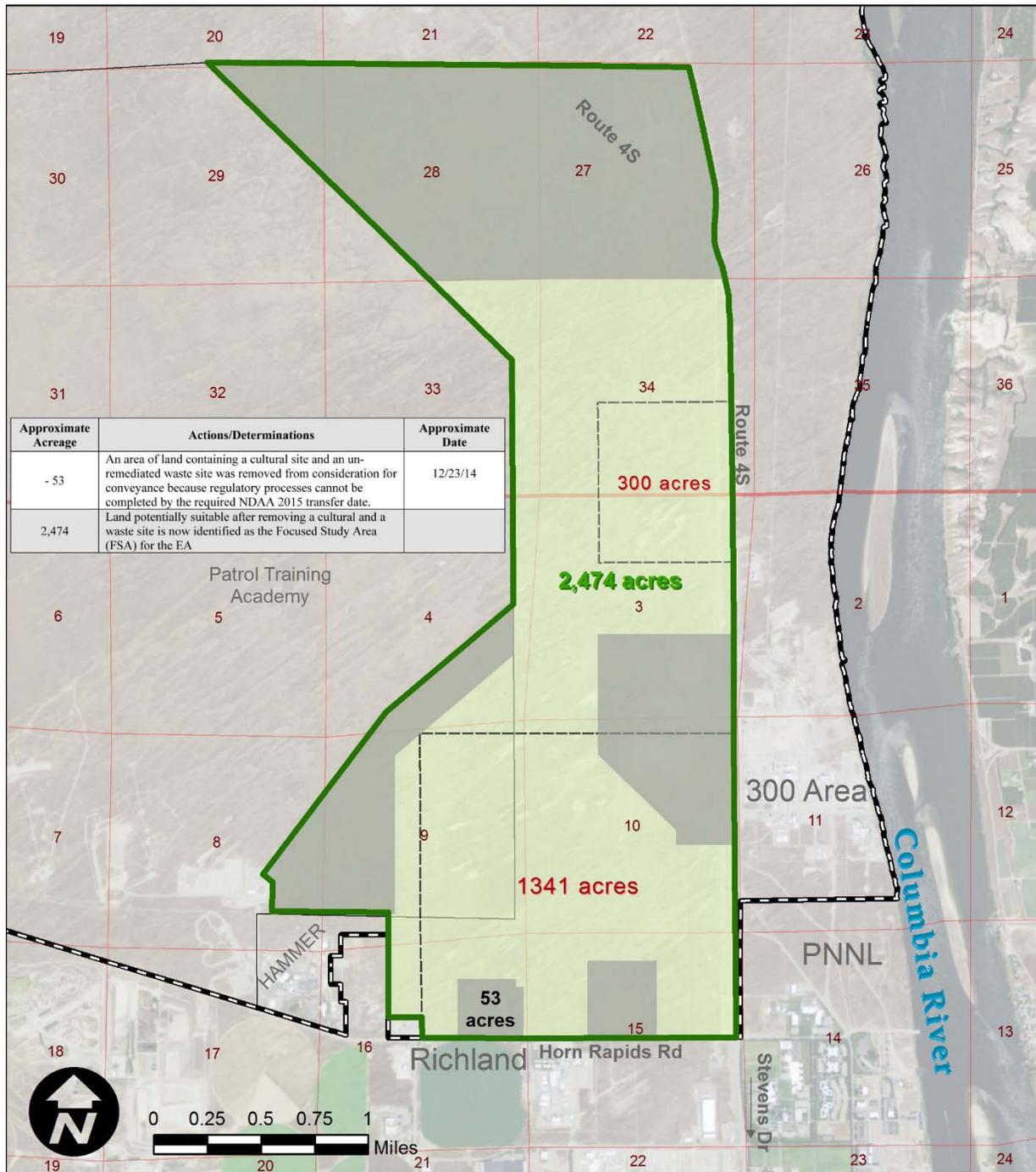
373

**Legend**

- TRIDEC Request
- Project Area
- Hanford Site
- Township, Range, Sections
- Constrained Areas

374  
375

**Figure 2-11. DOE Removed 53 Acres for Containing Unremediated Waste and a Cultural Site Leaving 2,474 Acres of the PA Potentially Suitable for Transfer**



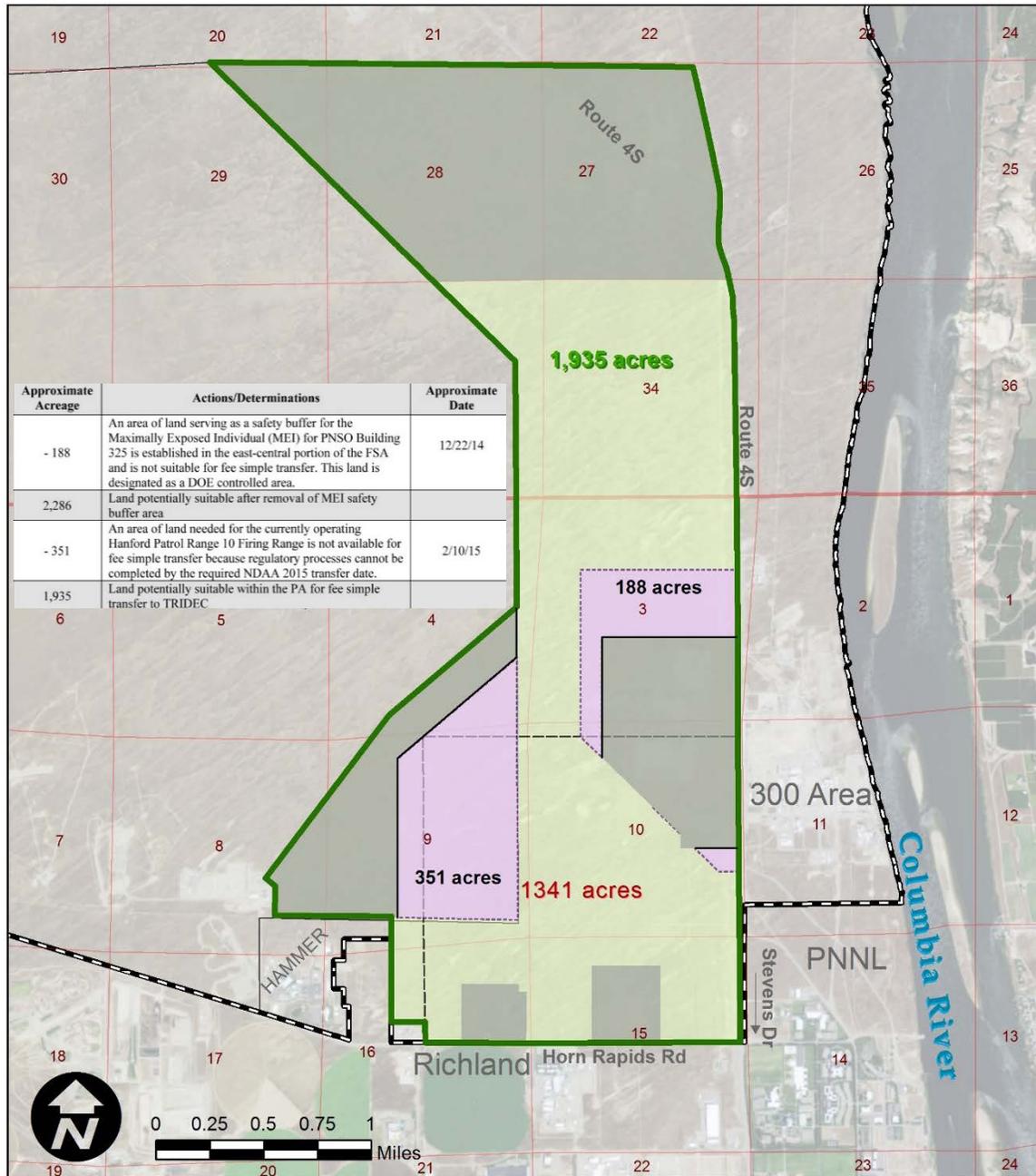
**Legend**

- TRIDEC Request
- Project Area
- Hanford Site
- Constrained Areas
- Township, Range, Sections

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**Figure 2-12. DOE Removed 188 Acres for a Radiological Safety Buffer, and 351 Acres of the Patrol Firing Range that for Regulatory Reasons Could Not Be Available in Time for Transfer Leaving 1,935 Acres of the PA Potentially Suitable for Transfer**



**Legend**

- TRIDEC Request
- Hanford Site
- Potential Access Agreement Land
- Project Area
- Township, Range, Sections
- Constrained Areas

380

381 Following this review process (see **Appendix A**), DOE identified 2,474 acres of land that was  
382 potentially suitable for conveyance. The 2,474 acres of land is referred to as the FSA in this EA. DOE  
383 would convey approximately 1,641 acres from the FSA. Lands in the FSA are further distinguished  
384 by their suitability for transfer from federal ownership. The FSA contains 1,935 acres potentially  
385 suitable for transfer from federal ownership, and 539 acres that could be conveyed (e.g., leases and  
386 easements) but would remain under federal ownership.

387 The 1,341 acres that TRIDEC requested would come from the main FSA and the 300 acres requested  
388 would be the solar farm FSA. The 539 acres of lands removed from consideration for transfer in  
389 **Figure 2-12** are the two PAAL areas (i.e., 188 and 351 acres). The diagonally cross-hatched areas on  
390 **Figure 2-6** are those determined unsuitable for transfer. To provide a comprehensive impact analysis,  
391 the affected environment and environmental consequences (see **Chapter 3.0**) addresses the  
392 4,413-acre PA and surrounding lands, as applicable (the maximum amount of land to be conveyed is  
393 approximately 1,641 acres).

#### 394 **2.2.4 Probable Intended Uses**

395 **Section 2.2** presents TRIDEC's TMI categories. These were assumed to be the most probable  
396 intended uses for the conveyance lands and therefore can be considered the most reasonably  
397 foreseeable uses in the EA's analysis.

398 For the main FSA lands, the analysis in this EA uses representative  
399 example industry facilities for each of the TMI categories within a given  
400 subarea. Existing environmental analyses were used to obtain information  
401 about facility characteristics that are necessary for environmental  
402 consequence analysis (e.g., footprint, infrastructure, utilities, emissions,  
403 construction of buildings, projected workforce and traffic, water usage, and  
404 similar requirements). These were available for most of the representative  
405 types (see **Table 2-1**, "Representative Target Marketing Industry and Solar  
406 Technology Example Facilities"). Some of these facilities are constructed  
407 and operated by commercial private-sector enterprises and details of their  
408 construction or operation are not readily publicly available.

#### **Important Note:**

By identifying these facilities as representative for this EA, DOE in no way recommends or endorses these companies or their products.

409 **Table 2-1** identifies the representative TMI facility examples. An energy category was added to  
410 TRIDEC's original TMI proposal categories in order to address the proposed solar development and a  
411 biofuels manufacturing facility that appear in a more recent TRIDEC marketing study  
412 (TRIDEC 2014a). More detailed information on these representative facilities is provided in  
413 **Appendix E**. One facility is a "multi-phased development" and the others are all "single-phase  
414 developments." Phases refers to the facilities being constructed all at once (single phase) or spread  
415 out in time (multi-phase). All facilities were identified and information was obtained using online  
416 searches using key words from TRIDEC's TMI analyses.

417 **Table 2-1. Representative Target Marketing Industry and Solar Technology Example Facilities**

Target Marketing Industry Category	Subarea(s)	Type of Operation/Facility	Supporting Environmental Analysis <sup>8</sup>
<b>Multi-Phase Development</b>			
Warehousing and Distribution, Food Processing and Agriculture, and Back Office	Food and Agriculture, Refrigerated Warehousing and Storage, Packaging and Crating, Wine Processing, Food Processing, Administrative Processing, and Information Technology	Commerce Center – Phased Development Light Multi-Use Industrial Business Park	Yes
<b>Single-Phase Developments</b>			
Warehousing and Distribution – A	Manufactured Parts and Materials Distribution, Material Handling, Packaging and Crating, and Logistics	Manufactured Parts Distribution Center	No
Warehousing and Distribution – B	Food and Agriculture, Refrigerated Warehousing and Storage, Material Handling, and Logistics	Storage and Rail Distribution Center	No
Research and Development – A	Scientific Research, Computation, and Biotechnology	Biological Research and Development Center	No
Research and Development – B	Scientific Research, Software, Computation, and Energy	Energy Research and Development Center	No
Technology Manufacturing – A	Defense Manufacturing, Sensor, and Medical Device Manufacturing	Electronics Equipment Manufacturing	No
Technology Manufacturing – B	Advanced Materials Manufacturing	Light Industrial	No
Food Processing and Agriculture – A	Food Processing and Agricultural Products	Vegetable Food Processing	No
Food Processing and Agriculture – B	Wine Processing and Agricultural Products	Wine/Spirits Processing	Yes
Back Office – A	Call Center, Data Processing, and Training	National Call Center	No
Back Office – B	Administrative Processing, Data Processing, Information Technology, Professional Services, and Training	Automatic Data Processing Center	No
Energy	Biofuel Manufacturing	Biofuels Manufacturing	Yes
Energy	Photovoltaic Energy Production	Electrical Production Facility	Yes

418

419 General and resource-area specific assumptions were made to provide for a consistent analysis. These  
 420 assumptions are provided at the beginning of **Chapter 3.0**. Assumptions specific to analysis of  
 421 impacts for any particular resource are presented in the respective resource area subsections in  
 422 **Chapter 3.0**.

<sup>8</sup> Supporting Environmental Analysis refers to an environmental study like an EA or environmental impact statement. Where there is a “Yes” it means the information is taken from a study. If there is a “No” it means that study was not found for the representative facility. References for all these facilities are in Appendix E.

### 423 2.2.5 The Bounding-Case Analysis for the Main Focused Study Area

424 To account for uncertainties associated with the actual development of the FSA, this EA provides a  
425 bounding-case analysis. DOE NEPA guidance (DOE 2005a) states that:

426 A bounding analysis is an analysis designed to identify the **range** of potential impacts  
427 or risks, both upper and lower. Such an approach might be used in an EA or  
428 environmental impact statement, for example, to simplify assumptions, address  
429 uncertainty, or because expected values are unknown. As a practical matter, a  
430 bounding analysis most often is used to provide conservatism in the face of  
431 uncertainty.

432 A bounding-case analysis is not needed for the 300-acre solar farm FSA since the specific use of the  
433 land was identified by TRIDEC (2011b). The lower bound is represented by the No Action  
434 Alternative. The upper bound is represented by the development of these lands. This EA  
435 environmental consequence analysis becomes bounding in that it addresses a “range” of:

- 436 • Reasonable Land Uses – There are two examples for each of the TRIDEC TMI representative  
437 facilities in development of the main FSA plus the multi-phase development facility.
- 438 • Locations – This EA assumes each of the example representative facilities would be  
439 constructed and operated anywhere within the main FSA to identify potential location-  
440 specific impacts.
- 441 • Construction Durations – All TMI representative facilities would begin and end construction  
442 at about the same time to address the collective short-term construction impacts. Longer-term  
443 impacts are associated with the multi-phase development.
- 444 • Individual and Collective Impacts – The environmental consequences for any representative  
445 facility were assessed by each resource area for those that are general (the same regardless of  
446 location) and those that are location-specific.

447 DOE’s NEPA-implementing regulations address mitigation (10 CFR 1021.322 (b) (1)) and mitigation  
448 action plans (10 CFR 1021.331). The types of mitigation measures that could be applied for a  
449 proposed action include the following:

- 450 • Avoiding an impact by not taking an action or parts of an action
- 451 • Minimizing impacts by limiting the degree or magnitude of an action and its implementation
- 452 • Rectifying an impact by repairing, rehabilitating, or restoring the affected environment
- 453 • Reducing or eliminating the impact by preservation and maintenance operations during the  
454 life of the action
- 455 • Compensating for the impact by replacing or providing substitute resources or environments  
456 (40 CFR 1508.20).

457 Through the land suitability review process described in Section 2.2.3, DOE proactively mitigated  
458 potential impacts by removing some lands from consideration for conveyance to avoid potential  
459 effects to cultural resources and ongoing federal missions. As a result, mitigation measures were built  
460 into the Proposed Action. In addition, DOE identified a number of mitigation measures to avoid,  
461 minimize, rectify, or compensate for potential adverse environmental effects associated with the  
462 Proposed Action.

463 In **Chapter 3.0**, each resource area analysis has a section on mitigation measures that could be  
464 performed by DOE or future land owners. DOE would perform any mitigation measures necessary on  
465 the PAAL since these lands stay under DOE ownership. DOE would prepare a mitigation action plan  
466 utilizing the mitigation measures described in **Chapter 3.0** that are within DOE's control.

### 467 3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

468 This chapter presents the affected environment and environmental consequences analyses for  
469 geology; water resources; air quality; ecological resources; wetlands and floodplains; historic  
470 properties and cultural resources; land use; visual resources; noise, vibration, and electromagnetic  
471 fields (EMF); utilities and infrastructure; transportation; waste management; socioeconomics and  
472 environmental justice; and human health and safety.

473 The affected environment analysis covers the Proposed Action lands considered for conveyance (see  
474 **Section 2.2.3**) identified as the 4,413-acre project area (PA). For many of the resource areas, this PA  
475 constitutes the study area or region of influence (ROI), although for some, like socioeconomics, the  
476 study area includes surrounding areas where there may be effects. The lands initially considered to be  
477 potentially suitable for conveyance are shown on **Figure 2-6**.

478 The environmental consequences analysis addresses those lands determined to be potentially suitable  
479 for conveyance after conducting a land suitability review for the PA (see **Appendix A**, “The Hanford  
480 Site Land Suitability Review,” and **Figure 2-6**). These lands are the 2,474-acre Focused Study Area  
481 (FSA) discussed in **Section 2.2.3** that consists of a 1,635-acre main FSA, a 300-acre solar farm FSA,  
482 and 539 acres of Potential Access Agreement Land (PAAL) (see **Figure 2-6**). The FSA lands are  
483 those that would be transferred by deed with the exception of the PAAL that would only be conveyed  
484 by realty instruments other than a deed. The U.S. Department of Energy (DOE) would convey  
485 approximately 1,641 acres of FSA land, which may include some PAAL conveyed (e.g., via lease or  
486 easement) for utilities and infrastructure. This analysis is based upon the proposed construction and  
487 operation of all the representative example facilities (including the solar farm) identified in  
488 **Section 2.2.1** and **Section 2.2.2** and described in **Appendix E**, “Representative Facilities.” In this  
489 chapter, impacts to adjacent land or facilities are also addressed to the extent necessary for some  
490 resource areas, such as, noise, vibration, and EMF. General assumptions for construction and  
491 operation are provided in the following sections.

#### 492 *Common No Action Alternative assumptions:*

493 For the No Action Alternative (i.e., no conveyance of lands), existing activities would continue  
494 (including the two borrow pits, Navy Storage Area and Load Test [SALT] Site, well monitoring, and  
495 others). Assumptions for these include:

- 496 • Lands stay under federal ownership with restricted access and federal oversight of activities.
- 497 • Lands remain largely undeveloped and undisturbed as described in the affected environment  
498 sections regarding ambient noise, air quality, and vibration, with minimal artificial light.
- 499 • Minimal changes to the natural and cultural resources except those caused by nature  
500 (e.g., weather and burrowing animals).

#### 501 *Important assumptions for the 1,635-acre main FSA environmental consequence analysis:*

- 502 • The 1,341-acre parcel of land requested by the Tri-City Development Council (TRIDEC)  
503 would be selected, to the extent possible, from the 1,635-acre main FSA.
- 504 • Future landowners would construct and operate facilities within the target marketing industry  
505 (TMI) categories and subareas identified by TRIDEC (see **Figure 2-3**).
- 506 • Construction and operation characteristics for each selected facility example are indicative of  
507 the TMI category and subareas they represent.

- 508 • To evaluate location-specific environmental sensitivities, the multi-phase and single-phase  
509 representative industry examples could be built anywhere on the main FSA.
- 510 • To evaluate short-term construction impacts, the first phase of the multi-phased development  
511 and all the single-phase development representative examples would begin construction  
512 simultaneously for up to 18 months (although some could take a few months longer to  
513 complete than others).
- 514 • To evaluate the impacts associated with longer-term construction, the multi-phased  
515 development would be constructed and developed in phases over a 20-year period.
- 516 • Future landowners would construct and operate their facilities in compliance with applicable  
517 federal, state (e.g., the *State Environmental Policy Act* [SEPA]<sup>9</sup>), and local laws, regulations,  
518 and other legal requirements.
- 519 • Future landowners would comply with any deed restrictions and covenants accompanying the  
520 land transfer action.
- 521 • Any development of these lands would be in accordance with local comprehensive land use  
522 plans, zoning, and ordinances.
- 523 ***Important assumptions for the 300-acre solar farm FSA environmental consequence analysis:***
- 524 • The 300-acre parcel requested by TRIDEC is the solar farm FSA analyzed in this chapter.
- 525 • The single-axis photovoltaic (PV) solar technology is considered for construction and  
526 operation on the solar farm FSA.
- 527 • The solar technology example facility is much larger than the 300 acres proposed for transfer  
528 in the Proposed Action; therefore, its construction characteristics are linearly proportioned to  
529 the 300 acres of land.
- 530 • The entire solar farm FSA would be populated with PV arrays to a maximum reasonable  
531 density, avoiding the “infrastructure corridor” so as not to interfere with the operation, repair,  
532 or maintenance of the railroad, power lines, and similar systems.
- 533 • Future landowners would comply with any deed restrictions and covenants accompanying the  
534 land transfer action.
- 535 • Future landowners would construct and operate their facilities in compliance with the federal,  
536 state, and local laws, regulations, and other legal requirements.
- 537 • Any development of these lands would be in accordance with local comprehensive land use  
538 plans, zoning, and ordinances.

---

<sup>9</sup> *State Environmental Policy Act* (SEPA) (RCW 43.21C) is implemented by the SEPA rules (WAC 197-11-704) and applies to state agencies, municipal and public corporations, and counties. Much like NEPA, after which SEPA is patterned, the SEPA process includes evaluation of a proposed action’s potential effects on the environment, mitigation measures, consideration of alternatives, documentation, and public notification. For further information about the SEPA process, please see <http://www.ecy.wa.gov/programs/sea/sepa/e-review.html>. After the FSA lands are transferred from federal ownership, SEPA responsibilities could be carried out by, for example, the City of Richland, Benton County, or the Port of Benton, depending on which organization is determined to be the lead agency for a proposed action.

539 ***Important assumptions for the 539-acre PAAL environmental consequence analysis:***

- 540       • These 539 acres would remain under DOE ownership.
- 541       • The PAAL includes two separate areas described in **Appendix A** (see **Figure A-6**).
- 542           – Patrol Training Academy Range 10 and related lands.
- 543           – A DOE-controlled area.
- 544       • Access to PAAL would only be for the purpose of construction or maintenance of utilities on
- 545           these lands.
- 546       • No public access would be allowed onto or across these lands.
- 547       • Use of this land would be subject to applicable federal laws and DOE orders, regulations, and
- 548           oversight.

549 ***Construction assumptions:***

550 Construction of the representative facilities on the main and solar farm FSAs would involve extensive

551 land disturbing activities necessary for buildings, equipment, roads, parking areas, and utilities and

552 infrastructure. These activities would include site clearing, grading, land contouring, adding aggregate

553 fill, soil compacting, and excavating for footings and trenches or pilings. These activities would

554 remove vegetation, surface soil, natural and manmade surface features, and any associated objects

555 and materials, changing the landscape from one sculpted by wind and weather to one characterized by

556 industrial development.

557 The use of heavy machinery to effect these changes would introduce machine noise and vibration.

558 Noise and vibration levels would be within *Richland Municipal Code* (RMC) requirements at the

559 representative facility site boundary<sup>10</sup>. Odors associated with diesel engines, lubricants, and other

560 sources could also be noticeable but are expected to be within the RMC limits (the regulatory

561 compliance point for odor is at the industrial use district boundary, RMC 23.26.020). The sight of

562 large construction equipment moving across the landscape would be readily discernable. During the

563 part of the year with fewer daylight hours, temporary lighting would flood the construction sites so

564 that operations could be conducted safely. Lighting would be visible from the construction sites but

565 within the “uplight” shielding requirements of the RMC (RMC 23.58.030).

566 After site clearing activities have concluded, construction materials would be brought onsite by heavy

567 trucks driving across unimproved surfaces. Cranes and boom-trucks would be brought onsite for

568 building erection, sized to the task for “tilt-up” warehouses or multistory buildings. Utility services

569 could be extended from existing lines at Horn Rapids Road before or in sequence with these activities

570 requiring erection of power poles or buried cable, water and sewer lines, and gas lines. During

571 construction, pneumatic tools using air compressors are often used that create higher noise levels but

572 must still be within the RMC at the site boundary.

573 ***Facility operation assumptions:***

- 574       • Future landowners would operate their facilities in accordance with all applicable federal,
- 575           state, and local laws, regulations, and ordinances.

---

<sup>10</sup> RMC Chapter 23.22, “Commercial Zoning Districts,” Section 23.22.020, “Performance standards and special requirements”; and Chapter 9.16, “Public Nuisance Noise – Prohibited.”

- 576 • Future landowners or parties to a PAAL agreement would comply with any deed restrictions,  
577 and covenants or requirements in other realty instruments that would be conveyed to them.

### 578 3.1 Geology

579 The geologic conditions important to the potential development of the PA include soils or near  
580 surface geologic strata, mineral (gravel) deposits, topography, and the Hanford Site environmental  
581 remediation, which is discussed in **Section 3.7**. Soils lie above bedrock and usually consist of  
582 weathered bedrock fragments or material deposited by wind, often with decomposed organic matter  
583 from plants, bacteria, fungi, and other living things. Mineral resources in this area are earth materials  
584 that can be extracted for a useful purpose, such as gravel that can be used for road beds or backfill.  
585 Topography refers to the elevation, slope, aspect, and surface features found within a given area. The  
586 ROI for these geologic resources is the PA and immediately adjacent lands.

587 The principal geologic hazards that could affect man-made structures or the use of conveyed property  
588 are soil and slope stability (e.g., landslide potential or soils that shrink and swell and could crack  
589 foundations), seismic activity (earthquakes), and volcanic activity. This environmental assessment  
590 (EA) assumes that these geologic hazards to structures on the conveyed lands would be addressed by  
591 the applicable commercial building codes and engineering design.

592 This geologic resource area section focuses on soils, gravel deposits, and topography.

#### 593 3.1.1 Affected Environment

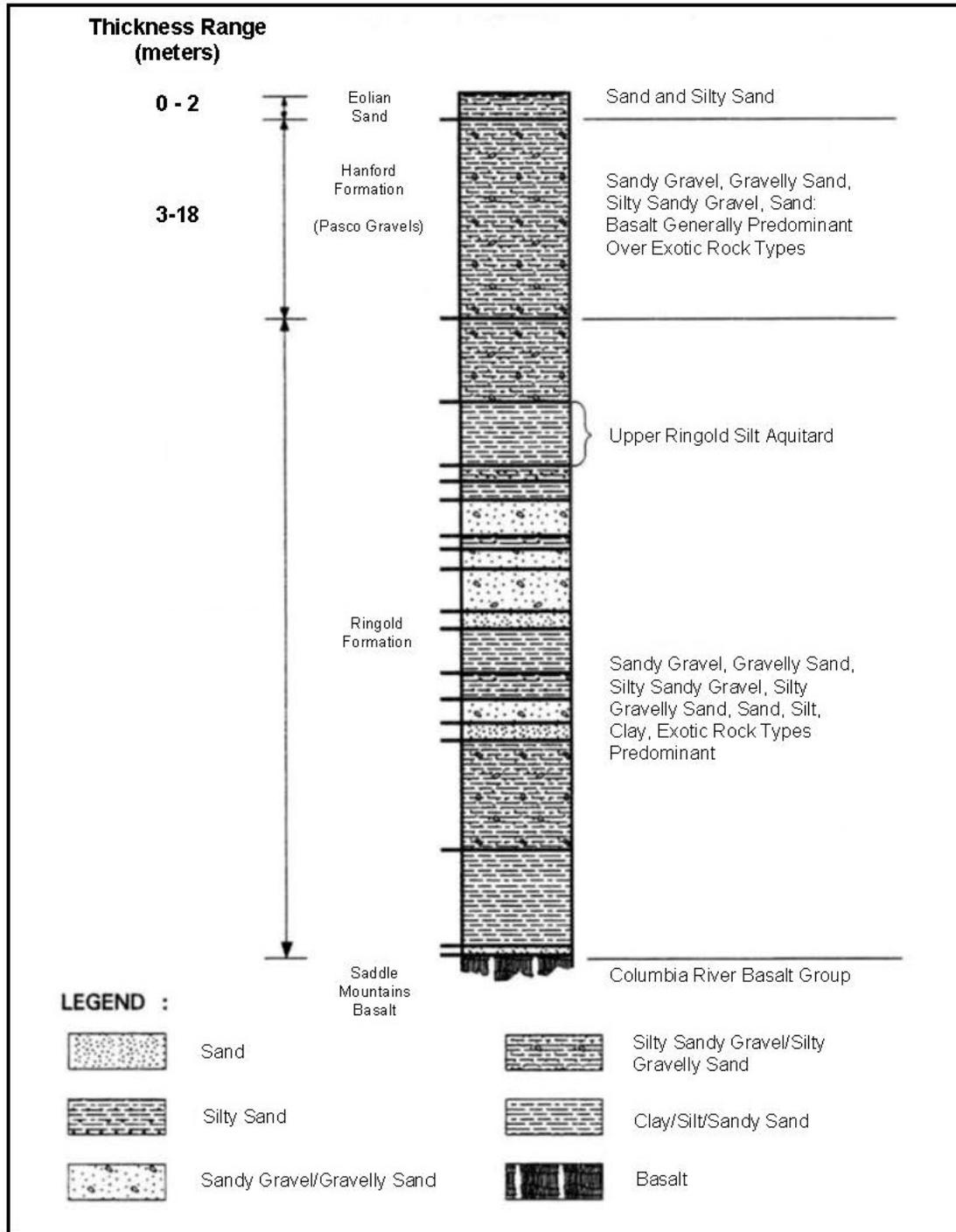
##### 594 3.1.1.1 Geology and Mineral Resources

595 The Hanford Site lies within the Columbia Basin, which comprises the northern part of the Columbia  
596 Plateau physiographic province and the Columbia River flood-basalt geologic province  
597 (Duncan 2007; Reidel et al. 1993). The extent of the Columbia Basin is generally defined as that area  
598 underlain by the Columbia River Basalt Group.

599 The physiographic setting of the Hanford Site is relatively low relief resulting from river and stream  
600 sedimentation filling the valleys and basins between the ridges. The surface rocks of the proposed  
601 land conveyance area include the Hanford formation and surficial sediments. Sediments deposited by  
602 the cataclysmic flood waters between about 1.8 million and 15,000 years ago have been informally  
603 called the Hanford formation (see **Figure 3-1**, “General Lithology of the Local Area”). Three major  
604 types of flood deposits are recognized: coarse sand- and gravel-dominated, sand-dominated, and  
605 interbedded sand- and silt-dominated (DOE 2002). The gravel- and sand-dominated sediments make  
606 up most of the vadose zone (water unsaturated soils above the shallow groundwater) beneath the  
607 Hanford Site. Gravel from these deposits is mined at Borrow Pits 9 and 6 within the PA (see  
608 **Appendix A, Figure A-1**). The Hanford formation in the vicinity of the 300 Area (between the  
609 Columbia River and Route 4S, north of the Pacific Northwest National Laboratory [PNNL]) is about  
610 15 meters (49 feet) thick and consists of both gravel-dominated and sand-dominated sediment  
611 (Duncan 2007). Wind has been the dominant process that has locally reworked the flood sediments,  
612 depositing Holocene (approximately 12,000 years ago to present) dune sands in the lower elevations  
613 and windblown silt around the margins of the Pasco Basin. Many of the sand dunes have been  
614 stabilized by vegetation. Active dunes exist north of the 300 Area in the Hanford Reach National  
615 Monument (HRNM). Some dunes elsewhere on the Hanford Site were temporarily reactivated by  
616 removal of vegetation resulting from a range fire in July 2000 (Duncan 2007).

617

Figure 3-1. General Lithology of the Local Area



Source: DOE 2014a.

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619  
620  
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**3.1.1.2 Soils**

622  
623  
624

The Soil Survey Hanford Project in Benton County Washington (PNL 1966) describes 15 different soil types on the Hanford Site, varying from sand to silty and sandy loam. The soil classifications have not been updated to reflect current reinterpretations of soil classifications. Soils identified within

625 the evaluated area include Rupert sand, Ephrata sandy loam, and Burbank loamy sand associated with  
626 the Quincy sand (Duncan 2007; Rasmussen 1971).

627 Rupert sand, brown to grayish-brown coarse sand grading to dark grayish-brown at a depth of  
628 90 centimeters (35 inches), is one of the most extensive soil types on the Hanford Site. Rupert sand  
629 developed under grass, sagebrush, and hopsage in coarse sandy alluvial deposits that were mantled by  
630 wind-blown sand and formed hummocky terraces and dune-like ridges (Duncan 2007).

631 Ephrata sandy loam is found on level topography on the Hanford Site. Its surface is darkly colored  
632 and its subsoil is dark grayish-brown medium-textured soil underlain by gravelly material that may  
633 continue for many feet (Duncan 2007).

634 Burbank loamy sand is a dark-colored, coarse-textured soil underlain by gravel. Its surface soil is  
635 usually about 40 centimeters (16 inches) thick but may be as much as 75 centimeters (30 inches)  
636 thick. The gravel content of its subsoil ranges from 20 to 80 percent (Duncan 2007). Burbank soils are  
637 geographically associated with Quincy soils that are excessively drained, coarse-textured soils on  
638 hummocky, or dune-like terraces (Rasmussen 1971).

639 The sandy nature of these soils contributes to very high permeability, with most or all precipitation  
640 and snowmelt infiltrating into the soil column before generating any surface runoff. The potential for  
641 water erosion is expected to be low, but the sandy soils are susceptible to wind erosion if disturbed or  
642 left unvegetated. Fertility is low, making the soils poorly suited for crop production without  
643 significant inputs of both water and nutrients (Rasmussen 1971).

#### 644 **3.1.1.3 Topography**

645 The Hanford Site lies in the Pasco Basin bounded on the north by the Saddle Mountains, on the west  
646 by Hog Ranch–Naneum Ridge and the eastern extension of Umtanum and Yakima Ridges, on the  
647 south by Rattlesnake Mountain and the Rattlesnake Hills, and on the east by the Palouse Slope. Two  
648 east-west trending ridges, Gable Butte and Gable Mountain, lie in the central portion of Hanford  
649 northwest of the PA. Rattlesnake Mountain, the highest of the Rattlesnake Hills, reaches an elevation  
650 of 1,060 meters (3,480 feet) above mean sea level, the highest elevation in the vicinity. The Pasco  
651 Basin is a structural and topographic depression of generally lower-relief plains and ridges  
652 (Duncan 2007). Elevations across the central portion of the basin and Hanford Site range from about  
653 119 meters (390 feet) above mean sea level at the Columbia River to 229 meters (750 feet) above  
654 mean sea level in the part of the Hanford Site that is the highest in elevation several miles to the  
655 northwest of the PA.

656 The landscape of the Hanford Site is dominated by the low-relief plains of the Central Plains and the  
657 ridges of the Yakima Folds physiographic regions. The surface topography has been modified within  
658 the past several million years by several geomorphic processes: cataclysmic flooding, wind activity,  
659 and landsliding. Cataclysmic flooding occurred when ice dams in western Montana and northern  
660 Idaho were breached and allowed large volumes of water to spill across eastern and central  
661 Washington. This flooding formed the channeled scablands and deposited sediments in the Pasco  
662 Basin. The last major flood occurred about 13,000 years ago. Braiding flood channels, giant current  
663 ripples, and giant flood bars are among the landforms created by the floods. Winds have locally  
664 reworked the flood sediments and have deposited dune sands in the lower elevations and loess  
665 (windblown silt) around the margins of the Pasco Basin. Many sand dunes have been stabilized by  
666 anchoring vegetation, except where they have been reactivated by human activity disturbing the  
667 vegetation. A series of bluffs occurs for a distance of approximately 56 kilometers (35 miles) along  
668 the eastern and northern shores of the Columbia River. In the northern portion of the Hanford Site,  
669 these bluffs are known as the White Bluffs (DOE 1999a).

### 670 3.1.2 Environmental Consequences

671 The following sections address environmental consequences related to geological and mineral  
672 resources, soils, and topography that could occur on the FSA.

#### 673 3.1.2.1 No Action Alternative

674 Under the No Action Alternative, existing activities would continue on the PA and some of the FSA  
675 lands (including Borrow Pits 6 and 9, Navy SALT Site, well monitoring, and others). Vehicles for  
676 these operations driving on unimproved roads would continue to disturb surface soils. Some deeper  
677 geologic units would continue to be disturbed by the gravel mining at the borrow pits. These activities  
678 are small in area and short in duration. No additional impacts on geology would occur from taking no  
679 action.

#### 680 3.1.2.2 Proposed Action

##### 681 Construction

682 Development of the FSA lands for the purpose of constructing any of the representative facilities (see  
683 **Table 2-1**) would involve site clearing, grading, and contouring that would alter the topography of the  
684 property in the areas developed. Soils and bedrock materials would be removed from some locations  
685 and moved to other locations in order to construct building footings and foundations, dig trenches for  
686 utilities and infrastructure, and level the land for roads and parking areas. Excess excavated materials  
687 (sand and gravel) could be transported offsite for disposal, but it is more likely that these materials  
688 would be stockpiled and used on other construction sites.

689 The geology and minerals resources, soils, and topography impacts are:

- 690 • Partial or complete removal, redistribution, mixing of soil horizons, and soil compaction  
691 affecting soil permeability and porosity
- 692 • Minimal to substantial changes in topographic relief resulting from grading lands for  
693 building, roads, and parking lot construction.

694 For geology, there are no appreciable differences in the types of impacts due to the construction of  
695 any representative facility. However, these impacts differ in degree and extent. Facilities with a larger  
696 footprint and that require larger acreage would have a greater extent of impact on soils and  
697 topography than a smaller footprint facility. For geologic resources, there is no specific location  
698 within the FSA that is more sensitive to construction than another. These impacts would be of  
699 relatively short duration. The first phase of the multi-phased development and all the single-phase  
700 development representative examples would begin construction simultaneously for up to 18 months  
701 (although some could take a few months longer to complete than others). Impacts would be of longer  
702 duration for the multi-phased development because the construction activities would be spread out  
703 over many years (on the order of 20 years).

##### 704 Operation

705 There would be no additional impacts on geology and mineral resources, soils, and topography once  
706 the representative facilities (see **Table 2-1**) have been constructed. With time, as landscaping matures  
707 and the vegetation establishes or re-establishes itself, the soils would become more stabilized and less  
708 vulnerable to erosion. There are no specific locations that are more sensitive to geologic impacts from  
709 operations than any others on the FSA. There are no differences in impacts for this resource area  
710 among the representative facilities for operations.

**711 Prohibition on Mining**

712 The deed would prohibit mining on any conveyed land, including extraction or production of any  
713 coal, oil, gas, geothermal steam, associated geothermal resources, aggregate and any other minerals.

**714 3.1.3 Mitigation Measures**

715 Potential impacts would be mitigated by future landowners following state and local construction  
716 regulations. Construction projects that disturb 1 acre or more of land may require a stormwater permit  
717 under the National Pollutant Discharge Elimination System (NPDES) program (Ecology 2004). The  
718 permit process also requires a stormwater pollution prevention plan for the site. This plan would  
719 include erosion, sediment, and stormwater management controls to minimize the potential for soil  
720 removal. Examples include silt fences, sediment basins, erosion control mats and blankets, and other  
721 measures.

**722 3.1.4 Unavoidable Adverse Impacts**

723 Changes in topography would occur with soils being reworked for site construction. Some mineral  
724 resources (gravel) would be removed but the effect on geology over the FSA is minor relative to the  
725 surrounding areas (i.e., the rest of the PA and the ROI) that would remain largely undisturbed.

**726 3.2 Water Resources**

727 Water resources include surface water, the vadose zone, and groundwater. No perennial  
728 (i.e., continuously existing during years of normal rainfall) surface water exists on the PA. The  
729 vadose zone or unsaturated zone is a subsurface zone of soil or rock between the ground surface and  
730 the deeper saturated zone. Water in the vadose zone is called soil moisture. Groundwater refers to  
731 water within the saturated zone. Permeable saturated units in the subsurface are called aquifers. The  
732 ROI for water resources includes the PA and the hydraulically downgradient (in the direction of water  
733 flow) lands adjacent to the PA..

**734 3.2.1 Affected Environment****735 3.2.1.1 Surface Water**

736 The PA and adjacent areas do not have perennial surface water, streams, or ponds, and no wetlands  
737 have been identified (see **Section 3.5**). The nearest perennial surface water is the Columbia River,  
738 which is approximately 0.8 kilometers (0.5 miles) east of the PA at its closest point. It is possible that  
739 very localized areas have a limited amount of standing surface water after a heavy precipitation or  
740 snowmelt event, and these surface waters may flow limited distances before infiltrating into the  
741 highly permeable soils found on the PA.

**742 3.2.1.2 Flooding**

743 Large Columbia River floods have occurred in the past (DOE 1987), but the likelihood of recurrence  
744 of large-scale flooding has been reduced by the construction of several flood control/water-storage  
745 dams upstream of the Hanford Site. Major floods on the Columbia River are typically the result of  
746 rapid melting of the winter snowpack over a wide area augmented by above-normal precipitation.

747 The U.S. Army Corps of Engineers (USACE) has derived the Standard Project Flood with both  
748 regulated and unregulated peak discharges given for the Columbia River downstream of Priest Rapids  
749 Dam (USACE 1989). Frequency curves for both unregulated and regulated peak discharges are also  
750 given for the same portion of the Columbia River. The regulated Standard Project Flood for this part  
751 of the river is given as 15,200 cubic meters per second (m<sup>3</sup>/sec) (54,000 cubic feet per second

752 [ft<sup>3</sup>/sec]) and the 100-year regulated flood as 12,400 m<sup>3</sup>/sec (440,000 ft<sup>3</sup>/sec) (DOE 1998). Impacts to  
753 the Hanford Site, including the PA, would be less than the probable maximum flood (Duncan 2007).  
754 The maximum historical flood on record occurred June 7, 1894, with a peak discharge at the Hanford  
755 Site of 21,000 m<sup>3</sup>/sec (742,000 ft<sup>3</sup>/sec). The flood area on the Hanford Site was computer modeled  
756 using the topographic cross sections of the river, which showed that flooding did not go as far west  
757 from the river as the 300 Area (Duncan 2007). Since the flooding did not reach the 300 Area, it can  
758 be assumed that it did not reach the PA lands.

### 759 3.2.1.3 Groundwater

760 Groundwater at the Hanford Site originated as either recharge from rain and snowmelt, or from  
761 irrigation, canal seepage, and wastewater disposal. Most of this groundwater will eventually discharge  
762 to the Columbia River. Some will be brought to the surface through wells or excavations, or through  
763 evaporation or transpiration in shallow water table areas. Groundwater beneath the Hanford Site is  
764 found in both an upper unconfined aquifer system and deeper basalt-confined aquifers (**Figure 3-1**).  
765 The unconfined aquifer system is also referred to as the suprabasalt aquifer system because it is  
766 within the sediments that overlie the basalt bedrock. Portions of the suprabasalt aquifer system are  
767 locally confined. However, because the entire suprabasalt aquifer system is interconnected on a  
768 sitewide scale, it is referred to in this document as the Hanford unconfined aquifer system  
769 (CHPRC 2010).

770 Relatively permeable sedimentary interbeds and the more porous tops and bottoms of basalt flows  
771 provide the confined aquifers within the Columbia River Basalts. The horizontal hydraulic  
772 conductivities of most of these aquifers fall in the range of 10<sup>-10</sup> to 10<sup>-4</sup> m/sec (3×10<sup>-10</sup> to  
773 3×10<sup>-4</sup> ft/sec). Hydraulic head information indicates that groundwater in the basalt-confined aquifers  
774 generally flows toward the Columbia River and, in some places, toward areas of enhanced vertical  
775 interaquifer flow within the unconfined aquifer system (DOE 2015; CHPRC 2010).

776 The unconfined aquifer water table in the 300 Area, on the east side of Route 4 South, is found in  
777 both the Hanford formation and the Ringold Formation (see **Figure 3-1**). It is 0 to 62 feet below  
778 ground surface depending on location. Groundwater flows from the northwest, west, and even the  
779 southwest to discharge into the Columbia River near the 300 Area (CHPRC 2010). The Hanford Site  
780 environmental monitoring program has a number of wells on the PA (see **Appendix A, Figure A-1**).  
781 These wells monitor nitrate contamination found in the north Richland area in this aquifer. This is the  
782 result of industrial and agricultural sources not on the Hanford Site. The nitrate plume is migrating  
783 eastward and entering the Columbia River. Concentrations above the 45 milligram per liter maximum  
784 contaminant level are found over most of the north Richland area (DOE 2015a). The plume shown in  
785 green on **Figure 3-2**, “Groundwater Levels and Contaminated Plumes Near the 300 Area,” extends  
786 under the southeastern corner of the PA (DOE 2014b).

787 The unconfined groundwater aquifer in the vicinity of the PA has other contaminants (DOE 2015a).  
788 Uranium-contaminated groundwater exists under the 618-7 landfill and to the east of the PA near the  
789 Columbia River. In addition, uranium concentrations in groundwater to the south of the PA and in the  
790 vicinity of DOE’s inactive Horn Rapids Landfill have increased gradually since 1996, exceeding the  
791 drinking water standard in 2012 and dropping slightly below the standard in 2014. These plumes are  
792 shown on **Figure 3-2**. The presence of uranium at these locations is attributed to a dispersed  
793 groundwater plume moving northeast from historic discharges from AREVA, a commercial nuclear  
794 fuel production facility located south of the FSA and off the Hanford Site (DOE 2015a).

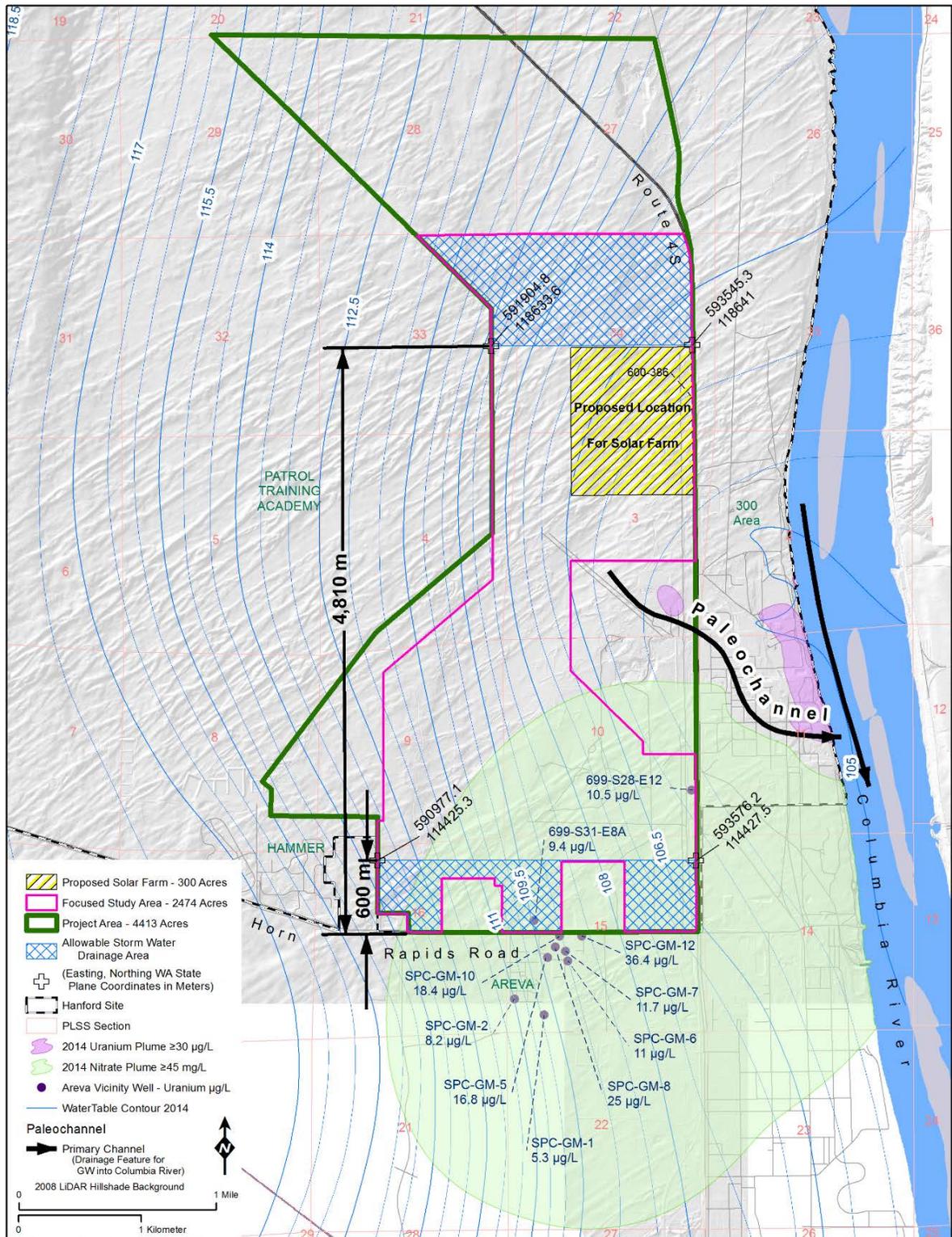
795 Historically, trichlorethylene (TCE)-contaminated groundwater was found upgradient and  
796 downgradient of the inactive DOE Horn Rapids Landfill. A review of available information indicated  
797 that TCE contamination moved into the Hanford Site’s 1100 Area via groundwater. AREVA has

798 investigated soil and groundwater contamination as an independent action in accordance with WAC  
799 173-340, “Model Toxics Control Act—Cleanup.” The past use of organic solvents at the AREVA  
800 lagoon area was the only documented record of TCE occurrence or use near the contaminant plume  
801 identified during the 1100-EM-1 remedial investigation/feasibility study (DOE 2015a). While the  
802 DOE Horn Rapids Landfill is thought to have received drummed waste solvents, no evidence of a  
803 TCE source was revealed by soil vapor surveys, geophysical investigations, and trenching activities  
804 during the 300 Area remedial investigation/feasibility study preparation (CHPRC 2010).

805 The FSA includes one waste site (600-386) that was remediated and added to the 300 Area Final  
806 Record of Decision as “no additional action needed” through the *Explanation of Significant*  
807 *Differences for the Hanford Site 300 Area Record of Decision for 300-FF-2 and 300-FF-5, and*  
808 *Record of Decision Amendment for 300-FF-1* (DOE 2015b). Prior to remediation, this site contained  
809 lead that was released as an abandoned dry cell battery. This former waste site is located at the eastern  
810 edge of the solar FSA (see **Figure 3-2**).

811

Figure 3-2. Groundwater Levels and Contaminated Plumes Near the 300 Area



Source: DOE 2014b.

812  
813  
814

815 The unconfined aquifer system consists primarily of the Ringold Formation and overlying Hanford  
816 formation (see **Figure 3-1**). In some areas, the coarse-grained multilithic facies of the Cold Creek unit  
817 (pre-Missoula gravels) lie between these formations and below the water table. The other subunits of  
818 the Cold Creek unit are generally above the water table (CHPRC 2010).

819 Water table elevations show that groundwater in the unconfined aquifer at Hanford generally flows  
820 from recharge areas in the elevated region near the western boundary of the Hanford Site toward the  
821 Columbia River on the eastern and northern boundaries. The Columbia River is the primary discharge  
822 area for the unconfined aquifer. The Yakima River borders the Hanford Site on the southwest and is  
823 generally regarded as a source of recharge (CHPRC 2010).

824 Recharge is variable both spatially and temporally. It is greatest for coarse-textured soils bare of  
825 deep-rooted vegetation and in years with rapid snowmelt events and precipitation during cool months.  
826 The magnitude of recharge at a particular location is influenced by five main factors: climate, soils,  
827 vegetation, topography, and springs and streams.

#### 828 **3.2.1.4 Vadose Zone**

829 The vadose zone is that part of the geologic media that extends from the earth's surface to the water  
830 table. At the Hanford Site, the thickness of the vadose zone ranges from 0 feet near the Columbia  
831 River to greater than 330 feet beneath parts of the Central Plateau (DOE 2015a). Unconsolidated  
832 glacio-fluvial sands and gravels of the Hanford formation make up most of the vadose zone (see  
833 **Figure 3-1**). Currently, the major source of moisture to the vadose zone in the PA is derived from  
834 precipitation that has infiltrated through the soil zone (CHPRC 2010).

### 835 **3.2.2 Environmental Consequences**

836 Impacts on water resources are typically defined by degradation of the quality of surface water or  
837 groundwater. Impacts could also include changes in quantities of surface water, changes in  
838 stormwater runoff volumes or locations, decreases or increases in groundwater levels, or changes to  
839 groundwater aquifer recharge. This section describes potential environmental consequences related to  
840 groundwater that could occur on the FSA and the hydraulically downgradient offsite adjacent areas.

#### 841 **3.2.2.1 No Action Alternative**

842 Under the No Action Alternative, existing activities would continue on the PA (including Borrow  
843 Pits 6 and 9, Navy SALT Site, well monitoring, and others). Of these operations, the borrow pits have  
844 the potential to affect water resources from excavation taking place in the vadose zone. During  
845 rainfall events this could allow rainfall directly into the vadose zone, and during dryer periods, soil  
846 moisture could be reduced. No additional impacts on water resources would occur from taking no  
847 action.

#### 848 **3.2.2.2 Proposed Action**

849 For the Proposed Action, groundwater wells would not be permitted on any transferred or conveyed  
850 lands, and would be restricted through deed or other realty instrument language.

### 851 **Construction**

852 The *Stormwater Management Manual for Eastern Washington* (Ecology 2004) specifies requirements  
853 for bioinfiltration swales. Swales are excavations in the ground designed to capture rainfall runoff and  
854 are often referred to as stormwater retention ponds. Bioinfiltration swales use the grass and soil to  
855 naturally filter the water that infiltrates the ground. The sizing is based upon the area of impervious  
856 surface needed to capture surface runoff. Approximately 20,000 ft<sup>3</sup> of soil and rock would be  
857 excavated for the swales when all the representative facilities are constructed (see **Table 3-1**,

858 “Calculated Impervious Land Area, Bioinfiltration Swale Sizing, and Paved Areas”). Bioinfiltration  
 859 swales use vegetation in strips or channels to capture and biologically reduce pollutants carried by  
 860 stormwater. Stormwater runoff captured by the swales would either infiltrate or evaporate. Swale  
 861 construction would be required for the construction of representative facilities. The solar farm  
 862 activities are not expected to create sufficient impervious surfaces to require swales.

863 **Table 3-1. Calculated Impervious Land Area, Bioinfiltration Swale Sizing, and Paved Areas**

Representative Facility	Type of Operation or Facility	Total Land Area (acres) <sup>a</sup>	Impervious Land Area <sup>b</sup> (acres)	Bioinfiltration Swale Sizing <sup>c</sup> (cubic feet)	Paved Area <sup>d</sup> (acres)
Commerce center	Phased development light multi-use industrial business park	180	117	4,404	108
Warehousing and distribution – A	Manufactured parts distribution center	10	8	304	6
Warehousing and distribution – B	Storage and rail distribution center	30	24	906	18
Research and development – A	Biological R&D center	17	14	516	10
Research and development – B	Energy R&D center	29	24	894	18
Technology and manufacturing – A	Electronics equipment manufacturing	30	24	911	18
Technology and manufacturing – B	Light industrial	50	41	1,519	30
Food and agriculture – A	Vegetable food processing	83	67	2,521	50
Food and agriculture – B	Wine/spirits processing	218	177	6,622	131
Back office – A	National call center	5	4	152	3
Back office – B	Automatic data processing center	6	5	182	4
Biofuels manufacturing facility	Biorefinery and feedstock processing facility	31	16	617	19
	<b>Totals</b>	<b>689</b>	<b>521</b>	<b>19,548</b>	<b>415</b>

864 <sup>a</sup> Acreage used is the actual acreage of the representative example facilities

865 <sup>b</sup> Calculated using impervious surface coefficients (California Environmental Protection Agency 2010).

866 <sup>c</sup> Calculated based upon the impervious surface area (Ecology 2004).

867 <sup>d</sup> Such as parking lots and roads. Calculated as 60 percent of total land area for the development (City of  
 868 Olympia and Ecology 1995).

869 Key: R&D = research and development.

870 Construction activities also involve earthmoving activities that have the potential to generate dust. In  
 871 order to control dust emissions, the standard procedure is to spray water on areas likely to produce  
 872 dust as required by the State of Washington (WAC 173-400-040(9)(a)) and the Benton Clean Air  
 873 Agency Urban Fugitive Dust Policy (BCAA 1996). The quantities of water applied would be  
 874 minimal, sufficient to limit dust generation. The application of dust suppression during deep  
 875 excavations is documented to mobilize contaminants into the groundwater aquifer (CHPRC 2010).

876 This is not a concern for FSA lands, which do not include areas with waste sites requiring cleanup or  
877 remedial action. Regarding the 600-386 waste site located on the east boundary of the solar FSA,  
878 adverse impacts would not occur since it has already been remediated and no hazardous materials  
879 remain.

880

881 Construction activities would be required to follow the appropriate regulatory process, such as  
882 obtaining an NPDES stormwater permit, if required. There are no specific site locations that are more  
883 sensitive to water resources impacts from construction than any others on the FSA. For the  
884 representative example facility construction, there is no difference in water resource issues except that  
885 larger footprint facilities would have larger impervious surfaces, more surface water runoff, and  
886 consequently larger bioinfiltration swales.

### 887 **Operation**

888 Surface water runoff from impervious surfaces such as buildings, parking lots, and roads would be  
889 much higher since the land currently has little impervious surface area. Design of the development  
890 would need to include stormwater retention and treatment as required by state and local regulations.  
891 While it is not anticipated that stormwater could impact contaminated groundwater plumes, a deed  
892 restriction limits the location of swales, ponds, and other stormwater drainage facilities in certain  
893 areas of the FSA. **Figure 3-2** shows areas where these facilities are allowed. DOE is currently  
894 conducting a quantitative analysis to evaluate whether stormwater runoff could impact contaminated  
895 groundwater plumes. The analysis will involve the construction of a local groundwater flow model  
896 for the unconfined aquifer in the area. The model will represent the major controlling features  
897 including the Columbia River, ambient recharge, and hydrostratigraphy for the unconfined  
898 groundwater aquifer. After the model is shown to represent local groundwater conditions, it will be  
899 used to further evaluate the impact of different stormwater discharge facilities of different sizes and at  
900 different locations within the land transfer area. The quantitative analysis will provide a more detailed  
901 evaluation for any potential impacts. The aforementioned deed restriction could be removed or  
902 modified depending upon findings from this analysis.

903 Also based on review of existing hydrologic information, it is reasonably anticipated that there is no  
904 potential for elevated groundwater levels to mobilize contamination from waste sites and disposal  
905 facilities in the vicinity of the FSA. Additional confirmatory modeling of this will be included in the  
906 quantitative analysis described above.

907 Water for operation of the facilities and landscape irrigation would be needed, the amount of which  
908 would vary depending on the type of facility (see **Section 3.10**).

### 909 **3.2.3 Mitigation Measures**

910 Groundwater wells would not be permitted on any transferred or conveyed lands, and would be  
911 restricted through deed or other realty instrument language.

912 During construction, exposed ground would be susceptible to erosion during precipitation events.  
913 Best management practices (BMP) would be used to minimize or eliminate these effects  
914 (EPA 2014a). NPDES permits may be required for construction sites disturbing 1 or more acres.

915 Increases in surface water runoff resulting from the creation of impervious surfaces would be  
916 attenuated by meeting the requirements of Core Elements established by the State of Washington  
917 (Ecology 2004) through the application of technology and water quality-based BMPs. Applicable  
918 standards that require the implementation of BMPs for stormwater are found in WAC 173-200,  
919 “Water Quality Standards for Ground Waters of the State of Washington”; WAC 173-201A, “Water

920 Quality Standards for Surface Waters of the State of Washington”; and WAC 173-204, “Sediment  
921 Management Standards.” Bioinfiltration swales are one of the methods (Ecology 2004).

922 While it is not anticipated that stormwater runoff following development of the FSA would mobilize  
923 contaminants from waste sites or groundwater contaminant plumes, a deed restriction limits the  
924 locations where stormwater drainage facilities are permissible to avoid potential for elevated  
925 groundwater levels to mobilize contamination in the vicinity of the FSA. DOE is conducting a  
926 quantitative analysis to determine whether the deed restriction will continue to be necessary or can be  
927 modified.

### 928 **3.2.4 Unavoidable Adverse Impacts**

929 This EA assumes that future landowners would comply with deed restrictions and follow state and  
930 local regulations, and use BMPs and stormwater retention and control methods to minimize potential  
931 impacts to water. Thus, unavoidable adverse impacts are not expected to occur.

## 932 **3.3 Air Quality**

933 The ROI for air quality includes the PA and surrounding areas. Regional air quality is measured by  
934 the EPA in terms of the concentrations of criteria pollutants in the atmosphere. Under the *Clean Air*  
935 *Act*, EPA developed numerical concentration-based standards, or National Ambient Air Quality  
936 Standards (NAAQS), for six criteria pollutants that have been determined to affect human health and  
937 the environment (EPA 2014b). The NAAQS represent the maximum allowable concentrations for  
938 ozone, carbon monoxide (CO), nitrogen dioxide, sulfur dioxide (SO<sub>2</sub>), lead, and respirable particulate  
939 matter (including particulate matter [PM] equal to or less than 10 micrometers in diameter [PM<sub>10</sub>] and  
940 particulate matter equal to or less than 2.5 micrometers in diameter [PM<sub>2.5</sub>]) (40 CFR 50).

941 EPA classifies the air quality in a region according to whether the concentrations of criteria pollutants  
942 in ambient air exceed the NAAQS. Areas are designated as either “attainment,” “nonattainment,”  
943 “maintenance,” or “unclassified” for each of the six criteria pollutants. Attainment means that the air  
944 quality is better than (i.e., pollutant levels are lower than) the NAAQS, nonattainment indicates that  
945 criteria pollutant levels exceed the NAAQS, maintenance indicates that an area was previously  
946 designated nonattainment but is now attainment, and an unclassified air quality designation by EPA  
947 means that there is not enough information to appropriately classify an area, so the area is treated as if  
948 it is attainment.

949 Greenhouse gases (GHG) in the atmosphere are also considered in an evaluation of air quality  
950 impacts. GHGs are gaseous emissions that trap heat in the atmosphere. These emissions occur from  
951 natural processes and human activities. The most common GHGs emitted from human activities are  
952 carbon dioxide (CO<sub>2</sub>), methane, and nitrous oxide. Human-caused GHG releases are produced  
953 primarily by burning fossil fuels and through industrial and biological processes. Because CO<sub>2</sub>  
954 emissions account for approximately 92 percent of all energy-related GHG emissions in the United  
955 States, they are used for analyses of GHG emissions in this EA.

### 956 **3.3.1 Affected Environment**

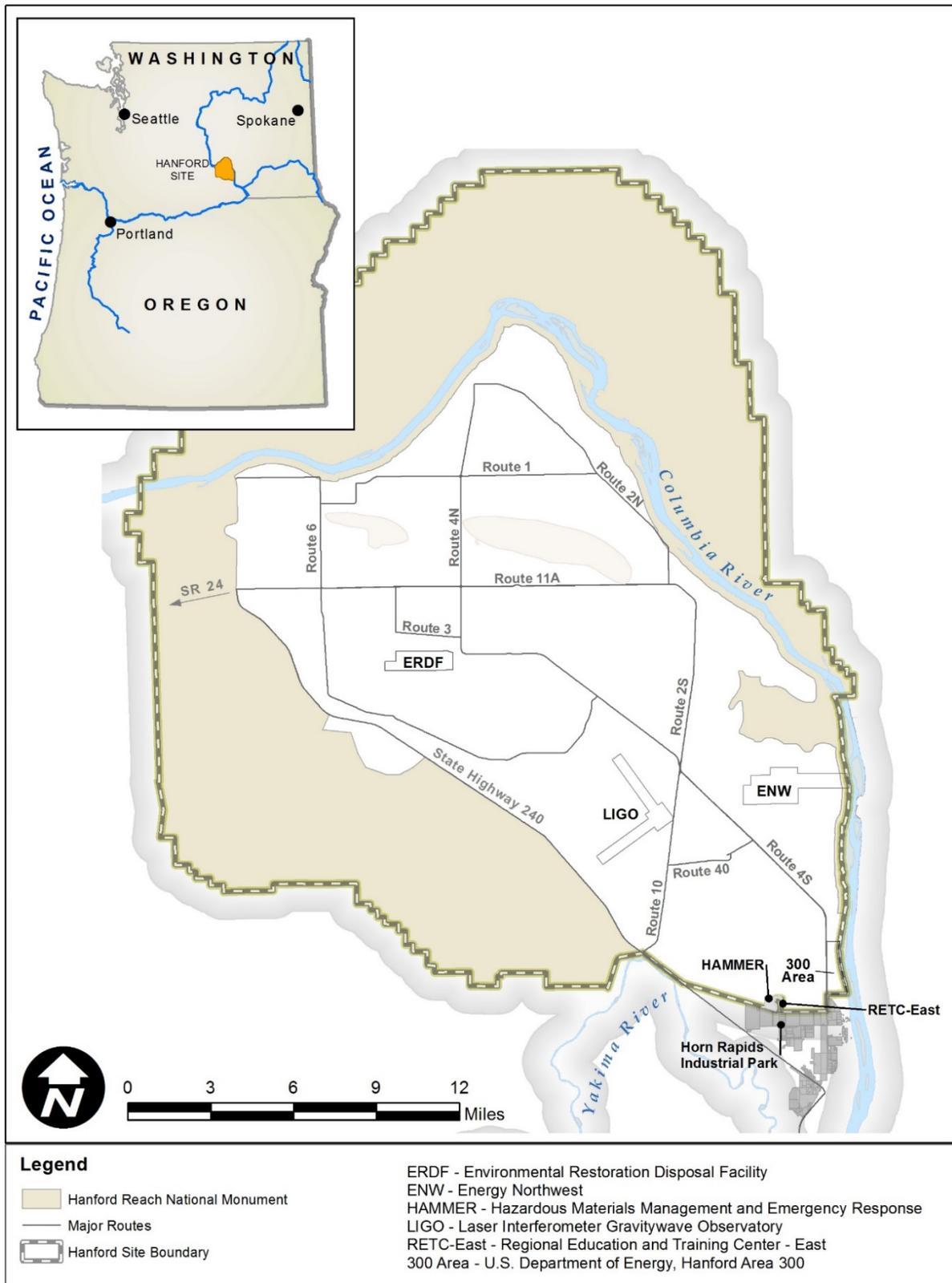
957 The PA is located in Benton County, Washington, where the air quality is considered to be good, and  
958 EPA has designated the county as unclassified/attainment for all criteria pollutants (DOE 2012a).  
959 Elevated particulate matter (dust) concentrations are of greatest concern and result from the typically  
960 windy and arid weather conditions. Aside from dust generation, the existing air quality emissions are  
961 all from offsite locations.

962 DOE activities at Hanford in the 200 Area generate fugitive dust emissions and equipment emissions  
963 from various borrow area and construction sites; dust and equipment emissions from ongoing  
964 construction and operation of the Environmental Restoration Disposal Facility; emissions from  
965 canyon disposition (221-U B-Plant or PUREX closure); emissions from facility demolition and  
966 remediation, including excavation, backfill, and capping; and emissions from above-grade structure  
967 removal of the Plutonium Finishing Plant (see **Figure 3-3**, “Facilities on the Hanford Site Adjacent to  
968 the Project Area”). In the 300 Area and nearby remediation areas such as 618-10 and 618-11, there  
969 could be fugitive dust emissions and other emissions from closure and future uses of surplus facilities  
970 (DOE 2012b). DOE and its contractors apply best available control technology to control fugitive  
971 dust emissions from its cleanup activities. As a result, fugitive emissions resulting from remediation  
972 activities are minimized and localized to the area of the specific remediation site.

973 Existing and reasonably foreseeable non-DOE local activities that may emit fugitive dust and other  
974 pollutants include commercial operations such as AREVA facility operations, which emit nitrogen  
975 oxide; and Perma-Fix non-thermal and thermal treatment of mixed low-level radioactive waste  
976 (LLW), which produces combustion emissions; and the pending American Rock Products mining  
977 operation. The operation of the US Ecology commercial LLW disposal site located near the center of  
978 the Hanford Site, produces fugitive dust emissions (DOE 2012b).

979 The Wanapa Energy Center, if built by the Confederated Tribes of the Umatilla Indian Reservation,  
980 could be a major source of air pollutant emissions, but would not substantially deteriorate the quality  
981 of the air surrounding the proposed site or lead to deterioration of air quality in nearby pristine areas  
982 (DOE 2012b). The Wanapa Energy Center would be located on about 20 acres of land east of the city  
983 of Umatilla, along the Columbia River. The Plymouth Generating Facility, if built by Plymouth  
984 Energy, LLC, would not substantially deteriorate the quality of the air surrounding the proposed site  
985 based on the analysis in the *Final Environmental Impact Statement for the Plymouth Generating  
986 Facility, Plymouth, Washington* (Benton County and BPA 2003). The Plymouth Generating Facility  
987 would be located on a 44.5-acre site, 2 miles west of the rural community of Plymouth in southern  
988 Benton County. The Wanapa Energy Center and Plymouth Generating Facility projects are currently  
989 on hold by the project proponents (DOE 2012b).

Figure 3-3. Facilities on the Hanford Site Adjacent to the Project Area



992 Mobile source emissions in Benton County account for about 68 percent of county annual emissions  
993 of CO, 52 percent of nitrogen oxides, 69 percent of sulfur oxides, and 39 percent of volatile organic  
994 compounds (DOE 2012b). In addition to the industrial sources of air pollutants discussed above, there  
995 are industries that produce asphalt paving material and block, nitrogen fertilizer, crushed stone,  
996 canned fruits and vegetables, frozen foods, and nonferrous metal sheets, as well as grain storage  
997 facilities and natural gas transmission facilities (DOE 2012b).

998 Other development in the region could result in increases in air pollutant emissions from construction  
999 activities, vehicle traffic, and other sources related to new housing, businesses, and industries. In  
1000 addition, increased mining activity and reclamation of mined areas could lead to increases in air  
1001 pollutant emissions.

1002 The majority of the PA is currently unused and there are no continuously emitting air pollution  
1003 sources except for DOE gravel pit operations at Borrow Pits 9 and 6 (DOE 2012a), which operate  
1004 intermittently. A discussion of radiological air emissions from outside of the PA is provided in  
1005 **Section 3.14** and **Appendix F**, “Radiological Accidents.”

### 1006 **3.3.2 Environmental Consequences**

1007 The environmental consequences analysis addresses potential impacts to air quality from the  
1008 construction and operation on the FSA from the representative facilities and the solar farm. All of the  
1009 construction activities are assumed to occur in the same (one) year, and all operation activities assume  
1010 full development of the FSA. Because the footprint and design of each building are not known,  
1011 assumptions were made to establish parameters for the air emissions analysis. The intent of these  
1012 assumptions was to bracket the potential air impacts to show the upper bounding scenario, which  
1013 overestimates the results.

#### 1014 **3.3.2.1 No Action Alternative**

1015 Under the No Action Alternative, there would be no change from existing conditions on air quality.  
1016 Air emissions from DOE gravel removal activities would continue at Borrow Pits 9 and 6.

#### 1017 **3.3.2.2 Proposed Action**

##### 1018 **Construction**

1019 Temporary effects on air quality would result from constructing the representative facilities including  
1020 roadways, parking lots, sidewalks, solar array, utility lines, and landscaping. These construction  
1021 activities would generate criteria pollutant and GHG air emissions from site-disturbing activities such  
1022 as grading, filling, compacting, and trenching and operation of construction equipment. Construction  
1023 activities would also generate particulate emissions as fugitive dust from ground-disturbing activities  
1024 and from the combustion of fuels in construction equipment. Fugitive dust emissions would be  
1025 greatest during the initial site preparation activities and would vary depending on the work phase,  
1026 level of activity, and prevailing weather conditions. The quantity of uncontrolled fugitive dust  
1027 emissions from a work site is proportional to the area of land being worked and the level of activity.  
1028 Construction workers (2,500 daily workers for the main FSA, 100 daily workers for solar farm, and  
1029 200 daily workers for the PAAL) commuting daily to and from the work site in their personal  
1030 vehicles would also result in criteria and GHG pollutant emissions. Emissions from construction  
1031 activities would be produced for the duration of construction activities, nominally during daylight  
1032 hours and weekdays. The numbers of construction workers here differs from those given in the  
1033 Socioeconomics and Environmental Justice analysis (see **Section 3.13.1.1**) because these are  
1034 conservative numbers that are based upon construction acreage, number of daily construction  
1035 commuters, and vary depending on the type of facility.

1036 The construction activities associated with each target industry would entail similar levels of ground  
 1037 disturbance requiring similar amounts of material, staffing, and equipment. Therefore, construction  
 1038 for each possible facility would result in similar air quality impacts, and the sequencing of such  
 1039 activities would not affect air quality differently. There are no locations on the FSA that are  
 1040 particularly sensitive to air quality; therefore, impacts to air quality would be the same regardless of  
 1041 the location of facilities. **Table 3-2**, “Estimated Annual Air Emissions from Hypothetical  
 1042 Construction on the Main FSA,” contains a quantitative estimate of the air emissions from  
 1043 construction on the main FSA; **Table 3-3**, “Estimated Annual Air Emissions from Constructing the  
 1044 Solar Farm FSA,” contains a quantitative estimate of the air emissions from constructing a single  
 1045 solar technology on the solar farm FSA; and **Table 3-4**, “Estimated Air Emissions from Constructing  
 1046 Utilities and Infrastructure on the PAAL,” contains a quantitative estimate of the air emissions from  
 1047 constructing utilities and infrastructure on the PAAL.

1048 **Table 3-2. Estimated Annual Air Emissions from Hypothetical Construction on the Main FSA**

Activity	Emissions (tons per year)						
	NO <sub>x</sub>	Volatile Organic Compounds	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
Combustion	500.716	43.983	218.694	39.910	35.442	34.379	57,175.102
Fugitive dust	-	-	-	-	1,991.385	199.139	-
Haul truck, on-road	67.972	6.328	36.332	0.218	2.182	2.073	17,622.489
Construction commuter	9.310	9.555	91.857	0.129	1.077	0.690	13,218.305
<b>Total Yearly Construction Emissions</b>	<b>577.997</b>	<b>59.867</b>	<b>346.883</b>	<b>40.257</b>	<b>2,030.087</b>	<b>236.281</b>	<b>88,015.896</b>

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**Table 3-3. Estimated Annual Air Emissions from Constructing the Solar Farm FSA**

Activity	Emissions (tons per year)						
	NO <sub>x</sub>	Volatile Organic Compounds	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
Combustion	3.748	0.232	1.414	0.310	0.229	0.222	444.737
Fugitive dust	-	-	-	-	85.500	8.550	-
Construction commuter	0.372	0.382	3.674	0.005	0.043	0.028	528.732
<b>Total Yearly Construction Emissions</b>	<b>4.120</b>	<b>0.614</b>	<b>5.088</b>	<b>0.316</b>	<b>85.772</b>	<b>8.800</b>	<b>973.470</b>

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1055**Table 3-4. Estimated Air Emissions from Constructing Utilities and Infrastructure on the PAAL**

Activity	Emissions (tons per year)						
	NO <sub>x</sub>	Volatile Organic Compounds	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
Combustion	0.625	0.039	0.236	0.052	0.038	0.037	74.123
Fugitive dust	-	-	-	-	61.446	6.145	-
Haul truck, on-road	1.792	0.167	0.958	0.006	0.058	0.055	464.470
Construction commuter	0.745	0.764	7.349	0.010	0.086	0.055	1,057.464
<b>Total Construction Emissions</b>	<b>3.161</b>	<b>0.970</b>	<b>8.542</b>	<b>0.068</b>	<b>61.628</b>	<b>6.291</b>	<b>1,596.057</b>

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Assumptions specific to air quality include the following:

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- The 1,341 acres would be disturbed by construction in 1 year (this is the size of the main FSA).

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- The proposed buildings would occupy 70 percent (939 acres); roadways, parking, and pavement, 25 percent (335 acres); and landscaping and open space, 5 percent (67 acres) of the 1,341-acre parcel. These are standard modeling parameters for air emissions analysis.

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- Each building would be one story in height. Even though some representative facilities are shown to be multi-story, this simplification does not appreciably affect the air quality estimates because the amount of ground disturbance would not change based on the number of floors in each building.

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- For the solar farm FSA grading activities would take 3 months and construction would take 1 year.

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- Ten percent of the PAAL would be disturbed from construction of utilities and infrastructure.

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**Appendix J**, "Air Emissions Estimates," contains a detailed summary of the quantitative air emissions estimates and a list of assumptions used during its development.

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Air emissions from construction activities would be entirely from mobile sources, which are not subject to most permitting requirements such as prevention of significant deterioration (PSD), Title V, or State of Washington air operating permits. Site operators would obtain any applicable construction permits for stationary sources to be constructed (e.g., boilers, emergency electrical generators, and industry-specific manufacturing equipment).

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For a PSD major source, regulatory thresholds are 250 tons per year of any criteria pollutant or 100,000 metric tons per year of CO<sub>2</sub>. These thresholds provide a reference point for evaluating potential impacts. Based on these thresholds, air emissions from construction activities would exceed the significance thresholds for nitrogen oxides (NO<sub>x</sub>), CO, PM<sub>10</sub>, and PM<sub>2.5</sub>. However, these emissions were calculated as though they were coming from a single PSD major source, when they would actually come from 12 independent construction sites. Each construction site would be subject to its own applicable air permitting requirements. Individually, each of these construction sites would not exceed the thresholds for NO<sub>x</sub>, CO, PM<sub>10</sub>, and PM<sub>2.5</sub>.

1086 There are no specific site locations that are more sensitive to air quality impacts from construction  
 1087 than any others. The emissions analysis for construction does not discriminate on the basis of the  
 1088 representative facility type only building size. Larger buildings would contribute more emissions than  
 1089 smaller buildings because of the amount of time and materials it takes to construct larger facilities.

1090 **Operation**

1091 Long-term, moderate effects on air quality would result from the operation of the various  
 1092 representative facilities that could be on the main FSA. Operation of these facilities would generate  
 1093 criteria pollutant and GHG air emissions from building heating equipment, emergency electrical  
 1094 generators, industry-specific manufacturing equipment, truck traffic, and employees commuting daily  
 1095 to and from the proposed buildings. **Table 3-5**, “Estimated Annual Air Emissions from Operational  
 1096 Activities,” contains a quantitative estimate of these emissions.

1097 **Table 3-5. Estimated Annual Air Emissions from Operational Activities**

Activity	Emissions (tons per year)						
	NO <sub>x</sub>	Volatile Organic Compounds	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
Boiler (40,902,840 ft <sup>2</sup> )	71.580	3.937	60.127	0.429	5.440	5.440	85,895.964
Diesel generator (50 generators)	94.110	7.682	20.273	6.189	6.615	6.615	3,499.787
Truck traffic	41.204	3.836	22.024	0.132	1.323	1.257	10,682.540
Employee commuter (4,000 new employees)	11.172	11.466	110.228	0.154	1.293	0.828	15,861.966
<b>Total</b>	<b>218.066</b>	<b>26.922</b>	<b>212.652</b>	<b>6.905</b>	<b>14.671</b>	<b>14.140</b>	<b>115,940.256</b>

1098 **Source:** BCAA 2015.

1099  
 1100 The estimated air emissions in **Table 3-5** would be produced after the proposed construction period is  
 1101 complete. Lesser quantities of operational air emissions would be produced during the construction  
 1102 period and would progressively increase as more buildings become operational. **Appendix J** contains  
 1103 a detailed summary of the quantitative air emissions estimates and a complete list of assumptions  
 1104 used during its development.

1105 Air emissions from the boilers, emergency electrical generators, and industry-specific manufacturing  
 1106 equipment assumed to be used in future development of the FSA would be from stationary sources  
 1107 and would be subject to applicable operational air permit requirements. Such permits could include  
 1108 PSD, Title V, or State of Washington air operating permits. In Benton County, the Benton Clean Air  
 1109 Agency would issue any applicable state-level air operating permits. Air emissions from new  
 1110 employees commuting to and from work and from truck traffic hauling goods and other materials  
 1111 would be from mobile sources, which are not subject to permitting requirements.

1112 For a PSD major source, regulatory thresholds are 250 tons per year of any criteria pollutant or  
 1113 100,000 metric tons per year of CO<sub>2</sub>. These thresholds provide a reference point for evaluating  
 1114 potential impacts. The rationale for these levels is that they are consistent with the threshold for a  
 1115 PSD major source. Based on these significance thresholds, none of the criteria pollutant emissions  
 1116 would exceed the 250-ton-per-year threshold; however, NO<sub>x</sub> and CO air emissions would be near the  
 1117 threshold. Under the bounding-case scenario, which overestimates results, emissions of CO<sub>2</sub> would

1118 slightly exceed the 100,000-metric tons-per-year threshold, mostly from the natural gas-fired boiler  
1119 emissions.

1120 There are no specific site locations that are more sensitive to air quality impacts from operations than  
1121 any others. The emissions analysis for operations does not discriminate on the basis of the  
1122 representative facility type only building size. Larger buildings would contribute more emissions than  
1123 smaller buildings simply because of the energy demands of larger facilities.

### 1124 **3.3.3 Mitigation Measures**

1125 Although not obligatory or within the control of DOE, the following section describes potential  
1126 mitigation measures, which could be undertaken by a future landowner.

1127 Impacts from fugitive dust can be mitigated by applying water to areas of disturbance and by  
1128 minimizing the amount of land disturbed at a given time by staging phases of the construction.  
1129 Additionally, construction vehicles could use diesel particle filters to reduce emissions.

1130 Possible mitigation of emissions from mobile sources could be accomplished through the institution  
1131 of mass transit, car-pooling, and other ride-sharing approaches by the City of Richland, local transit  
1132 authority, and future landowners. Possible mitigation measures for mobile air emissions from  
1133 commercial truck hauling could be accomplished by encouraging facility owners to minimize truck  
1134 idling while at a facility, using yard-trucks (efficient slow-speed vehicles) to move trailers around a  
1135 facility, and designing roads and traffic patterns to minimize truck idling situations (e.g., having few  
1136 stop signs and maximizing one-way truck movement).

### 1137 **3.3.4 Unavoidable Adverse Impacts**

1138 Construction and operation of new facilities would create new air emissions of criteria and GHG air  
1139 pollutants that would not be created under the No Action Alternative or existing condition. These  
1140 emissions cannot be completely mitigated and, therefore, represent an unavoidable adverse impact.

### 1141 **3.3.5 Climate Change**

1142 DOE has determined that it is reasonably foreseeable that climate change may substantially alter the  
1143 affected environment described in this EA. Climate change is a global phenomenon that the proposed  
1144 land transfer would not alter. However, climate change would result in a new affected environment in  
1145 the future. DOE considered if this new future baseline environment would be impacted differently by  
1146 the Proposed Action than the current baseline environment. The most recent climate change impacts  
1147 report (GCRP 2014) issued by the U.S. Global Change Research Program (GCRP) was reviewed to  
1148 determine if plausible nexuses exist between climate change and the Proposed Action that would alter  
1149 impacts. The interagency GCRP was established under the *Global Change Research Act of 1990*  
1150 (P.L. 101-606) (15 USC 2921 et seq.) “to understand, assess, predict, and respond to human-induced  
1151 and natural processes of global change” and is the authoritative United States government source on  
1152 climate change in the United States. Most GCRP projections are expressed as a change expected  
1153 during the later part of the 21st century (2071–2099) relative to average conditions existing in the  
1154 later part of the 20th century (1970–1999). In the Pacific Northwest an increase in average annual  
1155 temperature of 3.3°F to 9.7°F is projected by 2070-2099. The temperature increases are projected to  
1156 be largest in summer. Change in annual average precipitation in the Pacific Northwest is projected to  
1157 be within a range of a 10 percent decrease to an 18 percent increase for 2070-2099. These changes  
1158 will result in earlier snowmelt and greater heat stress to plants. Although flows in the Columbia River  
1159 are highly regulated through an extensive number of dams, these changes in the climate would likely  
1160 result in some reduction in water availability in summer months. However, DOE identified no

1161 plausible nexuses between the Proposed Action and global climate change that would alter its impact  
1162 determinations.

### 1163 **3.4 Ecological Resources**

1164 The ROI for ecological resources includes the PA and adjacent Hanford Site lands. The following  
1165 section addresses vegetation, wildlife, and habitat for the PA and adjacent Hanford Site lands.

#### 1166 **3.4.1 Affected Environment**

1167 The 375,000-acre Hanford Site represents one of the largest remaining blocks of relatively  
1168 undisturbed shrub-steppe habitat in the Columbia Basin Ecoregion (DOE 2012c; Poston et al. 2009).  
1169 Shrub-steppe habitats in the region and throughout western North America have declined from  
1170 agriculture, grazing, and human development activities (Poston et al. 2009). Studies show that eastern  
1171 Washington's shrub-steppe habitats, which once covered 15 million acres, have decreased by  
1172 50 percent since the arrival of settlers in the 1840s (DOE 2012c). Hanford Site lands are important  
1173 because they add to habitat value and facilitate landscape connectivity with other regional  
1174 shrub-steppe habitat areas, such as the Yakima Training Center to the west and Columbia National  
1175 Wildlife Refuge to the north (DOE 2013a). More than half (52 percent) of the site was included in the  
1176 2000 HRNM designation. The HRNM was established, in part, to permanently protect its  
1177 shrub-steppe vegetation communities and wildlife habitats (Proclamation 7319 of June 9, 2000,  
1178 "Establishment of the Hanford Reach National Monument").

1179 The PA makes up approximately one-half of one percent of the Hanford Site. Prior to federal  
1180 acquisition of the Hanford Site (see **Section 3.6.1.1**), vegetation and wildlife habitat in the PA were  
1181 subject to human disturbance from irrigation system development, homesteading, and agricultural  
1182 activities. Following federal acquisition, PA lands functioned as a buffer area for Hanford Site  
1183 defense-related production and waste management activities, with human activities primarily  
1184 concentrated in transportation and utility corridors, borrow areas, the Horn Rapids landfill, and  
1185 groundwater monitoring well sites. Less than three percent of the shrub component of the vegetation  
1186 communities remains due to several wildfires that have burned over the PA (PNNL 2011). Most of  
1187 the lands have been sprayed with herbicide to control weeds (see **Appendix I**, "Salstrom and  
1188 Easterly, Vegetation Survey of the Proposed Land Conveyance, Central Hanford, Washington").  
1189 Aside from these factors, portions of the PA have remained relatively undisturbed for more than 70  
1190 years.

1191 This analysis considers the results of wildlife and plant surveys conducted for this EA (see  
1192 **Appendix H**, "Wildlife Survey," and **Appendix I**) and other existing ecological studies of the  
1193 Hanford Site. Survey results are considered in context of the Hanford Site Biological Resources  
1194 Management Plan (BRMP) (DOE 2013a), which is used to address vegetation and wildlife habitat  
1195 concerns for Hanford Site projects. The BRMP identifies six levels of resource concern (Levels 0  
1196 through 5), with Level 0 representing the lowest and 5 the highest, each with corresponding  
1197 management guidance. For example, Level 5 resources include species listed on the *Endangered*  
1198 *Species Act*, Level 4 includes candidate and state listed species and high quality habitats, and Levels 3  
1199 through 1 include migratory birds, state monitor species, and common native and plant species,  
1200 respectively. Guidance for Level 5 and 4 resources is avoidance, and if that is not possible,  
1201 compensatory mitigation measures are recommended. Guidance for Levels 3 through 1 resources  
1202 includes avoidance, conservation actions, and some mitigation measures (DOE 2013a). A June 20,  
1203 2014, presidential memorandum places a national emphasis on the importance of pollinator health. A  
1204 subsequent national strategy includes federal actions to benefit pollinator health, including

1205 consideration of pollinator health in federal land management decisions.<sup>11</sup> Very little is currently  
1206 known about the variety of native pollinators on the Hanford Site or their plant preferences.

#### 1207 3.4.1.1 Vegetation

1208 The PA landscape has been shaped by the Pleistocene cataclysmic floods, with most of the area  
1209 consisting of a flood terrace where fine-textured sediments were deposited (see **Appendix I**). Flood  
1210 sediments are capped by layers of wind-blown sand, and dunes have formed in some areas. The dunes  
1211 are stabilized by vegetation with some blowouts caused by wind. Most of the PA has been burned by  
1212 wildfire during recent decades, and the shrub component of PA vegetation communities was burned  
1213 off by a large wildfire in 2000 (PNNL 2011). While sagebrush is mostly absent, snow buckwheat  
1214 (*Eriogonum niveum*) and green (*Chrysothamnus viscidiflorus*) and grey rabbitbrush (*Ericameria*  
1215 *nauseosus*), have reestablished in some areas.

1216 A detailed list of plant species observed within the PA during the 2013 field survey is included in  
1217 **Appendix I**. There are no known species currently considered to be rare in the PA. Since some  
1218 annual species likely did not have their environmental conditions met during 2013, the lack of their  
1219 detection does not rule out that they are present, just that the conditions were not conducive for them  
1220 to be growing in 2013. Areas with the highest potential for those species are associated with the open  
1221 sands on the stabilized dunes, which are limited in the PA (see **Appendix I**).

1222 Beardless wildrye (*Leymus triticoides*), a species not recently collected in Washington, was identified  
1223 during 2013 field surveys. This species is currently identified by the state as a species of potential  
1224 concern, with insufficient information available to determine if a different conservation status rating  
1225 is appropriate (WHNP 2015). The species' distribution within the PA was limited to an area within  
1226 the FSA with three swales, or areas lower in elevation than surrounding terrain. The swales include  
1227 plants not known to occur elsewhere on the Hanford Site, or away from riparian areas at the Hanford  
1228 Site, including hairy crabgrass (*Digitaria sanguinalis*), mountain rush (*Juncus arcticus*), salt  
1229 heliotrope (*Heliotropium curassavicum*), Douglas' sedge (*Carex douglasii*), yellow bee plant (*Cleome*  
1230 *lutea*), and coyote willow (*Salix exigua*). An abundance of insect activity was noted in this area  
1231 during the 2013 field surveys (see **Appendix I**).

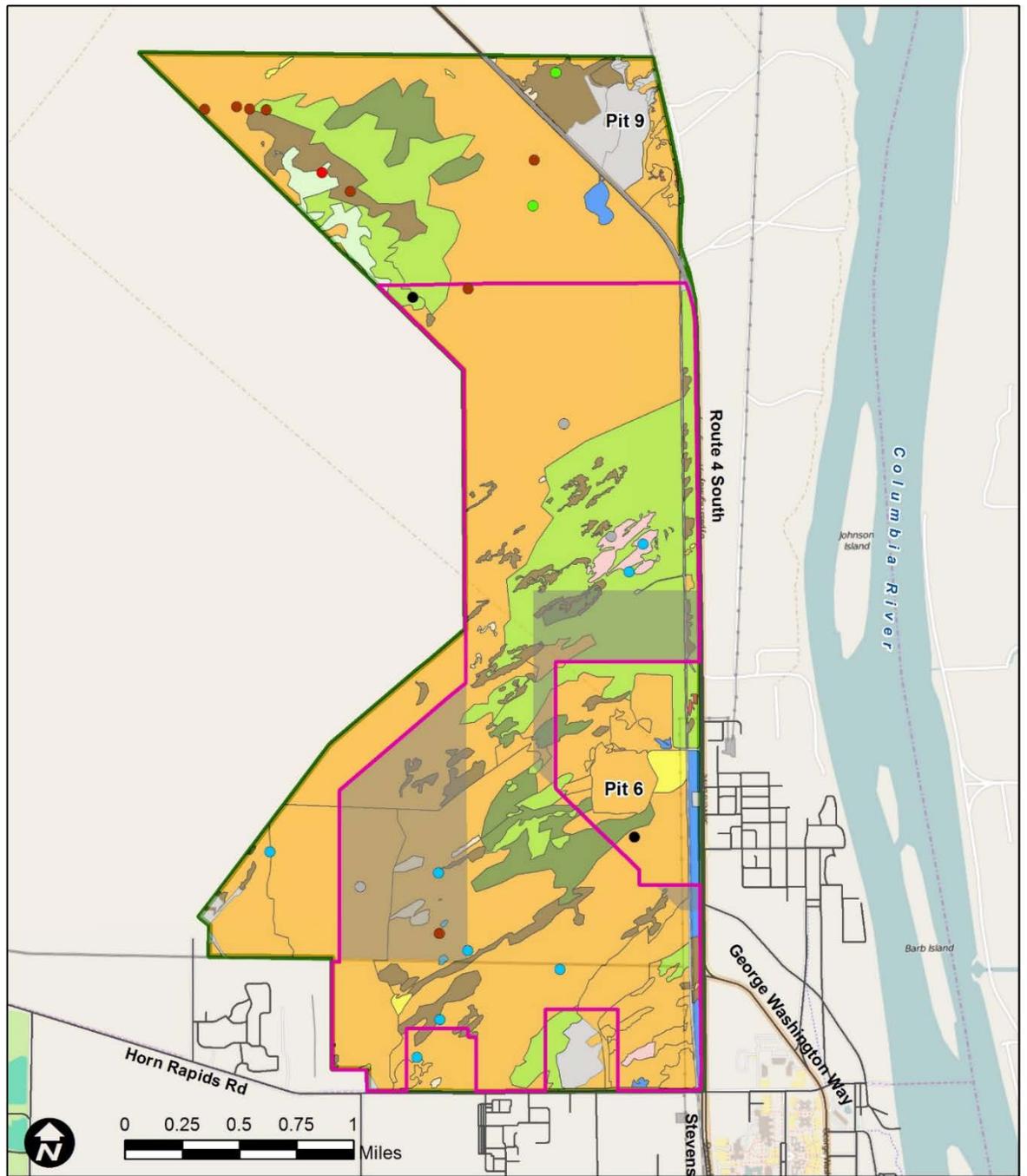
1232 **Table 3-6**, "Vegetation Community Types and Cover in the PA and FSA," lists current vegetation  
1233 communities in the PA and FSA. Most of the FSA (66 percent) consists of a BRMP Level 2 sandberg  
1234 bluegrass-cheatgrass vegetation community (*Poa secunda*, *Bromus tectorum*). BRMP Level 3 snow  
1235 buckwheat and needle-and-threadgrass communities make up about 21 percent of the FSA, and  
1236 Level 4 bitterbrush/Indian ricegrass and bitterbrush/needle and threadgrass communities make up  
1237 about 2 percent of the FSA (see **Figure 3-4**, "Vegetation and Wildlife Survey Map Showing the  
1238 Location of the FSA," and **Table 3-6**).

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<sup>11</sup> 79 FR 35901 – Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators

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Figure 3-4. Vegetation and Wildlife Survey Map Showing the Location of the FSA



**Legend**

- |                         |  |  |                                   |
|-------------------------|--|--|-----------------------------------|
| ● Bird Nesting Location | ▭ Project Area                                   | ▭ Needle-and-threadgrass                       | ▭ Swale                           |
| ● Burrow                | ▭ FocusedStudyArea                               | ▭ Sagebrush/Sandberg bluegrass-Cheatgrass      | ▭ Disturbed                       |
| ● Reptile Sighting      | ▭ Bitterbrush/Indian ricegrass                   | ▭ Sand   | ▭ Potential Access Agreement Land |
| ● Coyote Sighting       | ▭ Bitterbrush/Needle-and-threadgrass             | ▭ Sandberg bluegrass-Cheatgrass                |                                   |
| ● Coyote Den            | ▭ Bitterbrush/Sandberg bluegrass-Cheatgrass      | ▭ Snow buckwheat/Needle-and-threadgrass        |                                   |
| ● Elk Sighting          | ▭ Gray Rabbitbrush/Sandberg bluegrass-Cheatgrass | ▭ Snow buckwheat/Sandberg bluegrass-Cheatgrass |                                   |
| — Road                  |  |  |                                   |

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Source: See Appendices H and I.

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**Table 3-6. Vegetation Community Types and Cover in the PA and FSA**

Dominant Vegetation Type	PA Cover (rounded percent)	PA Cover (approximate acres)	FSA Cover including the PAAL (rounded percent)	FSA Cover including the PAAL (approximate acres)
Bitterbrush/Indian ricegrass	0.7	31	1.3	32
Bitterbrush/needle-and-threadgrass	0.9	40	0.0	1
Bitterbrush/Sandberg bluegrass-cheatgrass	0.5	22	0.2	4
Gray rabbitbrush/Sandberg bluegrass-cheatgrass	0.9	40	0.5	13
Needle-and-threadgrass	4.4	194	4.5	110
Sagebrush/Sandberg bluegrass-cheatgrass	0.1	4	0.0	0
Sandberg bluegrass-cheatgrass	64.9	2864	65.5	1613
Snow buckwheat/needle-and-threadgrass	17.3	763	20.7	509
Snow buckwheat/Sandberg bluegrass-cheatgrass	6.2	274	5.8	143
Swale	0.03	1	0.0	1
Sand	0.4	18	0.6	14
Disturbed	3.7	163	0.9	22
Total Cover	100	4414	100.0	2461

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Source: See **Appendix I**.

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**3.4.1.2 Wildlife**

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Wildlife resources that inhabit the PA primarily consist of native wildlife, invertebrate, and plant species and include several species of concern, state monitor species, and species protected under the *Migratory Bird Treaty Act* (MBTA). All species observed during the wildlife surveys conducted in 2013 are included in BRMP Levels 1, 2, or 3, with most included in Level 2. Habitats within the PA are categorized by the BRMP as Levels 2 and 3 (see **Appendix H**; DOE 2013a).

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A detailed account of wildlife species observed within the PA during the 2013 field survey is included in **Appendix H**.

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**3.4.1.3 Birds**

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Bird species in the PA include common native species found in shrub-steppe habitats throughout the Hanford Site, including the western meadowlark, horned lark, and western kingbird (see **Table 3-7**, “Bird Species Observed during Surveys of the Hanford Land Conveyance Property in late May and early June 2013”). Based upon the 2013 field survey, these species are likely to nest throughout much of the property (see **Appendix H**). In addition, the Swainson’s hawk, nighthawk, and long-billed curlew nest in the PA. The long-billed curlew, a U.S. Fish and Wildlife Service (USFWS) Bird of Conservation Concern and Washington State Monitor Species, was observed throughout the PA during the 2013 field survey.

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Neither ferruginous hawks nor burrowing owls nest within the PA, but are known to nest on Hanford Site lands west of the PA, and may use PA lands for foraging habitat.

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1264**Table 3-7. Bird Species Observed During Surveys of the Hanford Land Conveyance Property in late May and early June 2013**

Common Name/Scientific Name	Status <sup>1, 2</sup>	Occurrence During Surveys <sup>3</sup>
Western Meadowlark ( <i>Sturnella neglecta</i> )	MBTA	C
Horned Lark ( <i>Eremophila alpestris</i> )	MBTA	C
Western Kingbird ( <i>Tyrannus verticalis</i> )	MBTA	FC
Long-billed Curlew ( <i>Numenius americanus</i> )	MBTA; State Monitored	FC
Mourning Dove	MBTA	FC
Common Nighthawk ( <i>Chordeiles minor</i> )	MBTA	FC
Black-billed Magpie ( <i>Pica hudsonia</i> )	MBTA	U
Common Raven ( <i>Corvus corax</i> )	MBTA	FC
Barn swallow ( <i>Hirundo rustica</i> )	MBTA	U
Grasshopper sparrow ( <i>Ammodramus savannarum</i> )	State Monitored; MBTA	R
Lark sparrow ( <i>Chondestes grammacus</i> )	MBTA	R
European Starling ( <i>Sturnus vulgaris</i> )		U
Chukar ( <i>Alectoris chukar</i> )		R
American kestrel ( <i>Falco sparverius</i> )	MBTA	U
Swainsons Hawk	State Monitored	U
Ferruginous Hawk ( <i>Buteo regalis</i> )	Federal Species of Concern State Threatened; MBTA	R
Red Tailed Hawk ( <i>Buteo jamaicensis</i> )	MBTA	U

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1268<sup>1</sup>MBTA = Species is listed under the *Migratory Bird Treaty Act*.<sup>2</sup>Source: USFWS 2013<sup>3</sup>This column refers to the frequency observed during the 2013 surveys: C = Common, FC = Fairly Common, U = Uncommon, R = Rare

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**3.4.1.4 Mammals**1270  
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**Table 3-8**, “Mammal Species Observed during Surveys of the Hanford Land Conveyance Property in late May and early June 2013,” shows mammal species observed in the PA during 2013. Burrows found throughout the PA indicated that the PA is likely inhabited by badgers, ground squirrels, mice, voles, and shrews. Evidence of jackrabbits has not been documented on the PA lands in recent years. While bat roosts are not likely to occur in the PA, bats may use the area for foraging.

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**Table 3-8. Mammal Species Observed during Surveys of the Hanford Land Conveyance Property in late May and early June 2013**

Species	Status	Occurrence During Surveys <sup>1</sup>
Coyote ( <i>Canis latrans</i> )	None	U
Mule Deer ( <i>Odocoileus hemionus</i> )	None	R
Elk ( <i>Cervus elaphus</i> )	None	R

1277 <sup>1</sup>C = Common, FC = Fairly Common, U = Uncommon, R = Rare

1278 **3.4.1.5 Reptiles and Amphibians**

1279 **Table 3-9**, “Reptile Species Observed during surveys of the Hanford Land Conveyance Property in  
1280 late May and early June 2013,” shows reptile species observed in the PA during 2013. Due to lack of  
1281 surface water, the PA does not have suitable habitat for amphibian species. Reptiles known or likely  
1282 to occur on the PA include the western yellow-bellied racer (*Coluber constrictor*), the Great Basin  
1283 gopher snake (*Pituophis catenifer*), pygmy short-horned lizard (*Phrynosoma douglasii*), and the  
1284 common side-blotched lizard (*Uta stansburiana*). In addition, sagebrush lizards (*Sceloporus*  
1285 *graciosus*) could be expected to occur in the portions of the PA with some shrub cover (DOE 2013a).

1286 **Table 3-9. Reptile Species Observed during surveys of the Hanford Land Conveyance Property**  
1287 **in late May and early June 2013**

Species	Status	Occurrence During Surveys <sup>1</sup>
Gopher Snake (Bull Snake) ( <i>Pituophis catenifer</i> )	None	U
Short-horned lizard ( <i>Phrynosoma douglassii</i> )	State Monitored	R

1288 <sup>1</sup>C = Common, FC = Fairly Common, U = Uncommon, R = Rare

1289  
1290 **3.4.1.6 Threatened and Endangered Species**

1291 Federally listed threatened and endangered species that have the potential to occur in Benton County  
1292 were identified from available data on websites maintained by the USFWS, National Marine Fisheries  
1293 Service, and the Washington Department of Fish and Wildlife (WDFW). Priority habitat and species  
1294 data were also reviewed from WDFW’s online resources. USFWS lists for Benton County include 11  
1295 species, distinct population segments, or evolutionarily significant units listed as threatened or  
1296 endangered, 2 candidate species, and 22 species of concern under the *Endangered Species Act*. None  
1297 of the threatened, endangered, or candidate species listed for the county is documented to occur  
1298 within the FSA or PA (see **Appendix H**; WDFW 2013) and none of these species were observed  
1299 during the wildlife surveys conducted in May and June 2013. Based on agency data and the 2013  
1300 surveys, there are no listed species or any that are currently proposed for listing in the PA (see  
1301 **Appendix H**).

1302 The Greater sage grouse is a Washington state listed threatened species and a candidate for federal  
1303 protection under the *Endangered Species Act*. This species was historically known to occur  
1304 throughout the Columbia Basin, including on the Hanford Site. There have been sporadic sightings of  
1305 sage grouse on the Hanford Site, but no known breeding populations currently exist on the site  
1306 (Duncan 2007; DOE 2013a).

1307 The bald eagle (*Haliaeetus leucocephalus*) was removed from the federal threatened and endangered  
1308 species list in July 2007 and its status was changed from threatened to sensitive in Washington State

1309 in January 2008. Federal and state protection is still applied to bald eagles through the *Bald and*  
1310 *Golden Eagle Protection Act*, the MBTA (USFWS 2012), and the Washington Administrative Code.  
1311 Bald eagles are reported to occur during the winter months along the Yakima River and the Columbia  
1312 River. They are not known to use the PA.

1313 The WDFW (2013) also lists the black-tailed jackrabbit (*Lepus californicus*) and white-tailed  
1314 jackrabbit (*Lepus townsendii*) as state candidate species. Field personnel conducting surveys in 2011,  
1315 including night spotlight surveys throughout the Hanford Site, yielded no jackrabbit sightings  
1316 (DOE 2012a). Field personnel conducting surveys in 2013 demonstrated the occurrence of  
1317 black-tailed jackrabbits in the northern areas of Hanford, with the closest sighting approximately  
1318 2 miles to the north of the PA (Lindsey et al. 2014). No rabbits or rabbit presence indicators were  
1319 observed during the wildlife surveys for this project (see **Appendix H**).

## 1320 **3.4.2 Environmental Consequences**

1321 The following sections describe the effects from construction and operational activities in the FSA.

### 1322 **3.4.2.1 No Action Alternative**

1323 Under the No Action Alternative, current human activities occurring within the FSA would continue  
1324 and new development is not anticipated. Currently documented wildlife species would continue to use  
1325 the area. If vegetation communities continue to recover from past disturbance, wildlife species not  
1326 currently present could move into the area in the future.

### 1327 **3.4.2.2 Proposed Action**

1328 Land conveyance and subsequent development would result in wildlife disturbance and habitat loss.  
1329 Regardless of which representative facilities are constructed, the general effects to wildlife and  
1330 existing habitat would be similar, but would vary by degree and intensity related to the amount of  
1331 land area that is affected and whether a representative facility operates at night.

## 1332 **Construction**

1333 For the purpose of this analysis, construction activities for the various proposed single-phase  
1334 developments are assumed to take roughly one to two years to complete, depending on the facility.  
1335 The multi-phased development would be constructed over a 20-year period.

### 1336 *Vegetation and Wildlife*

1337 Of the representative facilities for the FSA, the back offices would result in the least amount of  
1338 habitat loss, while the much larger footprints for the food and agriculture processing, biofuels  
1339 manufacturing facility, and warehouse facilities would have the greatest amount of impact on  
1340 vegetation and wildlife resources.

1341 Construction activities would remove vegetation, level the land for development, and introduce noise,  
1342 traffic, lighting, and human presence in the FSA. Most wildlife species with adequate mobility (birds,  
1343 larger mammals) would leave the area and seek replacement habitat. If construction occurs during  
1344 bird nesting, birds may abandon nests. Some bird species tolerant to human activity may continue to  
1345 reside in the area or use structures as roosts or nesting areas. However, many of the current bird  
1346 species nesting in the area would lose their habitat. Areas in the surrounding Hanford Site, including  
1347 the HRNM, contain habitats of similar ecological value and would potentially allow displaced birds to  
1348 relocate to these areas. If these birds encounter competition by birds that already occupy these  
1349 adjacent habitats, this forced displacement may result in mortality. Some small mammals and reptiles  
1350 may be unable to escape construction activities and injury or mortality may occur.

1351 For the solar farm, permanent loss of vegetation and wildlife habitat is anticipated with vegetation  
1352 clearing, grading, and construction of solar arrays.

1353 Construction activities could increase the chance of human-caused wildfire through increased  
1354 presence of humans and operation of machinery on the land. Wildfires starting on FSA lands could  
1355 impact adjacent Hanford Site lands if they are not controlled or extinguished. This potential effect is  
1356 expected to be minimal due to the removal of the vegetation fuel load that would occur during site  
1357 preparation for construction activities.

1358 Much of the shrub-steppe habitat has been lost in the Columbia Basin Ecoregion and some of the last  
1359 remaining large tracts of this habitat occur on the Hanford Site. While most of the FSA has lost the  
1360 shrub component of the shrub-steppe vegetation community (less than three percent of the shrub  
1361 component remains), construction activities would further reduce the amount of this habitat that  
1362 remains available to its endemic species. Consequently, this loss of habitat may place further pressure  
1363 on populations of some of these species that are already experiencing habitat loss in other parts of  
1364 their range. The FSA encompasses approximately one-half of one percent of the Hanford Site,  
1365 including the HRNM, which contains large areas of similar habitat.

1366  
1367 *Threatened and Endangered Species*

1368 Construction of the representative facilities within the FSA would eliminate much of the existing  
1369 vegetation and habitat. No species are known to occur on the PA that are listed under the *Endangered*  
1370 *Species Act* (see **Appendices H and I**). As a result, construction activities on the FSA would be  
1371 unlikely to have an effect on any federally listed species.

## 1372 **Operation**

1373 Once construction activities are complete, the FSA would function as an industrial landscape with  
1374 little habitat value for wildlife. Operation of the representative facilities would be similar to those  
1375 from construction for the different proposed facilities, but vary by degree and intensity depending on  
1376 the type of facility and its location.

## 1377 *Vegetation and Wildlife*

1378 During operations in the main FSA, vegetation would likely include native or ornamental species in  
1379 landscaped areas around developed facilities and bio-infiltration swales. For the solar farm FSA,  
1380 vegetated areas would be minimal due to maintenance activities such as mowing, mirror washing, and  
1381 weed management, and the large areas of perennial shade created by the solar facility. Motion of the  
1382 single-axis PV panels at the solar facility (see **Appendix E**) is sufficiently slow as to not be  
1383 noticeable to wildlife (Power Engineers Inc. 2014).

1384 Wildlife species that were not displaced during construction; such as birds and small mammals;  
1385 would be exposed to dangers from traffic (vehicle strikes), buildings (flight collision), power lines  
1386 (electrocution). Some warehousing facilities with noise, lighting, and activity occurring all day and  
1387 night; would be a continual source of disturbance to birds, bats, and other wildlife in the area. Noise  
1388 and lighting impacts would extend beyond the footprint of the development and could also affect  
1389 wildlife on adjacent lands. For example, birds must be able to discriminate between songs of their  
1390 own and other species, apart from any background noise. Calls are important in the isolation of  
1391 species, pair bond formation, courtship display, territorial defense, danger, advertisement of food  
1392 sources, and flock cohesion (FHWA 2004). The warehouse and distribution facility involves trains  
1393 that would create acoustic noise and ground vibration. While some wildlife may habituate to these  
1394 disturbances many mobile species would likely leave the area.

1395 Operations of multiple development sites would serve to fragment any remaining habitats in the FSA  
 1396 and degrade or eliminate connectivity between adjacent habitats.

1397 Industrial activities could increase the chance of human-caused wildfire through increased presence  
 1398 of humans and operation of machinery. Wildfires starting on FSA lands could impact adjacent  
 1399 Hanford Site lands if they are not controlled or extinguished. Vegetation clearing activities during site  
 1400 preparation for construction would remove much of the fuel loads within the FSA. During the  
 1401 operational phase, infrastructure would be required by local authorities to contain fire protection  
 1402 systems and to meet fire protection standards, thus this potential effect is anticipated to be minimal.

1403 *Threatened and Endangered Species*

1404 No species listed under the *Endangered Species Act* are known to occur on the PA  
 1405 (see **Appendices H and I**). As a result, operation of facilities on the FSA would be unlikely to have  
 1406 an effect on any federally listed species.

1407 **3.4.3 Mitigation Measures**

1408 Development locations within the FSA have not been determined at this time; however, it is possible  
 1409 that facilities may not completely cover FSA lands. Mitigation measures that could be considered by  
 1410 future landowners include avoiding a potential impact (location), limiting the degree of an action (the  
 1411 intensity of the facility operation), and compensating for a potential impact (protecting the same  
 1412 resource at another location). Mitigation measures that would be undertaken by DOE involve  
 1413 compensating for the loss of habitat within the FSA by making habitat improvements or enhancing  
 1414 habitat protection in surrounding areas. Mitigation measures are summarized below in **Table 3-10**,  
 1415 “Mitigation Measures for Impacts to Ecological Resources.”

1416 **Table 3-10. Mitigation Measures for Impacts to Ecological Resources**

Environmental Consequence	Type of Mitigation Measure (Avoid/Prevent, Reduce, or Remedy/Offset)	Mitigation Measure Effectiveness		
		Mitigation Measure	Residual Environmental Consequence with Mitigation	Environmental Consequence without Mitigation
Loss of shrub-steppe habitat and bird nesting habitat; displacement of wildlife species; facilities and roads will fragment habitat and impair movement through area; power lines and increased vehicles increase mortality/collision risk.	Remedy/Offset	Habitat improvements or enhanced habitat protection would be made to surrounding areas consistent with BRMP Levels 2–4 resources, and would be included in the mitigation action plan (see General Response #9a in <b>Appendix L</b> ).	Specific development type and locations within the FSA have not been determined at this time; however, impacts to migratory bird nesting and shrub-steppe habitats used by wildlife would occur within the FSA. Habitat improvements would be made on surrounding lands to the benefit of migratory bird nesting and shrub-steppe resources.	Any or all environmentally sensitive areas in the FSA including MBTA bird nesting sites such as curlews on the FSA lands conveyed would be eliminated; shrub-steppe habitat would be lost, and wildlife would be displaced.

1417  
 1418 **3.4.4 Unavoidable Adverse Impacts**

1419 Some shrub-steppe habitats categorized as BRMP Levels 2 through 4 would be eliminated by  
 1420 development within the FSA. The quality and quantity of wildlife habitat over the entire FSA will be

1421 greatly reduced for many species and eliminated for others. The FSA, however, makes up  
1422 approximately one-half of one percent of the Hanford Site.

### 1423 3.5 Wetlands and Floodplains

#### 1424 3.5.1 Affected Environment

##### 1425 3.5.1.1 Wetlands

1426 Wetlands often perform important hydrologic support, water quality treatment, and habitat functions,  
1427 including groundwater recharge and discharge, stormwater attenuation and storage, erosion protection  
1428 pollution mitigation, nutrient cycling, sediment detention, and wildlife habitat.

1429 A preliminary field survey of the PA was conducted in June 2012. Five small areas were identified as  
1430 potential wetland areas in the southwestern part of the PA. Potential wetland areas within the PA were  
1431 assessed in 2013 through a two-step process to verify the need for delineation. First, a botanical  
1432 survey was conducted in May 2013 (see **Appendix I**). The botanical survey identified specific  
1433 locations where plant species that are common within wetlands occur. A wetland reconnaissance was  
1434 then conducted within those areas on May 15 and 16, 2013, to document the existing conditions of  
1435 these potential wetland areas (HDR 2015).

1436 Field observations for wetland indicators were conducted in accordance with the *Corps of Engineers*  
1437 *Wetland Delineation Manual* (USACE 1987) and the *Regional Supplement to the Corps of Engineers*  
1438 *Wetland Delineation Manual: Arid West Region* (USACE 2008). The 1987 manual and its  
1439 supplement provide technical guidance and procedures for identifying and delineating wetlands  
1440 potentially subject to Section 404 of the *Clean Water Act* or Section 10 of the *Rivers and Harbors*  
1441 *Act*. Environmental conditions can differ regionally; therefore, supplemental manuals (e.g., that for  
1442 the Arid West Region) were prepared by USACE to accommodate regional characteristics.

1443 USACE's wetland delineation process is a three-parameter approach. Areas must meet all three of the  
1444 mandatory criteria of (1) dominance of hydrophytic vegetation (plants tolerant of wet soil conditions),  
1445 (2) presence of wetland hydrology, and (3) presence of hydric soils (saturated for sufficient time to  
1446 develop anaerobic conditions). National Wetland Inventory Maps do not indicate wetlands are present  
1447 on the Hanford Site.

1448 Specific areas evaluated during the wetland reconnaissance are located within several shallow  
1449 depressions totaling approximately 0.11 acres. These areas contain cheatgrass (*Bromus tectorum*),  
1450 yellow spiderflower (*Cleome lutea*), seaside heliotrope (*Heliotropium curassavicum*), Douglas's  
1451 sedge (*Carex douglasii*), arctic rush (*Juncus arcticus*), beardless wildrye (*Leymus triticoides*), coastal  
1452 fiddleneck (*Amsinckia lycopsoides*), and hairy crabgrass (*Digitaria sanguinalis*), as well as a few  
1453 saplings of coyote willow (*Salix exigua*). These depressional areas contain plant species that often are  
1454 found in wetlands (e.g., Douglas's sedge, arctic rush, beardless wildrye, narrow-leaf willow), but the  
1455 dominant cover consists of upland species.

1456 For the first three weeks of May 2013, the Hanford Meteorological Station recorded a trace of  
1457 precipitation, whereas the average precipitation recorded from 1947 to 2012 is 0.53 inches of  
1458 precipitation for the month of May (DOE 2013b). This indicates that the Hanford Site was  
1459 experiencing drier conditions than average during the site reconnaissance. However, precipitation  
1460 recorded during the prior months of March and April 2013 was within the normal range when  
1461 compared to the WETS table, a tool to determine the normal range for monthly precipitation  
1462 (DOE 2013b; NRCS 2013). As a result, the period between March and May 2013 was considered to  
1463 be a normal rainfall season in the region. Surface water was not observed in any of the subject areas

1464 and no evidence of recent inundation typical to arid regions such as surface soil cracks, salt crust,  
1465 biotic crust, water marks, sediment deposits, drift deposits, or drainage patterns was observed in the  
1466 subject areas. Aerial imagery of the site also did not show signs of inundation.

1467 Surface soil maps show the PA as largely made up of Quincy sand. According to the Natural  
1468 Resources Conservation Service soil survey (NRCS 2013), Quincy soils consist of very deep,  
1469 excessively drained soils formed in sands on dunes and terraces and have rapid or rapid permeability.  
1470 Based on the description from the soil survey and field observations of soil conditions, the areas with  
1471 hydrophytic vegetation are unlikely to contain hydric soils

1472 Based on the field observations and soils data for the Hanford Site, the areas that contain hydrophytic  
1473 vegetation do not meet the federal definition of what constitutes a wetland (USACE 1987;  
1474 USACE 2008). The three wetland criteria as applied to these areas are summarized below:

- 1475 1. Hydrophytic Vegetation – These areas do not have a “predominance of wetland vegetation.”  
1476 The plant species growing in these areas are species often found in wet conditions, but these  
1477 species are not dominant. Instead, upland plant species dominate these depression areas.
- 1478 2. Wetland Hydrology – There is no visible source or evidence of wetland hydrology  
1479 (e.g., surface ponding, soil cracks, drainage patterns, saturation).
- 1480 3. Hydric Soils – The soil survey indicates the soils in these areas are excessively drained, and  
1481 sandy soils were observed in the areas during the site reconnaissance. In addition, there were  
1482 no visible signs of hydrology that would indicate the potential for hydric soil conditions  
1483 (USACE 1987; USACE 2008).

#### 1484 **3.5.1.2 Floodplains**

1485 A floodplain is defined as “the lowlands adjoining inland and coastal waters and relatively flat areas  
1486 and flood prone areas of offshore islands” (10 CFR 1022.4), including at a minimum, that area subject  
1487 to a 1 percent or greater chance of occurrence in any given year. The frequency of flooding typically  
1488 results in a complex ecosystem containing diverse habitats serving a variety of riparian functions.

1489 There are no naturally occurring surface water bodies or designated floodplains within the PA  
1490 (Conrads 1998). The PA is located approximately 0.5 mile west of the Columbia River and 2 miles  
1491 north of the Yakima River. The PA is outside of the 100-year and 500-year floodplains of the  
1492 Columbia and Yakima rivers (Conrads 1998). The Columbia River is bounded by uplands and levees  
1493 in the reach to the east and south of the PA. The Yakima River 100-year floodplain extends east of  
1494 the river channel and is located approximately 1.75 miles southwest of the PA. The closest area to the  
1495 project where the Columbia River 100-year floodplain extends landward is at the confluence of the  
1496 Yakima and Columbia rivers approximately 7 miles to the south based on the Federal Emergency  
1497 Management Agency flood insurance rate map.

### 1498 **3.5.2 Environmental Consequences**

#### 1499 **3.5.2.1 No Action Alternative**

1500 There would be no effects on wetlands or floodplains from the No Action Alternative because neither  
1501 is present on the PA.

#### 1502 **3.5.2.2 Proposed Action**

1503 There would be no effects on wetlands or floodplains from construction or operation of the Proposed  
1504 Action because neither is present in the PA nor within close enough proximity to the PA to

1505 experience effects. Therefore, there are no specific site locations that are more sensitive to wetland  
1506 and floodplain impacts from construction or operations than any others on the FSA.

### 1507 **3.5.3 Mitigation Measures**

1508 There would be no effects on wetlands or floodplains, and therefore no mitigation measures are  
1509 required.

### 1510 **3.5.4 Unavoidable Adverse Impacts**

1511 There would be no unavoidable adverse impacts to wetlands or floodplains from the proposed project.

## 1512 **3.6 Cultural Resources**

1513 For cultural resources, the ROI is the PA. The PA and initial area of potential effects (APE; described  
1514 below) originally comprised 4,413 acres. Through the land suitability evaluation process, the PA was  
1515 reduced to become the FSA and the final APE (2,474 acres). The final APE consists of the main and  
1516 solar farm FSAs and the PAAL (see **Section 2.2.3**). Although the FSA and APE are equivalent, the  
1517 term “APE” is retained because it has a regulatory meaning, and is defined as “...the geographic area  
1518 or areas within which an undertaking may directly or indirectly cause alterations in the character or  
1519 use of historic properties, if any such properties exist...” (36 CFR 800.16(d)). The Washington State  
1520 Historic Preservation Officer concurred with the APE in September 2012.

1521 Cultural resources and historic properties must be evaluated for federal actions in accordance with the  
1522 *National Environmental Policy Act* (NEPA) and the *National Historic Preservation Act* (NHPA). As  
1523 explained in *NEPA and NHPA, A Handbook for Integrating NEPA and Section 106* (CEQ and  
1524 ACHP 2013), cultural resource effects assessed under NEPA (40 CFR 1508.8) consider both cultural  
1525 resources and historic properties. The NEPA term “cultural resources” covers a wider range of  
1526 resources than the NHPA term “historic properties.” Under NEPA, “cultural resources” may include  
1527 sacred sites and archeological sites not eligible for listing in the National Register of Historic Places  
1528 (NRHP). Sacred sites are also considered under the multi-agency sacred sites memorandum of  
1529 understanding<sup>12</sup>.

1530 The process for compliance with Section 106 of the NHPA is outlined in the regulations at 36 CFR  
1531 800. This process includes identifying consulting parties, defining the APE, identifying historic  
1532 properties, evaluating effects, and resolving any potential adverse effects. The Section 106 process  
1533 has been completed as reflected in the signed Memorandum of Agreement (MOA) (see **Appendix K**,  
1534 “Memorandum of Agreement”).

1535 DOE is required to identify the consulting parties. Historic properties of religious and cultural  
1536 significance to an Indian tribe may be located on ancestral, aboriginal, or ceded lands. The NHPA  
1537 requires federal agencies to consult with any Indian tribe that attaches religious or cultural  
1538 significance to historic properties that may be affected. DOE identified as the consulting parties, and  
1539 consulted with, the State Historic Preservation Officer, four Indian tribes, the Advisory Council on  
1540 Historic Preservation, representatives of local government, applicants (project proponents), and  
1541 certain individuals and organizations with a demonstrated interest in the undertaking (see “consulting  
1542 parties” as defined in 36 CFR 800.2(c)).

1543 The APE is defined as “...the geographic area or areas within which an undertaking may directly or  
1544 indirectly cause alterations in the character or use of historic properties, if any such properties

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<sup>12</sup> <http://www.bia.gov/cs/groups/xnifc/documents/text/idc-037385.pdf>.

1545 exist...” (36 CFR 800.16(d)). The Washington State Historic Preservation Officer concurred with the  
 1546 APE in September 2012.

1547 Section 106 requires agencies to identify historic properties within the APE for the proposed  
 1548 undertaking. Under NHPA, “historic property” means any prehistoric or historic district, site,  
 1549 building, structure, or object included in, or eligible for inclusion in, the NRHP maintained by the  
 1550 Secretary of the Interior. Section 106 of the NHPA requires federal agencies to take into account the  
 1551 effect of proposed undertakings on any historic properties (16 USC 470f).

1552 An “adverse effect” is found when an undertaking may alter, directly or indirectly, any of the  
 1553 characteristics of a historic property that qualify the property for inclusion in the NRHP. Adverse  
 1554 effects may include reasonably foreseeable effects caused by the undertaking that may occur later in  
 1555 time, be farther removed in distance, or be cumulative (36 CFR 800.5(a)(1)).

1556 Under NEPA and NHPA, the meaning of “effects” is different. The comparison of defined terms in  
 1557 **Table 3-11**, “Meaning of “Effects” Under NEPA and NHPA,” are taken from the NEPA and NHPA  
 1558 guidance for integration (CEQ and ACHP 2013).

1559 **Table 3-11. Meaning of “Effects” Under NEPA and NHPA**

	NEPA	NHPA
Type of Effects or Impacts	Effects and impacts are synonymous terms under NEPA. The magnitude, duration, and timing of the effect to different aspects of the human environment are evaluated in the impact section of an EA or an environmental impact statement for their significance. Effects can be beneficial or adverse, and direct, indirect, or cumulative (40 CFR 1508.8).	An “effect” means alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the NRHP (36 CFR 800.16(i)).
Direct Effects	An impact that occurs as a result of the proposal or alternative in the same place and at the same time as the action. Direct effects include actual changes to cultural or historic resources (40 CFR 1508.8).	A direct effect to a historic property would include demolition of a historic building, major disturbance of an archeological site, or any other actions that occur to the property itself.
Indirect Effects	Reasonably foreseeable impacts that occur later in time or are further removed in distance from the Proposed Action (40 CFR 1508.8).	Indirect effects may change the character of the property’s use or physical features within the property’s setting that contribute to its historic significance; are often audible, atmospheric, and visual effects; and may relate to viewshed issues.

1560 **Source:** Adapted from CEQ and ACHP 2013.

1561 Cultural resource protection for lands in DOE ownership is governed by the *Hanford Cultural*  
 1562 *Resources Management Plan* (DOE 2003b), as amended. Privately owned lands are subject to  
 1563 Washington State laws and requirements protecting archeological sites, Native American graves, and  
 1564 abandoned, historic pioneer cemeteries and graves. These laws and requirements include the *Indian*  
 1565 *Graves and Records Act* (RCW 27.44), the *Archaeological Sites and Resources Act* (RCW 27.53), the  
 1566 *Abandoned and Historic Cemeteries and Historic Graves Act* (RCW 68.60), the *Archaeological*  
 1567 *Excavation and Removal Permit* process (WAC 25-48), and *Human Remains* (RCW 68.50). In

1568 addition, the SEPA review process and the Washington State’s Executive Order 05-05 requires  
1569 consideration of archeological and cultural resources during capital improvement project planning  
1570 and implementation. The FSA lands are not currently within the state’s jurisdiction, but would be  
1571 following a transfer of lands by deed to TRIDEC.

### 1572 3.6.1 Affected Environment

#### 1573 3.6.1.1 Background

1574 The Hanford Site has been a focus of human activity for more than 10,000 years. Proximity to the  
1575 Columbia River influenced pre-contact and historic settlement in the region. This discussion of  
1576 pre-contact history and historical development is from the historical and cultural review of the region  
1577 completed for the *National Register of Historic Places Multiple Property Documentation*  
1578 *Form-Historic, Archaeological, and Traditional Cultural Properties of the Hanford Site*  
1579 (DOE 1997a), *Hanford Site National Environmental Policy Act Characterization* (Duncan 2007) and  
1580 previous archeological investigations in the area. For this reason, this EA and the MOA use the terms  
1581 “pre-contact” and “historic” to describe these periods when appropriate.

1582 Pre-contact occupation of the area is characterized by Paleo-Indian groups relying upon hunting wild  
1583 game and gathering wild plant foods. These groups became increasingly sedentary around the  
1584 Frenchman Springs Period (4500–2500 BP [years before present]) during the Mid-Holocene with the  
1585 emergence of semi-subterranean house-dwellings. Groups still remained mobile, however, as  
1586 environmental changes fluctuated. During the Upper Mid-Holocene, specifically the Cascade and  
1587 Vantage phases, reduced large mammal hunting occurred due to decreased large mammal populations  
1588 from gradual drought in the area (DOE 1997a). When Europeans first arrived in the Northwest, the  
1589 descendants of ancient Native peoples were still living a traditional lifestyle. Native peoples that lived  
1590 and used the area and its resources included the Chamnapum, the Wanapum, the Walla Walla,  
1591 Yakama, the Umatilla, the Nez Perce Tribe, the Palouse, and others. When the Treaties of 1855 were  
1592 signed, many of these peoples and their descendants moved to reservations, while some, such as the  
1593 Wanapum, did not (Walker 1998). The descendants of these groups continue to live in the region and  
1594 still highly value the Hanford Site lands and resources.

1595 The first Euro-Americans to enter the Columbia Plateau region were with the Lewis and Clark  
1596 expedition between 1804 and 1806. Shortly after the Lewis and Clark expedition, other exploration  
1597 parties and, eventually, settlers came into the region. Like many territories or states surrounding the  
1598 region, the discovery of gold brought an influx of non-Indian people into the area by the 1860s  
1599 (Rodman 2001). Concurrently, the end of the Civil War and the passage of the *Homestead Act* in  
1600 1862 further contributed to large movements of Euro-American settlers across the American West  
1601 that included the Mid-Columbia River Basin and Priest Rapids Valley.

1602 In 1902, the *Newlands Reclamation Act* made possible large-scale irrigation projects and the  
1603 establishment of irrigation districts with federal funding. As a result, irrigation infrastructure  
1604 improvements took place in the Columbia and Yakima River valleys leading to the founding of towns  
1605 such as Richland, Hanford, White Bluffs, and, within the PA, a small, short-lived community known  
1606 as Fruitvale. Much of the land making up Fruitvale was owned by the Richland Irrigation District  
1607 (Sharpe 1999; Metsker 1934; U.S. War Department 1943). People purchased land from the irrigation  
1608 district and the new community of Fruitvale was born. However, the community waned through the  
1609 Great Depression and was subsumed by the federal government in 1942 under the *Second War*  
1610 *Powers Act* for the location of the Hanford Engineer Works subsequently known as the Hanford Site  
1611 (Marceau et al. 2003; PNNL 2003).

1612 The war-time Hanford Site acquisition was one of the largest in the nation. The federal government  
1613 redeveloped the land into several production districts, some with multiple areas (Harvey 2003). One  
1614 area was a broad expanse that contained transportation networks, such as roads and rail systems  
1615 between production areas. Between 1950 and 1961, expansion included the construction of anti-  
1616 aircraft artillery batteries and Nike missile systems used for air defense (Harvey 2003).

### 1617 **3.6.1.2 Identification of Cultural Resources and Historic Properties**

1618 The NHPA requires DOE to make a reasonable and good faith effort to identify historic properties.  
1619 The following approach was used to identify cultural resources and historic properties in the PA,  
1620 consistent with the Advisory Council on Historic Preservation’s guidance, *Meeting the “Reasonable  
1621 and Good Faith” Identification Standard in Section 106 Review*. A literature review and  
1622 archeological surveys were conducted to identify previously recorded archeological sites and  
1623 architectural/historic resources, conduct field investigations, and evaluate the eligibility of resources  
1624 located within the PA.

1625 This work began with archival research at several locations. Archival sources such as photographs,  
1626 manuscripts, land records, and property records were examined at the following institutions:

- 1627
- 1628 • DOE Hanford, Cultural Resource Records Library (Richland, Washington)
  - 1629 • Benton County Courthouse
  - 1630 • Richland and Kennewick Public Libraries
  - 1631 • East Benton County Historical Society and Museum
  - 1632 • University of Washington, University Libraries, Special Collections
  - 1633 • Bureau of Land Management (BLM), General Land Office, Records Automation website
  - 1634 • Ancestry.com

1635 Document searches pertaining to previous archeological investigations took place at the DOE  
1636 Hanford Cultural Resource Records Library, Mission Support Alliance, LLC Cultural and Historic  
1637 Resources Program Global Indexing System proprietary database, and the Department of  
1638 Archaeological and Historic Preservation’s Washington Information System for Architectural and  
1639 Archaeological Records Data.

1640 After the document searches, field (pedestrian) surveys were conducted throughout the entire PA,  
1641 focusing special attention on those areas where the document search showed sites identified by  
1642 previous investigations. Additional field and archival document studies were then conducted to  
1643 complete determinations of NRHP eligibility of sites for which additional archeological information  
1644 was needed. Description of surveys conducted and resources encountered were provided in the NHPA  
1645 cultural resource report (Morton et al. 2015)<sup>13</sup>.

1646 In May 2013, a field survey was conducted by walking 171 transects spaced 20 meters  
1647 (approximately 65 feet) apart. About 170 acres of the PA’s 4,413 acres were not surveyed as they  
1648 contained a high traffic road, Stevens Drive; the Horn Rapids landfill; Borrow Pit 6 (and its  
1649 expansion); and Borrow Pit 9. Portions of the project’s survey area had been disturbed from existing

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<sup>13</sup> NHPA analysis of the historic properties has been separately prepared as an “Official Use Only” cultural resources report to address the potential effects to NRHP-eligible and NRHP listed historic properties on the lands that could be transferred out of federal control in accordance with the NHPA directives (Morton et al. 2015). That report was provided to the State Historic Preservation Officer and the tribes in June 2015. Official Use Only or OOU is a category of sensitive unclassified information whose release to an unauthorized person could damage Governmental, commercial, or private interest and falls under an exemption in the *Freedom of Information Act*.

1650 gravel roads, proximity to high traffic roads, construction activities, and maintenance work related to  
1651 the borrow pits and transmission power lines.

1652 The purpose of the field surveys were to identify and document historic properties in the PA and to  
1653 evaluate the presence and condition of previously documented sites revealed by the archival  
1654 document search. While a site can range in size and complexity (e.g., small single-use hunting camps  
1655 to big permanent villages), archeological isolates are single artifacts not associated geographically  
1656 with a larger archeological site. Archeological isolates were not evaluated for eligibility as these  
1657 resources do not have the potential to be significant.

1658 Archeological subsurface investigations (shovel testing) were also conducted in November 2013  
1659 using a 10 meters (approximately 32 feet) grid spacing centered on surface features. The objective  
1660 was to determine the nature and extent of any buried archeological materials associated with surface  
1661 features. Sites that appeared to have moderate to good integrity (characteristics to determine  
1662 eligibility) and potential to yield buried deposits were selected for subsurface testing. A testing plan  
1663 was developed in order to determine which archeological sites were to be shovel tested. This plan  
1664 outlined research questions that would enable identification of those sites with the greatest potential  
1665 to meet the aforementioned NRHP eligibility criteria.

#### 1666 **Field Survey Results**

1667 The field work identified a number of archeological sites on the PA including 38 pre-contact and  
1668 historical period archeological sites and 20 archeological isolates. A brief description of these is  
1669 provided in **Table 3-12**, "Archeological Sites and Isolates Identified on the PA." Of the 16 pre-  
1670 contact archeological resources, 5 are sites and 11 are isolates. Of the 44 historic archeological  
1671 resources, 35 are sites and 9 are isolates. Two of the archeological sites are multi-component,  
1672 meaning they have both pre-contact and historic components, making the total number of sites 38 and  
1673 not 40.

1674 **Table 3-12. Archeological Sites and Isolates Identified on the PA**

Archeological Resource Type	Resource Date		General Description
	Pre-Contact	Historic	
Site	X		Faunal materials and charcoal
Isolate	X		Lithic flake
Site		X	Hanford Site Plant Railroad
Site		X	Debris concentration
Site		X	Refuse scatter
Site		X	Artifact scatter
Site		X	Farmstead
Site		X	Debris scatter
Site		X	Richland Irrigation Canal
Isolate	X		Cobble chopper - bifacially flaked
Isolate		X	Steel beer can - Heidelberg
Isolate	X		Projectile point
Isolate		X	Base fragment of clear bottle
Site		X	Debris scatter
Site		X	Debris scatter and debris concentration

Archeological Resource Type	Resource Date		General Description
	Pre-Contact	Historic	
Site		X	Tin can scatter
Site		X	Refuse scatter
Site		X	Debris scatter
Site		X	Debris scatter
Site		X	Debris scatter
Site		X	Can dump
Site		X	Military property and objects
Site		X	Debris scatter
Site	X	X	Debris and lithic scatter
Site		X	Homestead
Site		X	Debris scatter
Site		X	Debris scatter
Site		X	Debris scatter
Site	X	X	Debris and lithic scatter
Site		X	Debris scatter
Site		X	Debris scatter
Site		X	Debris scatter
Site		X	Debris scatter
Site		X	Debris scatter
Site		X	Debris scatter
Site		X	Debris scatter
Site		X	Debris scatter
Site	X		Lithic scatter
Isolate		X	12-Gauge shotgun shell casing – Western Cartridge Company
Isolate		X	12-Gauge shotgun shell casing – Peters Cartridge Company
Isolate		X	Glass insulator – clear, short-domed
Isolate		X	SCA liquor flask – embossed bottle reading “FULL PINT”
Isolate		X	Glass insulator – embossed, colorless, with attached guide wire, pole bracket, and anchors
Isolate		X	12-Gauge shotgun shell casing – Clinton Cartridge Company
Isolate	X		Fragmented projectile point – Quilomene Bar, basal-notched, Type A
Isolate	X		Primary lithic flake – petrified wood
Isolate	X		Secondary lithic flake, fine-grained, translucent, greenish-brown chert
Isolate	X		Projectile point – probable Columbia Stemmed, Type C – brown Jasper with a matrix

Archeological Resource Type	Resource Date		General Description
	Pre-Contact	Historic	
Isolate	X		Projectile point – Columbia corner-notched, Type B – caramel-colored, semi-translucent chert
Isolate	X		Primary lithic flake – buff/tan colored, fine-grained chert
Isolate	X		Projectile point – Columbia corner-notched, Type B, tan and pink-colored, banded chert
Isolate	X		Broken projectile point - whitish-pink chert
Isolate		X	License plate
Site		X	Debris scatter
Site		X	Debris scatter
Site		X	Debris scatter
Site	X		Lithic scatter
Site		X	Debris scatter
Site		X	Debris scatter

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The artifacts identified are consistent with the types of artifacts found at other locations surrounding the PA such as pre-contact lithic or artifact scatters (a scattering of chipped stone artifacts, shell, faunal bone, fire cracked rock, grinding stones and debris), and materials associated with historic period farms, fishing and hunting.

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A total of 12 of the archeological sites were tested to determine the nature and extent of any buried and associated archeological materials. Two isolated finds associated with the pre-contact period were also tested. A total of 77 shovel tests were shovel excavated for these 12 sites and 2 pre-contact isolated finds. One previously identified homestead was determined eligible for listing on the NRHP as a result of this study.

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Of the 38 archeological sites and 20 isolated artifact sites identified on the PA in the cultural resource surveys, 28 sites and 9 isolated finds are located within the FSA. Of these 28 archeological sites and 9 isolated finds, five sites and four isolated finds were determined to be NRHP-eligible properties that are located on the 1,935 acres of the FSA lands that could be transferred.

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**Tribal Traditional Cultural Property Studies and Consultation**

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DOE acknowledges the special expertise of area tribes in identifying properties that may possess religious or cultural significance to them. DOE funded four tribes – the Confederated Tribes of the Umatilla Indian Reservation, Confederated Tribes and Bands of the Yakama Nation, the Nez Perce Tribe, and the Wanapum – to complete a study<sup>14</sup> for this purpose. Each tribe provided a summary of its study to DOE and these summaries are included in **Appendix G**, “Tribal Studies Executive Summaries.” As requested by the tribes, these summaries have not been modified in any way. The tribal summaries describe potential effects that would occur from the Proposed Action to three

<sup>14</sup> The National Park Service introduced the concept of the traditional cultural property (TCP) as a means to identify and protect cultural landscapes, places, and objects that have special cultural significance to American Indians and other ethnic groups. A TCP that is eligible for the NRHP is associated with the cultural practices or beliefs of a living community that are rooted in that community’s history and are important in maintaining the continuing cultural identity of the community.

1697 properties: Laliik, Wanawish, and Gable Mountain. DOE had previously determined these three  
1698 properties to be eligible for listing in the NRHP. All three properties are outside of the FSA. This EA  
1699 describes potential effects to these three properties in **Section 3.8**, “Visual Resources.” The tribal  
1700 summaries also contain information about other named and unnamed places and traditional resources  
1701 (e.g., plants) of importance to the tribes. Following completion of the cultural resources report and  
1702 through consultation, tribes provided additional information regarding traditional cultural properties  
1703 (TCPs) within the FSA and potential effects. As a result of information received and consultation,  
1704 five additional NRHP-eligible properties were identified.

## 1705 **Evaluation of Identified Properties**

1706 NRHP-eligible properties identified are as described in the MOA and in Section 3.6.3, “Mitigation  
1707 Measures.” Previously unidentified properties that were identified during the literature review, field  
1708 surveys, tribal studies and consultation were evaluated for historic significance. As a result of these  
1709 efforts, newly identified archeological sites were found to be contributing elements of a previously  
1710 determined NRHP-eligible archeological district. Four newly identified properties of tribal cultural  
1711 significance were documented as TCPs eligible for listing in the NRHP. See **Appendix K**.

## 1712 **3.6.2 Environmental Consequences**

1713 The cultural resources environmental consequences analysis considers those impacts that could occur  
1714 on main and solar farm FSA lands, and the PAAL.

### 1715 **3.6.2.1 No Action Alternative**

1716 Under the No Action Alternative, there would be no additional environmental consequences to  
1717 cultural resources.

### 1718 **3.6.2.2 Proposed Action**

1719 The Proposed Action is for all the representative facilities and a single solar technology to be built on  
1720 1,641 acres of land out of the 1,935 acres potentially suitable within the FSA. Development  
1721 assumptions relevant to the Proposed Action were provided at the beginning of this chapter.

1722 From previous cultural studies and the current cultural resources survey it was estimated that:

- 1723 • About 5 percent or 127 of the 2,474 acres of the FSA have archeological sites on them.
- 1724 • About 6 percent or 118 of the 1,935 acres of the FSA that could be potentially suitable for  
1725 transfer by deed have archeological sites on them.
- 1726 • About 2 percent or 9 of the 539 acres within the FSA (PAAL) that could be conveyed by a  
1727 realty instrument other than a deed and remaining in federal control also contained  
1728 archeological sites.

1729 These percentages are a rough approximation that was calculated using ArcGIS mapping tools. The  
1730 reasons the percentages are approximations are provided at the end of **Section 3.6.1.2**. These  
1731 percentages do not include archeological sites that were previously identified but not found (located  
1732 again) by this survey.

## 1733 **Construction**

1734 Construction of the previously described representative facilities on the larger part of the main FSA  
1735 and the single solar technology on the solar farm FSA would involve extensive land disturbing  
1736 activities necessary for buildings, equipment, roads, parking areas, utilities, and infrastructure

1737 improvement such as those described in the introduction to this chapter. For the bounding case  
1738 analysis, the EA assumes that these activities could occur at any and all locations of the main FSA  
1739 lands that can be transferred by deed. These activities would remove vegetation, surface soil, natural  
1740 and manmade surface features, and any associated objects and materials changing the landscape from  
1741 one sculptured by wind and weather to industrial development. These development activities may  
1742 result in the destruction of archeological sites and may affect other cultural resources in the PA.

1743 Construction activities on the PAAL would not include buildings, but could include utilities to  
1744 provide services to the land that is transferred. Development could include construction of buried  
1745 sanitary and storm sewers, natural gas distribution lines, electrical cables, or above ground electrical  
1746 transmission and distribution lines. These activities would have more limited areas of land  
1747 disturbance than the main FSA because of the lesser acreages involved. Any archeological sites  
1748 potentially impacted by these activities would be addressed through implementation of the *Hanford*  
1749 *Cultural Resources Management Plan* (DOE 2003b), as amended, since these lands would remain in  
1750 DOE ownership.

1751 Land conveyance and subsequent development activities, such as those described above, could result  
1752 in adverse impacts to archeological sites or affect cultural resources located on the FSA. For example,  
1753 cultural resources can be affected by normal construction site noise, vibration, artificial light, and  
1754 odors. The heavy fossil-fueled machinery used during construction is known to generate noise and  
1755 vibration well above the current ambient background levels (see **Section 3.9**). This equipment also  
1756 produces diesel exhaust, although construction sites are expected to comply with the limits in the  
1757 RMCs. In the western and northern areas of the FSA away from other existing industrial activities,  
1758 construction activities could have a greater effect on the landscape, changing it from a previously  
1759 disturbed area that has, by lack of intrusion, returned to a more natural landscape to one that more  
1760 closely resembles the current Horn Rapids Industrial Park to the south where warehousing and  
1761 manufacturing facilities have and are being built.

1762 Since construction activities include the removal of surface vegetation, development would foreclose  
1763 opportunities for tribal use of traditional plant species. The Hanford Site includes large tracts of lands  
1764 with similar plant communities with the potential to support tribal uses. **Appendix I** includes the  
1765 vegetation survey performed in May and July of 2013.

1766 For construction, the environmental consequences do not vary to a meaningful extent as a result of the  
1767 specific representative facility or type of facility except that those facilities that require greater  
1768 acreage have more potential to affect one of these properties due to the amount of land needed. All  
1769 representative facilities require roads and parking lots or paved areas. Those that require larger  
1770 amounts of paved areas also have a greater potential to impact cultural resources because of the need  
1771 to level ground and thereby disturb a greater span of the surface (see **Section 3.8** for discussion of  
1772 visual impacts from construction).

### 1773 **Operation**

1774 Once the representative facilities are constructed and operational on the main FSA and the single  
1775 solar technology is operational within the solar farm FSA, the surface disturbance is largely  
1776 completed. However, some activities like landscaping (including tilling, terrain shaping, and planting)  
1777 could create some additional surface disturbance.

1778 Buildings, traffic, sound, light, and smells that differ from the pre-existing ambient condition have the  
1779 potential to affect cultural resources. The degree to which these effects would occur would vary  
1780 depending on the facilities. Warehousing and distribution centers are likely to have more commercial  
1781 vehicle traffic with more associated sounds, headlights, parking area lights, and similar effects.

1782 Agricultural food processing facilities are likely to produce odors that are not currently present in the  
1783 existing environment.

### 1784 **3.6.3 Mitigation Measures**

1785 In the Draft EA, DOE identified three NRHP-eligible properties: The Hanford Site Plant Railroad, the  
1786 Richland Irrigation Canal, and a historic homestead. Following the release of the Draft EA, DOE  
1787 continued consultation as discussed in **Section 3.6.1.2**, “Identification of Cultural Resources and  
1788 Historic Properties” and **Section 6.2**, “Agencies and Persons Consulted.” The continuing NHPA  
1789 Section 106 identification and consultation process resulted in DOE identifying additional  
1790 NRHP-eligible properties: Four TCPs and features linked to an archeological district (contributing  
1791 elements).

1792 An MOA was developed through the consultation process for the Proposed Action to resolve adverse  
1793 effects (see **Appendix K**). The MOA contains the mitigation measures agreed to by the consulting  
1794 parties to mitigate for the potential adverse effects to historic properties and cultural resources.  
1795 Through the MOA, DOE has agreed to implement mitigation measures that will apply to the entire  
1796 land parcel to be transferred. DOE will also implement mitigation measures for the individual historic  
1797 properties and cultural resources in accordance with the MOA.

1798 Mitigation for the Hanford Site Plant Railroad was previously completed in compliance with the  
1799 Hanford Built Environment Programmatic Agreement (DOE 1996a) and included a Historic Property  
1800 Inventory Form and documentation in the Hanford Site Manhattan Project and Cold War Era Historic  
1801 District (DOE 1997b).

1802 The historic remnants of the Richland Irrigation Canal are on FSA land that could be transferred, FSA  
1803 land that could be conveyed by other realty instrument other than a deed (PAAL), and Hanford Site  
1804 lands outside the PA. Mitigation for the canal will be implemented in accordance with the MOA (see  
1805 **Appendix K**).

1806 DOE mitigated adverse effects to the NRHP-eligible historic homestead by removing it from the  
1807 FSA. Development of the adjacent FSA lands would change the existing views from this location.  
1808 The potential change and existing views would not alter any of the NRHP-qualifying characteristics  
1809 of the historic homestead in a manner that would diminish its integrity. DOE will continue to manage  
1810 the property in accordance with DOE’s *Hanford Cultural Resources Management Plan*, as amended.

1811 DOE will implement the mitigation measures identified in the MOA for the four TCPs and features  
1812 linked to an archeological district (contributing elements).

1813 This section does not include a table on mitigation measures for impacts to cultural resources because  
1814 an MOA was signed, which identifies the agreed upon mitigation measures for cultural resources and  
1815 historic properties. This MOA can be found in **Appendix K**.

### 1816 **3.6.4 Unavoidable Adverse Impacts**

1817 Construction and operation of new facilities would likely result in direct or indirect impacts to some  
1818 archeological and cultural resources and historic properties, as described above in Section 3.6.

## 1819 **3.7 Land Use**

1820 Land use is defined as the way land is developed and used in terms of the kinds of human activities  
1821 that occur (e.g., agriculture, residential, and industrial areas). Cities and counties typically identify

1822 land uses and zoning for specific areas in which they want to encourage a particular kind of growth  
1823 with the idea that compatible land uses would be grouped together.

1824 The area analyzed for potential effects in this land use analysis includes the PA, as well as  
1825 DOE-owned Hanford Site lands in and around the FSA, and the adjacent City of Richland lands (see  
1826 **Figure 3-5**, “Land Use: Hanford Site and Richland”). For this resource area, the ROI includes the PA  
1827 and the surrounding urban and rural areas.

### 1828 **3.7.1 Affected Environment**

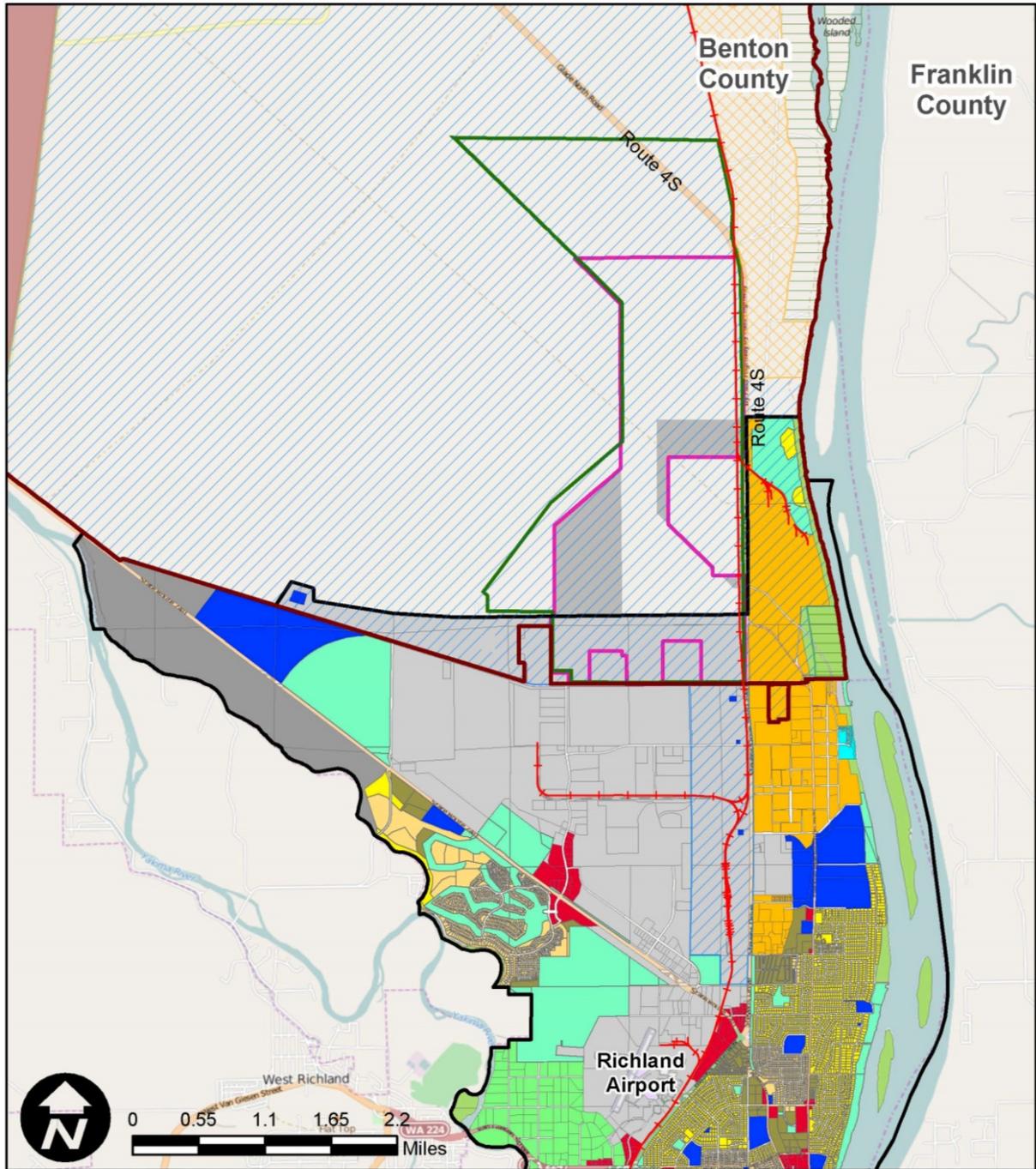
#### 1829 **3.7.1.1 Hanford Site**

1830 Land use at the Hanford Site is guided by the comprehensive land-use plan (CLUP; DOE 1999a).  
1831 Land use designations in the CLUP include areas envisioned for industrial, conservation,  
1832 preservation, recreation, and research and development uses (DOE 1999a). The area that includes the  
1833 PA is designated in the CLUP for industrial uses (see **Figure 3-5**).

1834 Some of the land within the PA is used for borrow pits, roads, utility corridor, train tracks, firing  
1835 range buffer zones, and the inactive Horn Rapids landfill. These are described in **Appendix A**. Also  
1836 located in the PA is the Navy SALT Site. The SALT Site is used to load test transporters that  
1837 transport decommissioned defueled Navy reactor compartment disposal packages and to store  
1838 equipment associated with the disposal program. A number of groundwater monitoring wells are in  
1839 the southeast corner of the PA (see **Appendix A, Figure A-1**).

1840

Figure 3-5. Land Use: Hanford Site and Richland



**Legend**

- Project Area
- Focused Study Area
- Railroads
- Urban Growth Area
- Potential Easement or Leased Land

**Hanford Land Use Designation**

- Conservation (Mining)
- Industrial (Exclusive)
- Preservation
- Recreation (High Intensity)
- Recreation (Low Intensity)
- R&D
- River
- Industrial

**City of Richland Land Use**

- Agriculture
- Business Commerce
- Business Research Park
- Central Business District
- Commercial
- Commercial Recreation
- Developed Open Space
- General Commercial
- High Density Residential
- Industrial
- Low Density Residential
- Medium Density Residential
- Natural Open Space
- Public Facility
- Retail Regional
- Urban Reserve
- Waterfront

1841

1842 The PA contains Waste Information Data System sites (DOE 2014c), shown on **Figure A-2**. These  
 1843 sites are not within the FSA and will remain under the administrative jurisdiction of DOE. There are  
 1844 no Waste Information Data System sites on FSA land that require further action.

1845 Most land within the Hanford Site adjacent to the PA is designated for industrial uses by the CLUP  
 1846 (DOE 1999a). The Hanford Site Patrol Training Academy ranges are to the west of the PA. Adjacent  
 1847 to the PA within the Hanford Site are a number of facilities (see **Figure 3-3**), including:

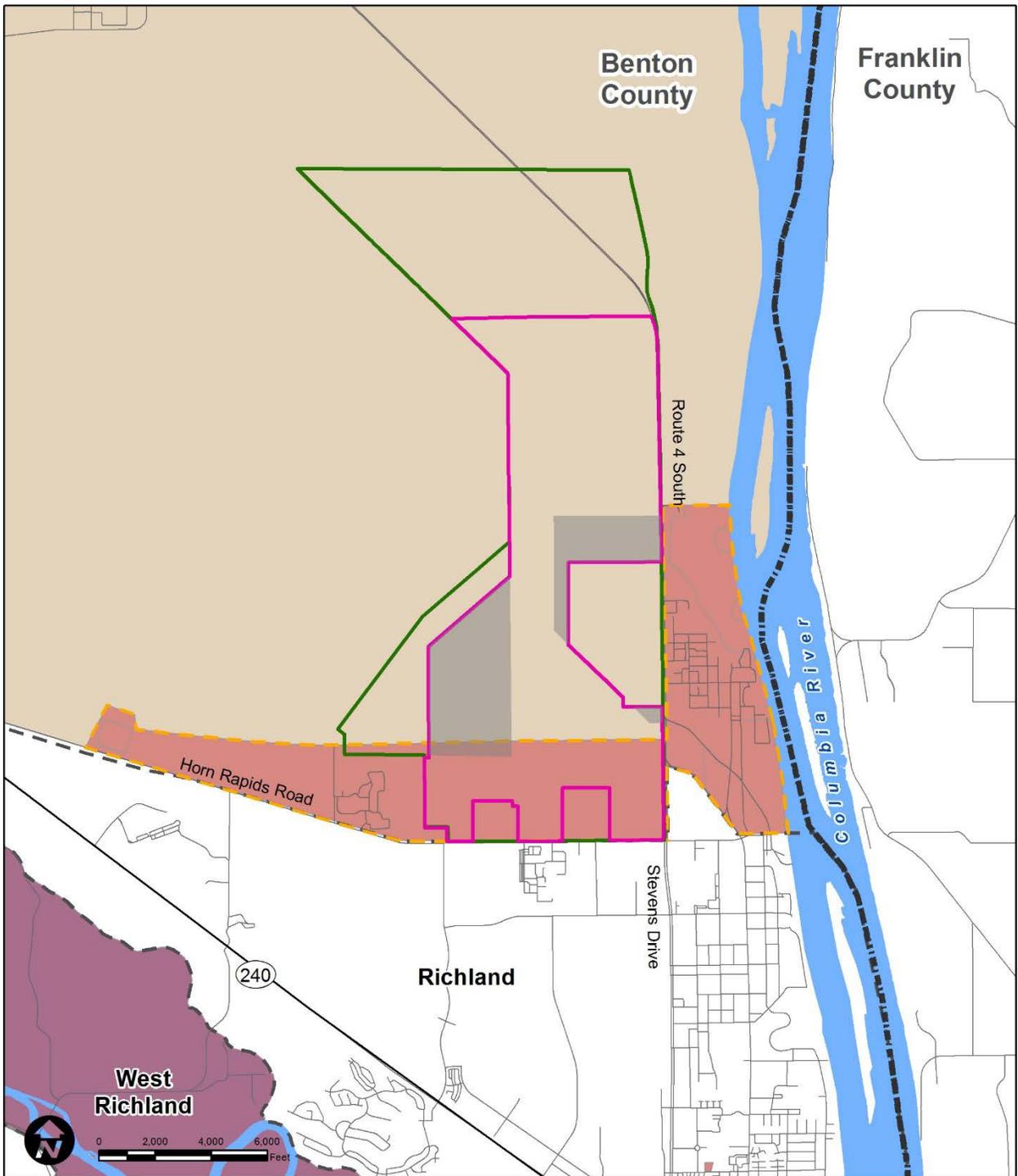
- 1848 • **Hazardous Materials Management and Emergency Response (HAMMER) Federal**  
 1849 **Training Center.** Located adjacent to the southwest corner of the PA, the HAMMER Federal  
 1850 Training Center is a training campus for local and federal law enforcement (within the Patrol  
 1851 Training Academy) and hazardous materials response personnel and includes classrooms,  
 1852 training courses, and a live fire ranges.
- 1853 • **Hanford Site 300 Area.** Located east of the PA this was used for fuel manufacturing  
 1854 operations and experimental and laboratory facilities. Remedial activities have removed many  
 1855 of the buildings; however, a few are still used by PNNL. This area includes the radiological  
 1856 sources cited in **Appendix F**.
- 1857 • **Environmental Restoration Disposal Facility.** Built in 1996, this facility accepts LLW,  
 1858 hazardous waste, and mixed waste that are generated during cleanup activities at the Hanford  
 1859 Site. This facility is several miles northwest of the PA.
- 1860 • **Laser Interferometer Gravitational-Wave Observatory (LIGO).** Located several miles  
 1861 from the northwest corner of the PA, the LIGO research facility's mission is to observe  
 1862 gravitational waves of cosmic origin using a laser beam that bounces off mirrors very distant  
 1863 from one another.
- 1864 • **Regional Education and Training Center-East.** Located adjacent to the HAMMER Facility  
 1865 and adjacent to the southwest corner of the PA, this training facility is used to train workers  
 1866 on high rise power structures (formerly known as the Northwest Utility Training and  
 1867 Education Center).
- 1868 • **Energy Northwest (formerly known as Washington Public Power Supply System).** North  
 1869 of the PA is the Energy Northwest facility, which is a nuclear power generation facility  
 1870 providing power to Washington State residents.
- 1871 • **AREVA and Perma-Fix.** Facilities south of the PA along Horn Rapids Road include  
 1872 AREVA, a nuclear fuels production facility, and Perma-Fix, which manages and treats both  
 1873 low-level and mixed LLWs.

### 1874 3.7.1.2 Benton County

1875 The PA is located in Benton County, Washington. Growth in Benton County is guided by the *Benton*  
 1876 *County Comprehensive Plan Update* (Benton County 2006). The land use element of the  
 1877 comprehensive plan provides the framework for future growth and development and guidance for  
 1878 ensuring that growth is consistent with the plan's objectives. The southern portion of the area  
 1879 immediately to the east of the PA was designated in the 1999 *Benton County Comprehensive Plan* as  
 1880 an urban growth area for the City of Richland (see **Figure 3-6**, "Land Use: Benton County"). Under  
 1881 the Washington State *Growth Management Act* (WAC 173-95A-610), an urban growth area is an area  
 1882 "within which urban growth shall be encouraged and outside of which growth can occur only if it is  
 1883 not urban in nature" (Benton County 2006). As defined in the Act, urban growth areas should include  
 1884 enough land to accommodate population growth and provide adequate land for industrial activities,  
 1885 open space, and public facilities.

1886

Figure 3-6. Land Use: Benton County



Legend

- |                                 |                  |                   |         |
|---------------------------------|------------------|-------------------|---------|
| Project Area                    | Light Industrial | Urban Growth Area | Highway |
| Focused Study Area              | Rural Lands 5    | County Boundary   | Road    |
| Potential Access Agreement Land | Unclassified     | City Limits       |         |
|                                 |                  | River             |         |

1887

1888 The *Growth Management Act* requires that counties and cities adopt zoning that is consistent with  
1889 local comprehensive land use plans, zoning, and ordinances. Benton County zoning designations are  
1890 provided in the county zoning code (Benton County 2012). The city’s northern urban growth area  
1891 identified in the county’s comprehensive plan is zoned as predominantly light industrial with areas of  
1892 park district, growth area residential, and general commercial (see **Figure 3-6**). Light industrial is  
1893 “designed to provide an area for the establishment of manufacturing facilities that generally do not  
1894 involve significant pollution issues, such as research and development, computer component  
1895 manufacturing businesses, and other businesses of a similar nature” (Benton County 2012). Reactor  
1896 operations are prohibited in these areas.

### 1897 **3.7.1.3 City of Richland**

1898 The City of Richland is located immediately south of the PA (see **Figure 3-5**). The *City of Richland*  
1899 *Comprehensive Plan* designates land uses within the city limits such as agriculture, commercial,  
1900 industrial, open space, business research park, and residential (City of Richland 2008). The PA  
1901 borders areas designated by the city for industrial and business research park uses (see **Figure 3-5**).  
1902 The city’s industrial designation includes a variety of light and heavy manufacturing, assembly,  
1903 warehousing, and distribution uses. The business research park designation provides for a variety of  
1904 office and research and development facilities in a planned business park setting (City of  
1905 Richland 2008). The *Growth Management Act* requires that counties and cities adopt local  
1906 comprehensive land use plans, zoning, and ordinances. The land uses as designated in the city’s  
1907 comprehensive plan are also used as the city’s zoning designations (City of Richland 2008).

### 1908 **3.7.1.4 Pacific Northwest National Laboratory**

1909 The PNNL campus is adjacent to the southeast corner of the main FSA. The PNNL campus consists  
1910 of a mix of public and private lands to the east of Stevens Drive. The majority of the campus is within  
1911 Richland city limits, with a small portion of DOE-owned campus lands within the urban growth area  
1912 in Benton County (PNNL 2012). PNNL consists of a series of research facilities, including the  
1913 Environmental Molecular Sciences Laboratory, the Atmospheric Radiation Measurement Climate  
1914 Research Facility, the Systems Engineering Laboratory, the Physical Sciences Laboratory, and the  
1915 Radiochemical Processing Laboratory.

## 1916 **3.7.2 Environmental Consequences**

1917 A proposed action could have a potential effect to land use if the action would be inconsistent or in  
1918 noncompliance with existing land use plans or policies, preclude the continued use or occupation of  
1919 an area, or be incompatible with adjacent land uses.

1920 The environmental consequences analysis addresses the impacts related to the Proposed Action on the  
1921 FSA lands and adjacent offsite locations. The Proposed Action assumes that the conveyed property  
1922 would be used for economic development purposes, as described by TRIDEC (see **Chapter 2.0**).

### 1923 **3.7.2.1 No Action Alternative**

1924 Under the No Action Alternative, the existing land uses described above would continue and there  
1925 would be no change as a result of the Proposed Action.

### 1926 **3.7.2.2 Proposed Action**

#### 1927 **Construction**

1928 One of the construction assumptions regarding the representative facilities (see **Table 2-1**) is that  
1929 development would be in accordance with local comprehensive land use plans, zoning, and

1930 ordinances. Facilities and necessary infrastructure include parking areas, roads, public services  
1931 (e.g., emergency response), and utilities (e.g., gas, electric, water).

1932 The land conveyance would result in a change in current land use from undeveloped to developed  
1933 industrial land use. The development would be consistent with the other industrial uses within the  
1934 ROI.

1935 The *City of Richland Comprehensive Plan* (City of Richland 2008) and the *Benton County*  
1936 *Comprehensive Plan Update* (Benton County 2006) would guide development of the FSA. Although  
1937 the PA is federal land and outside of county jurisdiction, the city and county plans designate the  
1938 southern portion of the PA as light industrial within an urban growth area. It is assumed that  
1939 following conveyance, the urban growth area would be expanded to include the PA, annexed by the  
1940 City of Richland, and subject to the city's zoning code.

#### 1941 **Operation**

1942 Land use would change from undeveloped to developed industrial land use. The development of the  
1943 FSA with representative facilities would be consistent with the local comprehensive land use plans,  
1944 zoning, and ordinances.

#### 1945 **3.7.3 Mitigation Measures**

1946 No mitigation measures for the change in land use would be required.

#### 1947 **3.7.4 Unavoidable Adverse Impacts**

1948 The FSA lands in the existing condition are largely an undeveloped area. The change in land use from  
1949 undeveloped to developed industrial land use and would foreclose opportunities for these lands to be  
1950 considered for other future uses.

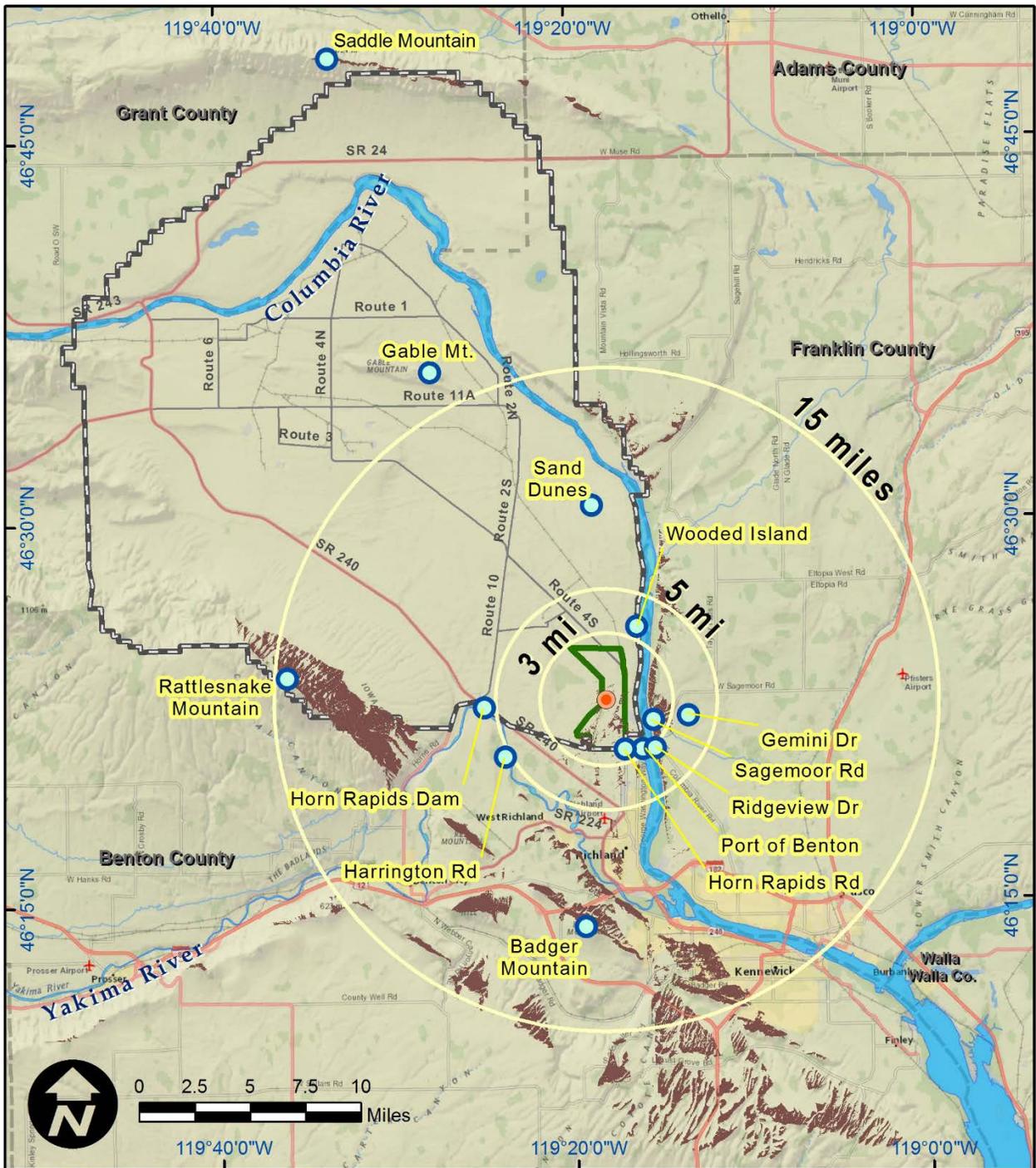
#### 1951 **3.8 Visual Resources**

1952 The ROI includes the PA and surrounding areas from which the PA can be viewed, as illustrated by  
1953 the brown-shaded terrain in **Figure 3-7**, "Viewshed as seen from the Approximate Center of the PA  
1954 from a 5-Foot Elevation." The viewshed is based upon an elevation of five feet in the approximate  
1955 middle of the PA, which represents the average eye-sight height above the ground. The PA terrain is  
1956 uneven with some higher and lower elevations so this height is an approximation.

1957 This section addresses visual resources, which include the natural and man-made physical features  
1958 that give a particular landscape its character. Features that form the overall visual impression a viewer  
1959 receives include landforms, vegetation, water, color, adjacent scenery, scarcity, and man-made  
1960 modifications. Evaluating the aesthetic qualities of an area is a subjective process because the value  
1961 that an observer places on a specific feature varies depending on their perspective and judgment. In  
1962 general, a feature observed within a landscape can be considered as "characteristic" (or character  
1963 defining) if it is inherent to the composition and function of the landscape. Landscapes can change  
1964 over time, so the assessment of the environmental effects of a proposed action on a given landscape  
1965 or area must be made relative to the "characteristic" features currently composing the landscape or  
1966 area.

1967

Figure 3-7. Viewshed as Seen from the Approximate Center of the PA from a 5-Foot Elevation



**Legend**

- Project Area Mean Center Viewpoint (VP)
- Key Observation Points (KOPs)
- Visible Lands from Mean Center View Point
- Hanford Site
- Project Area
- County Boundaries
- Rivers
- Highways
- Major Roads

1968

1969 The analysis of visual effects of the Proposed Action consists of a qualitative description of the visual  
 1970 characteristics of the PA and an assessment of potential changes from implementing the Proposed  
 1971 Action. DOE does not have a standardized approach to management of visual resources; therefore,  
 1972 the visual resources assessment in this EA uses the BLM's Visual Resource Management (VRM)  
 1973 classification system, as summarized below (BLM 2014). The BLM VRM classification system was  
 1974 chosen as representative of a federal agency methodology and the vistas at the Hanford Site are  
 1975 similar to the types of lands the BLM manages. A qualitative visual resource analysis was conducted  
 1976 to determine whether disturbances associated with project activities would alter the visual  
 1977 environment. Classifications were derived from an inventory of scenic qualities, sensitivity levels,  
 1978 and distance zones for particular areas:

- 1979
- Class I: Very limited management activity; natural ecological change.
- 1980
- Class II: Management activities related to solitary small buildings and dirt roads may be seen,  
 1981 but should not attract the attention of the casual observer.
- 1982
- Class III: Management activities may attract attention, but should not dominate the view of  
 1983 the casual observer; the natural landscape still dominates buildings, utility lines, and  
 1984 secondary roads.
- 1985
- Class IV: Management activities related to clusters of two-story buildings, large  
 1986 industrial/office complexes, and primary roads, as well as limited clearing for utility lines or  
 1987 ground disturbances, may dominate the view and be the major focus of viewer attention.

1988 The *Visual Resource Inventory Manual* (BLM 1986) identifies three mapping distance zones that  
 1989 qualitatively describe how landscapes are observed under good viewing conditions. These are:

- 1990
- Foreground-Midground Zone: Areas seen from highways, rivers, or other viewing  
 1991 locations less than 3 to 5 miles away. This is the point where the texture and form of  
 1992 individual plants are no longer apparent in the landscape.
- 1993
- Background Zone: Areas seen from beyond the foreground-midground zone but less than  
 1994 15 miles away. Vegetation in this zone is visible just as patterns of light and dark.
- 1995
- Seldom-Seen Zone: Areas that are hidden from view or not distinguishable and more than  
 1996 15 miles away.

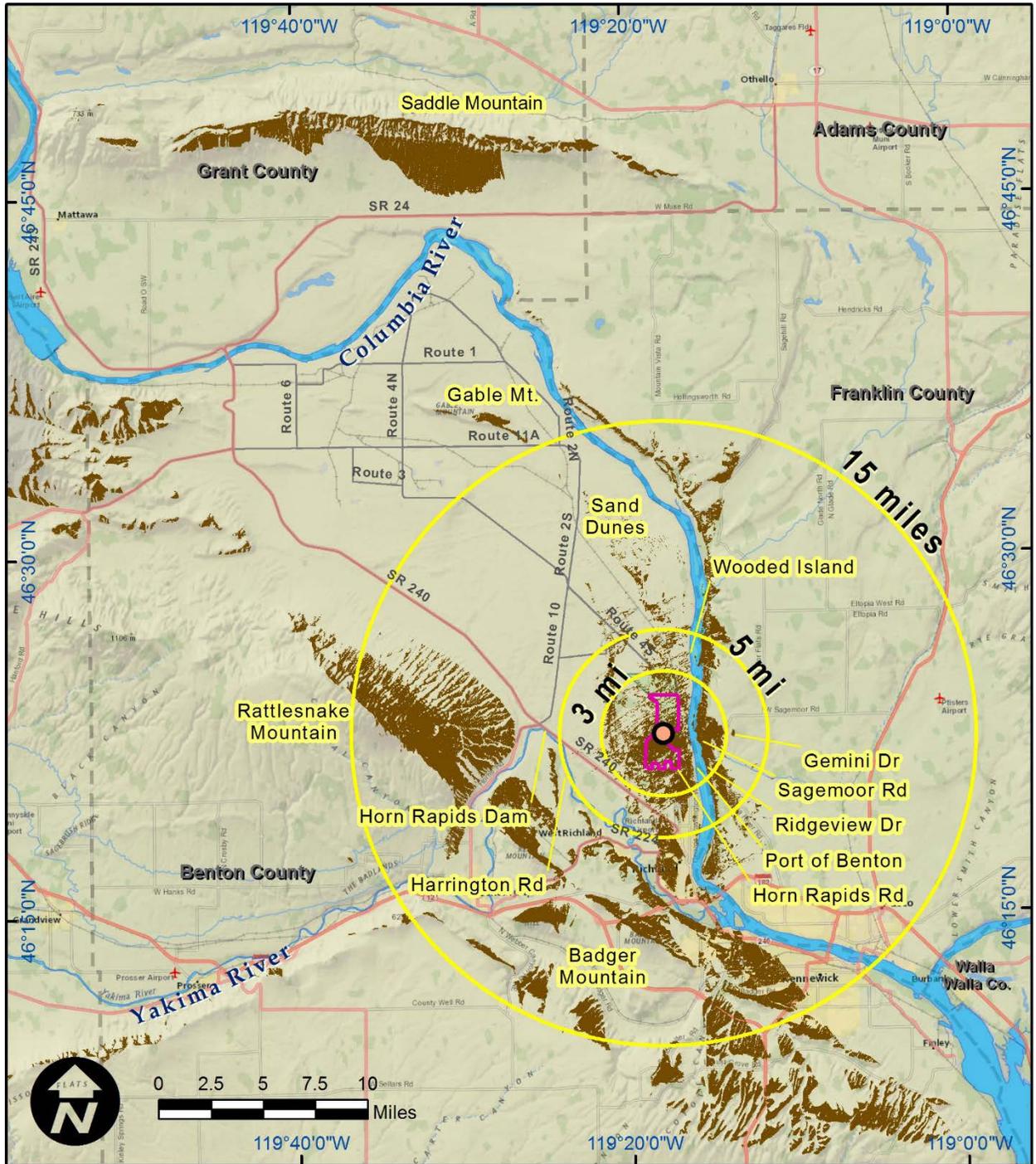
### 1997 **3.8.1 Affected Environment**

1998 DOE selected a number of key observation points (KOP), which include viewpoints along commonly  
 1999 traveled routes or other likely observation points. The KOPs selected do not represent all the potential  
 2000 sensitive viewer locations but rather a range of locations that could be important to a good portion of  
 2001 the viewers. Some of the KOPs are identified in the tribal summaries (see **Appendix G**) as being of  
 2002 importance to local tribes, including the Confederated Tribes of the Umatilla Indian Reservation,  
 2003 Confederated Tribes and Bands of the Yakama Nation, the Nez Perce Tribe, and Wanapum. These  
 2004 include Gable Mountain, Rattlesnake Mountain, and Saddle Mountain.

2005 The mapping distance zones and the KOPs for the affected environment description and for the  
 2006 environmental consequences analysis are shown on viewshed maps (see **Figure 3-7**, and **Figure 3-8**,  
 2007 "Viewshed as seen from the Approximate Center of the FSA from a 115-Foot Elevation") and  
 2008 described in the following sections.

2009  
2010

**Figure 3-8. Viewshed as Seen from the Approximate Center of the FSA from a 115-Foot Elevation**



**Legend**

- Focused Study Area Mean Center View Point
- Visible Area from 115 feet Height Above Land Surface
- County Boundaries
- Highways
- Focused Study Area
- Project Area
- Rivers
- Major Roads

2011

2012 The KOPs used in the viewshed analysis are:

2013 • Foreground-Midleground Zone

2014 – Horn Rapids Road

2015 – Port of Benton

2016 – Ridgeview Drive

2017 – Sagemoor Road

2018 – Gemini Drive

2019 • Background Zone

2020 – Rattlesnake Mountain

2021 – Badger Mountain

2022 – Sand Dunes

2023 – Horn Rapids Dam

2024 – Harrington Road

2025 • Seldom-Seen Zone

2026 – Saddle Mountain

2027 – Gable Mountain

2028 The analysis also takes into account whether development following the land conveyance would be  
2029 consistent with the visual resources goals of the *City of Richland Comprehensive Land Use Plan*  
2030 (City of Richland 2008) or the *Benton County Comprehensive Land Use Plan* (Benton County 2006),  
2031 as applicable.

2032 The land on and in the vicinity of the Hanford Site is generally flat with little relief. Rattlesnake  
2033 Mountain, rising to 1,060 meters (3,480 feet) above mean sea level, forms the southwestern boundary  
2034 of the Hanford Site. Gable Mountain and Gable Butte are the highest land forms within the central  
2035 Hanford Site. The Columbia River flows through the site. The Hanford Site is characterized by shrub-  
2036 steppe vegetation communities, with widely spaced clusters of industrial buildings along the southern  
2037 banks of the Columbia River and at several interior locations. The landscape adjacent to the Hanford  
2038 Site consists primarily of rural rangeland and farms. The City of Richland and PNNL are adjacent to  
2039 the Hanford Site to the south.

2040 Within the Hanford Site, developed areas in the Foreground-Midleground Zone are consistent with a  
2041 VRM Class IV rating. However, the majority of the Hanford Site is consistent with a VRM Class II or  
2042 III rating, as the site consists mostly of undeveloped areas that have some ongoing management  
2043 activity. The lands within the PA are consistent with a VRM Class III rating. The natural landscape  
2044 dominates; however, some roads and minor development are present in the area. The PA is most  
2045 visible from Horn Rapids Road to the south, and within the Hanford Site from Stevens Drive and  
2046 Hanford Route 10. The primary landscape features in the Background Zone visible from the analysis  
2047 area include Badger Mountain to the south and Rattlesnake Mountain to the west. Saddle Mountain  
2048 and Gable Mountain to the northwest are in the Seldom-Seen Zone (see **Figure 3-7**).

2049 From **Figure 3-7** for the affected environment, the following sites that the tribes identified as  
2050 important in their summaries (see **Appendix G**) would or would not be visible (land highlighted or  
2051 not highlighted in dark brown, respectively):

2052 • Gable Mountain – not visible from the PA because it is in the Seldom-Seen Zone and not  
2053 discernible (too far away).

- 2054 • Rattlesnake Mountain – a portion is visible from the PA but at the farthest edge of the  
2055 Background zone where objects are not readily discernible in the landscape.
- 2056 • Saddle Mountain – could potentially be visible from the far eastern mountain heights but  
2057 because of being in the Seldom-Seen Zone the PA is not discernible.

2058 The Hanford Site 300 Area, the PNNL complex and the Horn Rapids Industrial Park provide an  
2059 existing industrial development backdrop to the FSA.

## 2060 **3.8.2 Environmental Consequences**

2061 The visual resource analysis focuses on the degree of contrast between the Proposed Action and the  
2062 surrounding landscape, the sensitivity levels of KOPs, and the visibility of the Proposed Action from  
2063 those KOPs (see **Figure 3-8**) with regard to the FSA. The distance from a KOP to the affected area  
2064 was also considered, as distance can diminish the degree of contrast and visibility. To determine the  
2065 range of the potential visual effects, the viewshed analysis considered the potential effects in light of  
2066 the aesthetic quality of surrounding areas, as well as the visibility of possible activities and facilities  
2067 from vantage points.

### 2068 **3.8.2.1 No Action Alternative**

2069 Under the No Action Alternative, the appearance of the existing PA landscape would not change and  
2070 the existing visual resource classifications would remain.

### 2071 **3.8.2.2 Proposed Action**

#### 2072 **Construction**

2073 The overall effects to visual resources from construction of the representative facilities would be the  
2074 same. During construction, equipment and activities would be visible within the FSA, but the  
2075 visibility would diminish the farther a viewer is from the construction sites. Construction activities  
2076 would be similar to activities occurring in the 300 Area to the east and the city of Richland to the  
2077 south. To the west of the PA, the site is primarily undeveloped and construction activities would  
2078 change the visual environment. The FSA would be partially visible from Route 4 South and Route 10.  
2079 These vantage points do not offer unique views or serve as viewpoints for sensitive viewers. The  
2080 developed Hanford Site 300 Area lies between much of the river and the FSA; however, depending  
2081 on the location and characteristics such as topography the FSA may or may not be visible.

#### 2082 **Operation**

2083 The visual impacts from the representative facilities would vary slightly depending on the height of  
2084 the buildings. For example, a 115-foot-tall tower associated with the biofuels manufacturing facility  
2085 would be more visible than a 20-foot-tall food and agricultural facility. As depicted in **Figure 3-8**, the  
2086 tower could be visible from more than 30 miles away at Saddle Mountain although, since it lies in the  
2087 Seldom-Seen Zone, it would be difficult to distinguish from the urban landscape behind it in the city  
2088 of Richland.

2089 Regardless of the representative facilities, development would result in a change in the VRM  
2090 classification of the conveyed lands from Class III to Class IV, as the buildings and infrastructure on  
2091 the built-out site would become the primary focus for viewers. This development would be consistent  
2092 with development in the 300 Area to the east and in the city of Richland to the south. In both areas,  
2093 the existing buildings and structures are similar in height to the potential representative facilities. To  
2094 the west of the PA, the site is primarily undeveloped and new development would change the visual  
2095 environment. The FSA would be partially visible from Route 4 South and Route 10. These vantage  
2096 points do not offer unique views or would serve as viewpoints for sensitive viewers. The developed

2097 Hanford Site 300 Area lies between much of the river and the FSA; however, depending on the  
2098 location characteristics such as topography the FSA may or may not be visible.

2099 Development would be consistent with the visual resources goals of the *City of Richland*  
2100 *Comprehensive Land Use Plan* (City of Richland 2008). The plan states as a goal that development  
2101 should recognize and preserve established major vistas, as well as protect natural features such as  
2102 rivers, ridgelines, steep slopes, major drainage corridors, and archeological and historic resources.

2103 Once the FSA is developed, the following KOPs that the tribes identified as important in their  
2104 summaries (see **Appendix G**) would, or would not be visible (land highlighted or not highlighted in  
2105 dark brown, respectively) (see **Figure 3-8**):

2106 • Gable Mountain – not visible from the PA because it is in the Seldom-Seen Zone and not  
2107 discernable (too far away).

2108 • Rattlesnake Mountain – a portion is visible from the PA, but at the farthest edge of the  
2109 Background Zone where objects are not readily discernable in the landscape.

2110 • Saddle Mountain – the far eastern mountain heights could potentially be visible from the PA,  
2111 but because is in the Seldom-Seen Zone, it would be difficult to discern.

2112 The views from these KOPs would not change to any extent from the affected environment  
2113 perspective.

### 2114 **3.8.3 Mitigation Measures**

2115 In consultation, as well as in the tribal studies summaries (see **Appendix G**), the tribes have stressed  
2116 the importance of viewshed for Gable Mountain, Rattlesnake Mountain, and Saddle Mountain. While  
2117 the visual impacts analysis found that the views from these KOPs would not change to any extent  
2118 from the affected environment perspective, mitigation is contained in the MOA. Mitigation measures  
2119 include restricting the height and color of buildings and requiring the use of native plants in  
2120 landscaping.

### 2121 **3.8.4 Unavoidable Adverse Impacts**

2122 Views from the PA and surrounding areas from which the PA can be viewed would be changed with  
2123 buildings and infrastructure becoming the primary focus.

## 2124 **3.9 Noise, Vibration, and Electromagnetic Fields**

2125 The ROI for acoustic noise, vibration, and EMFs includes the PA and the surrounding area, including  
2126 the PNNL and LIGO facilities. These facilities contain receptors that are sensitive to vibration  
2127 (LIGO) and acoustic noise, vibration, and EMF (PNNL). The receptors have threshold levels much  
2128 lower than those regulated for the protection of human health. **Appendices B, C, and D** provide  
2129 information on acoustic noise, vibration and EMF and how they are generated from construction  
2130 activities and facility operations.

### 2131 **3.9.1 Affected Environment**

2132 Acoustic noise and vibration from DOE activities within the ROI occurs primarily from vehicle  
2133 traffic, operation of the borrow pits, and heavy equipment operating at remediation and waste sites.

2134 Noise and vibration from non-DOE activities at Hanford; such as workers commuting to and from the  
2135 Columbia Generating Station; vibration from regional dams; and operational noise from the AREVA

2136 facility, the Perma-Fix facility, and the US Ecology commercial LLW disposal site; are also part of  
2137 the existing background (ambient) sound and vibration environment near the PA.

2138 Future development in the area, such as new industry, agriculture, offices, schools, residential areas,  
2139 roads and other infrastructure, could result in variations in the levels of traffic noise from local roads  
2140 and increased noise levels near these developments. In May 2015, the Port of Benton sold 128 acres  
2141 west of Stevens Drive and south of Battelle Boulevard for mining purposes to supply material for  
2142 concrete and other construction projects in the Tri-Cities Area (Beaver 2015). This new facility, when  
2143 it begins operation, would use heavy machinery to excavate gravel and sand and haul it to a batch  
2144 plant at the Horn Rapids Industrial Park. Heavy equipment traveling down unimproved roads and  
2145 excavation of coarse material would be a major source of vibration (see **Appendix B**, “Acoustic  
2146 Noise and Vibration from Construction”). Other proposed developments in the area that are expected  
2147 to result in increased vibration levels include development of the 750-acre Horn Rapids Industrial  
2148 Park including the 313,000 square-foot, 10-story Preferred Freezer Services facility currently under  
2149 construction, and expansion of activities on the PNNL site.

### 2150 **3.9.1.1 Acoustic Noise**

2151 Acoustic noise is generally understood as unwanted sound. Sound propagates through air as well as  
2152 solid media such as geologic materials, or wood and even liquids such as water. Through air, sound  
2153 propagates as a compression wave and travels as fluctuations of air pressure above and below  
2154 atmospheric pressure. Sound can also be described in terms of a “wave” of vibrating air particles  
2155 where, at certain points along the wave, air particles are compressed and, at other points, the air  
2156 particles are spread out. The human ear perceives sound as tones or frequencies. Shorter wavelengths  
2157 are higher tones/frequencies and longer wavelengths are lower tones/frequencies. The sound pressure  
2158 level (SPL) is related to the amplitude of the wave, which is perceived as loudness. Noise may consist  
2159 of a single or range of frequencies. A frequency-dependent sound pressure rating scale was developed  
2160 with values given in decibels<sup>15</sup> (dB) to reflect the variations in human sensitivity known as the  
2161 A-weighting scale and values given in dBA. The threshold of audibility is generally within the range  
2162 of 10 to 25 dBA for normal hearing. **Appendix B** provides more general information on acoustic  
2163 noise.

2164 Sound is measured on an exponential scale, thus, two sources of sound are not necessarily twice the  
2165 amount of noise. The frequency and SPL are factors. Sounds can cancel each other or combine to  
2166 form new frequencies and sound levels depending on whether the peaks line up – **Appendix B**  
2167 graphically illustrates this phenomena. For the effect to be measurable, the two sounds must not only  
2168 be of the same frequency but of nearly the same SPL – within about 3 dB of each other. For example,  
2169 two pieces of the same type/manufacture of construction equipment could add or subtract noise.

2170 The State of Washington defines noise as the “...intensity, duration and character of sounds from any  
2171 and all sources” (RCW 70.107.020). RCW 70.107 and its implementing regulations (WAC 173-60 to  
2172 173-70) define the management of environmental noise levels. Maximum noise levels are defined for  
2173 the zoning of the area in accord with the environmental designation for noise abatement (EDNA). The  
2174 Hanford Site is classified as a Class C EDNA on the basis of industrial activities. Unoccupied areas  
2175 are also classified as Class C areas by default because they are neither Class A (residential) nor Class  
2176 B (commercial). Maximum noise levels are established based on the EDNA classification of the

---

<sup>15</sup> Decibel is a unit used to express the intensity of a sound wave, equal to 20 times the common logarithm of the ratio of the pressure produced by the sound wave to a reference pressure, usually 0.0002 microbar.

2177 receiving area and the source area. The Class C industrial receptor EDNA is 70 dBA for daytime  
 2178 hours (between 7:00 a.m. and 10:00 p.m.).

2179 The Hanford Site is within Benton County Washington. Chapter 6A.15 of the Benton County Code of  
 2180 Ordinances states that the policy of the county is to “minimize the exposure of its citizens to the  
 2181 adverse effects of excessive unwanted public nuisance noise and to protect, promote, and preserve the  
 2182 public health, safety and welfare.” However, a number of exemptions, such as sounds created by the  
 2183 temporary use of construction equipment, are allowed. PNNL is designated Business Research Park  
 2184 by the City of Richland (see **Figure 3-5**). The compliance point for the city would be at the boundary  
 2185 of the industrial zone at Stevens Drive (the receiving area). Therefore 70 dBA would be permitted at  
 2186 that point from 7:00 a.m. until 10:00 p.m.

2187 **Ambient Noise Levels on the PA**

2188 Wind is a primary contributor to background noise levels at Hanford. The entire Hanford Site  
 2189 experiences average wind speeds exceeding 12 miles per hour. In addition to noise from wind, routine  
 2190 DOE field activities contribute to the existing noise environment. Background noise levels in  
 2191 undeveloped areas on the Hanford Site were measured to range between 24 and 36 dBA  
 2192 (Coleman 1988).

2193 The National Park Service Natural Sounds and Night Skies Division performed sound modeling for  
 2194 the PA (Lynch 2014). **Table 3-13**, “Predicted Natural Ambient Sound Levels within the PA and Two  
 2195 Offsite Locations,” shows the output of that background noise modeling (November 10, 2014) using  
 2196 the methodology published in “A Geospatial Model of Ambient Sound Pressure Levels in the  
 2197 Contiguous United States” (Mennitt et al. 2014). These levels are consistent with those reported by  
 2198 Duncan (2007). **Figure 3-9**, “Location of the PA, Johnson Island, and Horn Rapids Dam,” shows  
 2199 Johnson Island, Horn Rapids Dam, and the PA background modeled locations.

2200 **Table 3-13. Predicted Natural Ambient Sound Levels within the PA and Two Offsite Locations**

Site Name	Metric	Predicted sound levels (dBA)					
		Min.	First Quartile	Median	Mean	Third Quartile	Max
PA	Predicted natural ambient	26.6	26.8	27.0	27.0	27.3	27.6
Johnson Island	Predicted natural ambient	28.8	28.8	28.8	28.8	28.8	28.8
Horn Rapids Dam	Predicted natural ambient	28.6	28.6	28.6	28.6	28.6	28.6

2201 **Source:** Lynch 2014.

2202

2203 **3.9.1.2 Vibration**

2204 Vibration is an oscillatory motion that can be described in terms of displacement, velocity, or  
 2205 acceleration. Ground-borne vibration can cause building floors to shake, windows to rattle, hanging  
 2206 pictures to fall off walls, and in some cases damage buildings. Like acoustic noise, vibration from a  
 2207 single source may consist of a range of frequencies. **Appendix B** provides more information on  
 2208 vibration. There are no state or local government regulations for vibration. Occupational Safety and  
 2209 Health Administration enforces vibration standards to protect workers and the only environmental

2210 standards are from the Federal Transit Administration for trains and mass transit to protect nearby  
2211 structures, not for sensitive receptors such as LIGO.

2212 **Ambient Vibration Levels on the PA**

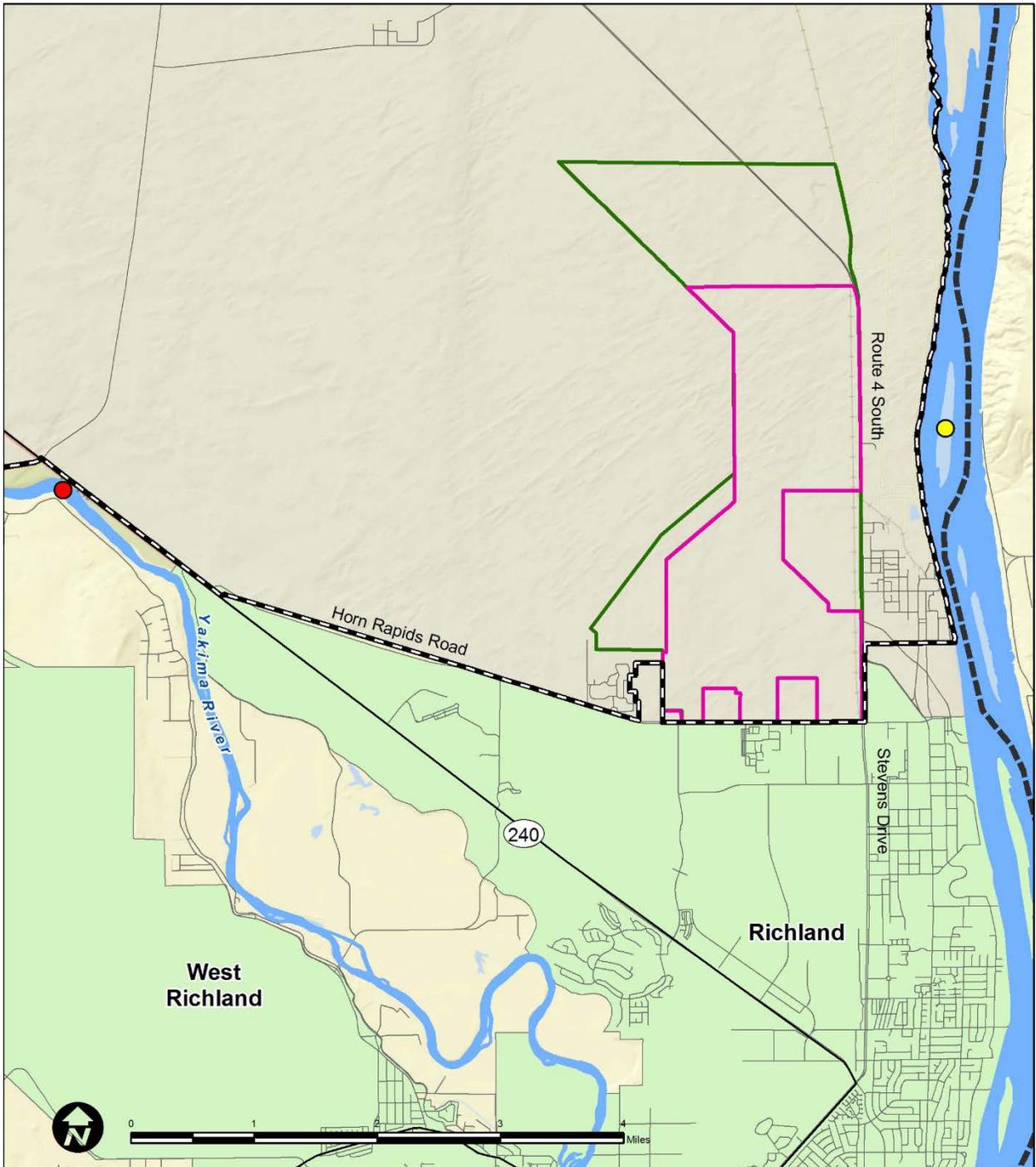
2213 Normal background levels of vibration in an urban environment are in the low 50 vibration decibels  
2214 (VdB) range (FTA 2006).

2215 “In contrast to airborne noise, ground-borne vibration is not a phenomenon that most people  
2216 experience every day. The background vibration velocity level in residential areas is usually 50 VdB  
2217 or lower, well below the threshold of perception for humans which is around 65 VdB. Most  
2218 perceptible indoor vibration is caused by sources within buildings such as operation of mechanical  
2219 equipment, movement of people or slamming of doors. Typical outdoor sources of perceptible  
2220 ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads.  
2221 If the roadway is smooth, the vibration from traffic is rarely perceptible” (FTA 2006). Background  
2222 vibration levels were measured by LIGO to determine impacts on their operations (Rohay 1996).

2223 Background vibration levels at the LIGO are normally below the LIGO standard spectrum between 1  
2224 and 10 Hertz (Rohay 1996). Assumptions about this spectrum, and LIGO’s recent operating  
2225 experience, can be used to establish design criteria necessary for LIGO’s seismic isolation needs. The  
2226 frequency ranges identified in **Appendix A, Section A.4.2** represent key points on the LIGO standard  
2227 spectrum. Vibration levels that exceed the LIGO standard spectrum could severely disrupt LIGO  
2228 operations.

2229

Figure 3-9. Location of the PA, Johnson Island, and Horn Rapids Dam



**Legend**

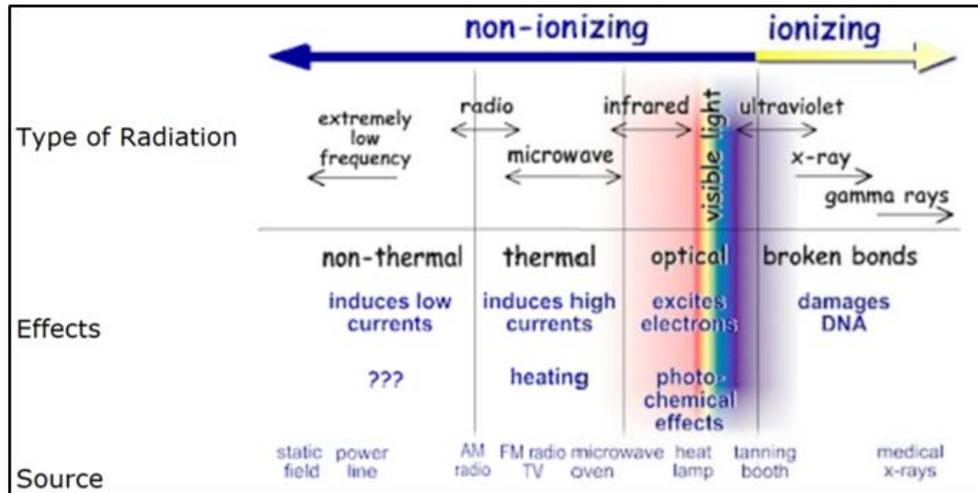
- |                       |                 |                 |
|-----------------------|-----------------|-----------------|
| Project Area          | County Boundary | Horn Rapids Dam |
| Focused Study Area    | River           | Johnson Island  |
| Hanford Site Boundary | Road            |                 |
| City of Richland      |                 |                 |

2230

2231 **3.9.1.3 Electromagnetic Fields**

2232 EMFs are created as a result of radiation in the electromagnetic spectrum (see **Figure 3-10**, “Types of  
 2233 Radiation in the Electromagnetic Spectrum”). EMF is produced through the generation, transmission,  
 2234 and use of electric power.

2235 **Figure 3-10. Types of Radiation in the Electromagnetic Spectrum**



Source: EPA 2013.

2236  
 2237  
 2238

2239 Magnetic fields associated with electrical power are measured in units of gauss<sup>16</sup> or tesla<sup>17</sup> (T), where  
 2240 1 T = 10,000 gauss. The magnetic field levels of concern to PNNL are in units of nanoteslas (nT). For  
 2241 reference, 1,000 nT equals 1 microtesla or 10 milligauss (mG). The earth’s static magnetic field is  
 2242 about 500 mG. **Appendix D**, “Electromagnetic Fields from Constuction and Facility Operation,”  
 2243 provides more information on electric and magnetic fields. There are no state or local government  
 2244 regulations for EMF. Occupational Safety and Health Administration enforces EMF standards  
 2245 established to protect workers, but not other receptors such as PNNL.

2246 **Ambient Electromagnetic Field Levels on the PA**

2247 The existing EMF sources on the PA come from electric transmission and distribution lines, electrical  
 2248 substations, and power transformers. These include the White Bluffs and the Sandhill Crane  
 2249 substations. White Bluffs is west of the FSA on the north side of Horn Rapids Road. The Sandhill  
 2250 Crane Substation is southwest of the corner of Horn Rapids Road and Stevens Drive. In general, EMF  
 2251 levels produced by electric power transmission are reduced with distance from the source. This  
 2252 characteristic is explained in detail in **Appendix D**.

2253 **3.9.2 Environmental Consequences**

2254 The environmental consequences related to acoustic noise, vibration, and EMFs result from  
 2255 construction and operation of the representative facilities on the FSA. This section addresses impacts  
 2256 to LIGO for vibration and to PNNL for all three technical issues.

<sup>16</sup> A gauss is a unit of magnetic induction wherein 1 gauss corresponds to the magnetic flux density that will induce an electromotive force of 1 abvolt (10<sup>-8</sup> volts) in a linear centimeter of wire moving laterally at 1 centimeter per second.

<sup>17</sup> A tesla is also a unit of magnetic flux density and is equal to 10<sup>-4</sup> gauss.

**2257 3.9.2.1 No Action Alternative**

2258 Under the No Action Alternative, acoustic noise, vibration, and EMFs would remain at their ambient  
2259 levels and there would be no environmental consequences to LIGO or PNNL other than what  
2260 currently occurs. For noise and vibration, this would be due to construction at and around PNNL and  
2261 from Horn Rapids Industrial Park, operation of the new aggregate materials mine, and truck traffic  
2262 along local roads. For EMFs at PNNL, this would be from existing sources on and around PNNL  
2263 including power transmission lines and electrical substations such as the nearby Sandhill Crane  
2264 Substation.

**2265 3.9.2.2 Proposed Action****2266 Acoustic Noise***2267 Construction Acoustic Noise and Vibration*

2268 For this EA it is assumed that all construction activities would comply with the federal, state, and  
2269 local laws and ordinances for noise and therefore there would be no human health-related impacts. It  
2270 is also assumed that construction would last up to 18 months depending upon the specific  
2271 representative facility.

2272 Noise levels upwards of 90 dBA would be produced from construction heavy equipment,  
2273 compressors, and generators (see **Appendix B**) but their SPLs are normally reduced dramatically as  
2274 the square of the distance (see **Figure B-2**). This means that a 100 dB source measured at 10 feet  
2275 would diminish to 66 dB at a distance of 500 feet from the source. Noise reduces approximately 6 dB  
2276 for every doubling of the distance. PNNL's closest future sensitive facility would not be closer than  
2277 500 feet from the west side of Stevens Drive right-of-way (referred to as the PNNL 500-foot setback)  
2278 (see **Figure A-8**). Since these construction activities would be at least 500 feet away from any  
2279 sensitive receptor, the SPLs would be reduced to about 66 dB by the time they reached the PNNL  
2280 500-foot setback. If measured at the Physical Sciences Facility about 5,100 feet away, the noise level  
2281 would be 46 dB, and at the Environmental Molecular Science Laboratory about 7,000 feet away it  
2282 would be 43 dB. These are the distances from the PNNL facilities to the closest point on the FSA.  
2283 There are some characteristics of sound propagation (ground, atmospheric, and wind effects) that  
2284 could allow some frequencies to transmit longer distances with less attenuation (see **Appendix B**).  
2285 These conditions, if occurred however, would likely be of short duration.

2286 Main sources of acoustic noise and vibration from construction activities would include operation of  
2287 heavy equipment, pile drivers, compressors, generators, pumps, and haul trucks. Much of this results  
2288 from their movement on non-paved surfaces and the gear-shifting from forward and backward  
2289 movements. Whenever wheels or tracks go over rough surfaces they generate both noise and  
2290 vibration. Blasting activities are not anticipated during construction because the site geology is  
2291 unconsolidated sediments and sand.

2292 Noise from construction would result in temporary, minor, changes to the ambient noise environment.  
2293 Construction noise would not likely exceed 100 dBA (i.e., at the source of the noise) even for a short  
2294 time and most construction equipment would not exceed 90 dBA measured at a distance of 50 feet  
2295 from the source (see **Table B-3** and **Figure B-7** in **Appendix B**). Equipment such as pile drivers and  
2296 rock hammers generate higher SPLs but would not likely be necessary on the FSA since soils and  
2297 rocks are relatively soft. Ambient noise levels (discussed in the affected environment) are 24 to  
2298 36 dBA. At times the SPLs could increase as much as 50 dBA during construction activity, but at the  
2299 end of the work day, noise would return to near ambient levels. Increases above ambient for  
2300 non-construction activities might be elevated if generators are used for something like security  
2301 lighting. It is assumed that each construction site would operate within the City of Richland 70 dBA  
2302 Class C EDNA at the industrial zone boundary.

2303 The nearest residential area is approximately 1,700 feet from the edge of the FSA. Noise generation  
2304 would last for the duration of construction activities. It is likely that the distance from the PA would  
2305 have a dampening effect on noise that could heard from the nearest residences, however depending on  
2306 the type of construction activity, the level and intensity would vary.

2307 Vibration sources for construction would primarily be heavy truck traffic crossing over unimproved  
2308 roads (see **Appendix B**, **Appendix C**, “Acoustic Noise and vibration from Facility Operations,” and  
2309 **Section C.3**). Measured values for construction equipment at 25 feet from the source would generally  
2310 be less than 90 dB and would continue to decrease at greater distances. LIGO would likely be able to  
2311 detect this truck traffic since it would be greater in intensity (i.e., the number of trucks, their weight,  
2312 and the surface roughness) than commuter traffic driving on smoother pavement. Increased periods of  
2313 vibration would be intermittent and of short duration during construction. As construction proceeds  
2314 towards completion, fewer trucks would be crossing unimproved roads and the effect would diminish.  
2315 For both LIGO and PNNL, the degree of effect would be related to the proximity of the vibration  
2316 source. Disturbance to LIGO and PNNL from vibration caused by construction activities cannot be  
2317 determined at this time because the necessary information needed to model the potential impacts is  
2318 unavailable. Given advance notice, both PNNL and LIGO may be able to accommodate some level of  
2319 impacts if the source activities are temporary or short-term in nature.

#### 2320 *Operation Acoustic Noise and Vibration*

2321 Operation of the representative facilities that consist mostly of warehouses or office buildings are not  
2322 likely to produce appreciable amounts of acoustic noise or vibration with the exception of truck  
2323 traffic. The transport and loading and unloading of semi tractor-trailers onsite would generate  
2324 acoustic noise and vibration. Vibration could result from trucks backing into loading docks and going  
2325 over speed bumps or other traffic calming devices (see **Appendix C**). Duration would be intermittent.  
2326 The most significant generators of acoustic noise and vibration would be the industrial facilities (the  
2327 biofuels manufacturing facility and the rail distribution center). Noise and vibration would be  
2328 generated at the biofuels manufacturing facility from heavy trucks, scrapers, and excavators moving  
2329 and separating waste and placing it into shredders and onto conveyors. At the rail distribution center,  
2330 noise and vibration would be generated by train locomotives and a 55-car train and delivery trucks  
2331 moving across Horn Rapids Road to and from the facility. These activities produce vibration levels  
2332 like those discussed in **Appendix C**, **Sections C.3.1** and **C.3.2**. Slower and lighter cars and train cars  
2333 generate lower energy vibration. For road traffic at a distance of about 100 meters (330 feet) from the  
2334 source, vibration levels decrease dramatically (see **Figure C-19**). At the current distance between  
2335 PNNL facilities and the FSA, vibration from these sources would be measureable (see **Appendix C**,  
2336 **Table C-13**) but appreciably reduced because of the geologic conditions (sandy unconsolidated soils  
2337 and bedrock. The direct vibration impacts to LIGO and PNNL from these operations cannot be  
2338 determined at this time because the necessary information needed to model the potential impacts are  
2339 unavailable.

2340 Operation of proposed industrial facilities would result in an increase in traffic volumes on the local  
2341 roadway network, and consequently, an intermittent increase in noise levels from traffic sources along  
2342 affected roadway segments. It is anticipated that noise levels from traffic would remain within  
2343 industrial noise ordnance levels.

#### 2344 *Construction Electromagnetic Field*

2345 Generation of EMF from construction activities can include mobile generators, misfiring combustion  
2346 engines, and temporary electrical connections. Resulting EMF levels are low, infrequent, and not of  
2347 long duration.

### 2348 *Operations Electromagnetic Field*

2349 Most of the EMF produced by the Proposed Action would result from the infrastructure upgrades and  
2350 not the representative facilities themselves. Exception are the solar farm inverters, transformers,  
2351 electrical substations, and power lines. Resulting EMF levels are not expected to affect the PNNL  
2352 sensitive receptors due to the distance between PNNL and the solar farm FSA. Another exception is  
2353 the food and agricultural processing facility, which may use industrial microwave heating devices and  
2354 magnetic induction furnaces for injection molding. Impacts to PNNL from the food and agricultural  
2355 processing facility cannot be determined at this time because the necessary information needed to  
2356 model the potential impacts is unavailable.

### 2357 **3.9.3 Mitigation Measures**

2358 This EA assumes that TRIDEC or the future landowners or public entity partners would comply with  
2359 all federal, state, and local laws and regulations for worker and public health and safety applicable to  
2360 acoustic noise, vibration, and EMFs. Deed restriction language would limit noise, vibration, and  
2361 electromagnetic fields to levels acceptable to PNNL and LIGO.

2362 Although not obligatory or within the control of DOE, additional mitigation measures described  
2363 below could be undertaken by a future landowner and a local jurisdiction. For example, development  
2364 plans could incorporate distance and shielding measures to reduce noise, vibration, and EMF levels.  
2365 The farther from a sensitive location, the less likely there would be an impact since all of these types  
2366 of energy would be reduced with distance. Shielding is effective for acoustic noise and electric fields  
2367 but less so for vibration and magnetic fields. Technological mitigation measures are possible for  
2368 acoustic noise, vibration, and EMFs if the sources are within a building or facility and less effective if  
2369 the sources are outdoors.

2370 In addition, operational activities that create substantial acoustic noise and vibration (e.g., the biofuels  
2371 manufacturing facility and the rail distribution center) could be located as far away as possible from  
2372 PNNL and LIGO because these characteristics (e.g., heavy equipment movement and train  
2373 locomotives) are largely outdoor sources and difficult to shield or mitigate. Likewise, to reduce  
2374 impacts from vibration and noise, heavy truck traffic could be directed along streets and highways  
2375 farther from PNNL and LIGO. Noise and vibration are greatest for trucks that are starting from a stop  
2376 or at higher speeds (see **Appendix C**), therefore, traffic flows could be designed to limit these  
2377 conditions.

2378 EMF is produced largely by electrical substations and power lines. The effects from power lines are a  
2379 function of the voltage magnitude and voltage fluctuation. Lower voltage lines do not create corona  
2380 effects (see **Appendix D**) so electromagnetic interference from that should be minimal if lines are  
2381 230 kilovolt (kV) or less. Impacts from power lines or substations would be mitigated by the 500 foot  
2382 PNNL setback (see **Figure A-8**). The other two operations that could produce EMF would be  
2383 magnetic induction furnaces that could be used for injection molding and industrial microwave  
2384 heating devices used in food and agriculture processing. The furnaces would likely be shielded to  
2385 protect workers and additional shielding could ensure a reduction in EMFs below levels of concern if  
2386 these facilities were located near PNNL (see **Appendix A**).

### 2387 **3.9.4 Unavoidable Adverse Impacts**

2388 Depending on the types and locations of facilities that are developed, the Proposed Action would  
2389 result in increased levels of noise, vibration and EMF within the ROI. The level of effects cannot be  
2390 determined at this time because the necessary information needed to model the potential impacts is  
2391 unavailable. Assuming future development implements necessary mitigation measures and complies

2392 with deed restrictions regarding these issues, the PNNL and LIGO mission capabilities would not be  
2393 adversely affected.

### 2394 **3.10 Utilities and Infrastructure**

2395 The ROI for utilities and infrastructure is the PA and the surrounding urban environment.  
2396 Infrastructure consists of the systems and physical structures that enable a population in a specified  
2397 area to function. Infrastructure is wholly human-made, with a high correlation between the type and  
2398 extent of infrastructure and the degree to which an area is characterized as “urban” or developed. The  
2399 availability of infrastructure and its capacity to support growth are generally regarded as essential to  
2400 the economic growth of an area. Utilities and infrastructure include electric power supply, gas supply,  
2401 water supply, and sewer and wastewater systems. The analysis to determine potential effects on  
2402 infrastructure and infrastructure systems considers primarily whether a proposed action would exceed  
2403 capacity or place unreasonable demand on a specific utility.

#### 2404 **3.10.1 Affected Environment**

##### 2405 **3.10.1.1 Hanford Site**

2406 Electric power for the Hanford Site is provided primarily by the Bonneville Power Administration  
2407 (BPA) and the City of Richland. The BPA provides approximately 90 percent of the electricity  
2408 consumed onsite; the City of Richland provides the majority of the remaining power (DOE 2012c).  
2409 The Benton Public Utility District provides electrical power to the LIGO via a 13.8-kV distribution  
2410 line from a DOE-owned electrical substation in the 400 Area. There is limited electrical infrastructure  
2411 within the area that is proposed for conveyance. The White Bluffs-Benton transmission line is a  
2412 115-kV power line from BPA White Bluffs Substation to the BPA Benton Substation that crosses the  
2413 proposed conveyance area (DOE 2012c). The nearest substations are the White Bluffs substation  
2414 operated by BPA located approximately 1.5 miles west of the HAMMER Facility and the Sandhill  
2415 Crane substation operated by the City of Richland on the southwest corner of Stevens Drive and Horn  
2416 Rapids Road (City of Richland 2008). Electricity usage for the Hanford Site has been approximately  
2417 173,000 megawatt-hours per year. Hanford is a priority customer of BPA and has historically had  
2418 surplus transmission line capacity (DOE 2012c).

2419 DOE has replaced centralized coal-fired steam plants in the 200 Area and 300 Area with smaller  
2420 boilers at specific facilities to supply heat and process steam. Oil-fired package boilers are used in the  
2421 200 Area, while steam in the 300 Area is produced by natural gas-fired boilers. A pipeline operated  
2422 by Cascade Natural Gas runs from South Richland to the 300 Area to supply natural gas to the  
2423 300 Area package boilers (DOE 1999a). Natural gas usage at the Hanford Site has been  
2424 approximately 978,000 cubic meters per year. No natural gas is currently delivered to the PA.

2425 Water is supplied to the Hanford Site from a Hanford Site-operated water system that draws water  
2426 from the Columbia River, the City of Richland water supply system, and water wells located onsite.  
2427 In the 100 Area and 200 Area, water is supplied by a DOE-operated water system that draws water  
2428 from the Columbia River. In the 300 Area, water is supplied by the City of Richland water supply  
2429 system. In the 400 Area, water is obtained from groundwater supply wells. Water usage at the  
2430 Hanford Site has been approximately 215 million gallons per year, which is less than 5 percent of the  
2431 capacity of the Hanford Export Water System (DOE 2012c).

##### 2432 **3.10.1.2 City of Richland**

2433 Following land conveyance and annexation, the City of Richland would provide electricity, water,  
2434 wastewater, and solid waste management services to the FSA. In the city of Richland, the BPA and  
2435 the city own and operate eight substations with a summer capacity of 302,000 kV amperes. In 2013,

2436 the summer peak demand was approximately 218,000 kilowatt (kW). The City of Richland has  
2437 recently updated their long range plan for electrical power delivery and plans to update their  
2438 distribution system to meet future growth (RGW Enterprises 2015).

2439 The Richland Department of Public Works provides water, wastewater, and solid waste management  
2440 services to the City of Richland. The City of Richland obtains about 82 percent of its water directly  
2441 from the Columbia River, with the remaining water coming from groundwater wells and from a well  
2442 field north of the city. Prior to consumption, water is stored in 15 reservoirs with a total capacity of  
2443 about 25 million gallons. The city maintains approximately 1.7 million feet of pipe. In 2013, the  
2444 average daily use of water across the entire service area was 14.7 million gallons and the peak daily  
2445 use was 34 million gallons (TRIDEC 2014b). Water drawn from the Columbia River is treated at the  
2446 city's water treatment facility. The treatment facility has a capacity of up to 36 million gallons per  
2447 day (City of Richland 2004). According to the City of Richland Comprehensive Plan, the city has  
2448 water rights totaling 58 million gallons per day, which is considered adequate to support any future  
2449 growth of the city (City of Richland 2008). Existing water mains extend to the Horn Rapids Sanitary  
2450 landfill southwest of the FSA. A 24-inch main extends north and south along Stevens Drive,  
2451 connecting to a 30-inch main that serves the Horn Rapids area (City of Richland 2008); however,  
2452 additional distribution mains would be required to serve the PA, as well as improvements to existing  
2453 water mains to provide increased capacity.

2454 Richland's sewer collection system consists of gravity sewers, pump stations, and force mains that  
2455 convey wastewater to the Richland Wastewater Treatment Facility. The treatment facility has a  
2456 capacity of 11.4 million gallons per day, and an average daily usage of about 5.5 million gallons per  
2457 day (TRIDEC 2014b). Treated wastewater is discharged to the Columbia River. The city maintains  
2458 about 1.2 million feet of sewer pipe throughout the service area (City of Richland 2004). Because the  
2459 city is relatively flat and cannot rely completely on gravity to encourage flow, the city owns and  
2460 operates 15 pump stations to help move sewage in the direction of the treatment facility. Existing  
2461 sewer mains serve the City of Richland's Horn Rapids Sanitary landfill approximately 1 mile west of  
2462 the southwest corner of the FSA; however, no distribution mains exist north of Horn Rapids Road  
2463 (City of Richland 2008).

2464 Cascade Natural Gas Corporation provides natural gas service to the city of Richland. Natural gas  
2465 pipelines are owned and maintained by Cascade Natural Gas Corporation. No natural gas pipelines  
2466 exist north of Horn Rapids Road that could service the FSA; however, an 8-inch main is located along  
2467 Kingsgate Way south of Horn Rapids Road that provides service to the Horn Rapids Industrial Park  
2468 (City of Richland 2011). Gas service would likely be extended north along the proposed extension of  
2469 Kingsgate Way to the FSA. In 2010, the City of Richland updated its comprehensive water system  
2470 plan in order to forecast future water demands and water supply for 20 years. The plan concluded that  
2471 current supplies within the City of Richland can support projected future usage (City of  
2472 Richland 2010).

2473 Richland Fire and Emergency Services provides fire, emergency medical services and transport, as  
2474 well as hazard mitigation services for approximately 46,000 citizens of Richland, and emergency  
2475 medical transport services for approximately 18,000 citizens within Benton County Fire District 4. In  
2476 addition, all services are extended to neighboring agencies through extensive automatic aid  
2477 agreements in the region. The department is made up of 56 uniformed officers and firefighters, of  
2478 whom 26 are paramedics and 27 are emergency medical technicians. Richland Fire and Emergency  
2479 Services shares borders with Kennewick, Pasco, Benton County Fire District 4, and the Hanford Fire  
2480 Department (Huntington 2010). It is assumed that these agreements and services would be extended  
2481 to cover the FSA.

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2482 **3.10.2 Environmental Consequences**

2483 The assessment of potential effects to infrastructure relies on identifying the current levels of service  
2484 for existing infrastructure and comparing that to the expected infrastructure requirements from the  
2485 construction and operation of the proposed facilities on the FSA. Spatially, the analysis extends to the  
2486 broader infrastructure systems that would be required for the new facilities. Temporally, the analysis  
2487 considers those effects that would occur in the short term (construction of facilities) and those that  
2488 would occur in the long term (operation of the facilities). See the individual resource topics in this EA  
2489 for discussion of anticipated impacts from construction, including utilities and infrastructure.

2490 **3.10.2.1 No Action Alternative**

2491 Under the No Action Alternative, no additional demands would be placed on infrastructure and no  
2492 effects would be anticipated.

2493 **3.10.2.2 Proposed Action**

2494 **Construction**

2495 Under the Proposed Action, the FSA would be developed for industrial purposes. The majority of the  
2496 FSA is currently undeveloped and does not have existing infrastructure; therefore, infrastructure  
2497 would have to be constructed. Existing water, sanitary sewer, and electrical lines are located at the  
2498 corner of Horn Rapids Road and Stevens Drive at the southeast corner of the FSA. Electricity is  
2499 provided by the City of Richland and natural gas provided by the Cascade Natural Gas Corporation.  
2500 Construction assumptions are discussed at the beginning of this chapter. Land disturbance for all  
2501 construction activities is described in **Section 3.1.2.2**.

2502 A single water line exists in Horn Rapids Road. Initially, water service would be extended north of  
2503 Horn Rapids Road to serve the first phase of the multi-phased industrial development. Heavy water  
2504 users like the wine/spirits and biofuels manufacturing representative facilities (see **Table 3-14**,  
2505 “Rough Estimate of the Projected Utility Usage by Representative Facility”) may require the  
2506 construction of additional water supply infrastructure, which would be identified, planned, and  
2507 overseen by the applicable local jurisdiction.

2508

2509

2510

**Table 3-14. Rough Estimate of the Projected Utility Usage by Representative Facility**

TMI Category	Type of Facility	Electrical	Natural Gas	Fuel Oil	All Major Fuels	Water	Wastewater	Solid Waste Generation	Electrical Generation	Energy Production
	<b>Units</b>	kW	BTUs/year (x 1,000)	BTUs/year (x 1,000)	BTUs/year (x 1,000)	Gallons/day	Gallons/day	Tons/year	kW	Gallons/year
Commerce Center	Multi-Use	4,500	81,000,000	21,000,000	261,000,000	106,849	360,000	4,000	N/A	N/A
Warehousing and Distribution – A	Manufactured Parts Distribution Center	200	7,000,000	20,000	13,000,000	8,219	20,000	1,000	N/A	N/A
Warehousing and Distribution – B	Storage and Rail Distribution Center	700	25,000,000	80,000	46,000,000	30,137	59,646	200	N/A	N/A
Research and Development – A	Biological R&D Center	400	5,000,000	550,000	20,000,000	27,397	34,000	900	N/A	N/A
Research and Development – B	Energy R&D Center	0	0	0	0	2,192	58,880	500	450	N/A
Technology and Manufacturing – A	Electronics Equipment Manufacturing	200	3,000,000	740,000	10,000,000	30,137	60,000	100	N/A	N/A
Technology and Manufacturing – B	Light Industrial	400	7,000,000	2,000,000	20,000,000	10,959	100,000	600	N/A	N/A
Food and Agriculture – A	Vegetable Food Processing	100	2,000,000	400,000	6,000,000	202,740	166,000	100	N/A	N/A
Food and Agriculture – B	Wine/Spirits Processing	2,600	46,000,000	12,000,000	148,000,000	1,197,260	436,000	2,000	N/A	N/A
Back Office – A	National Call Center	100	2,000,000	150,000	6,000,000	104,110	10,000	300	N/A	N/A
Back Office – B	Automatic Data Processing Ctr.	200	3,000,000	250,000	9,000,000	82,192	12,000	300	N/A	N/A
Biorefinery and Feedstock Processing	Biofuels Manufacturing Facility	6,500	3,000,000	Minimal	Minimal	457,534	61,400	800	N/A	10,000,000
	<b>TOTAL</b>	<b>15,900</b>	<b>184,000,000</b>	<b>37,190,000</b>	<b>539,000,000</b>	<b>2,260,000</b>	<b>1,380,000</b>	<b>10,800</b>	<b>450</b>	<b>10,000,000</b>

2511 <sup>a</sup> Energy usage derived from DOE (2012d), *Energy Efficiency & Renewable Energy, Buildings Energy Data*  
2512 *Book, Index for Commercial Buildings*, found at:  
2513 [http://buildingsdatabook.eren.doe.gov/docs%5CDataBooks%5C2011\\_BEDB.pdf](http://buildingsdatabook.eren.doe.gov/docs%5CDataBooks%5C2011_BEDB.pdf).

2514 <sup>b</sup> Industrial water use derived from water use coefficients by SIC code (gallons per employee per day), Pacific  
2515 Institute (2003), *Waste Not, Want Not: The Potential for Urban Water Conservation in California*,  
2516 Appendix C, found at: [http://www.pacinst.org/wp-](http://www.pacinst.org/wp-content/uploads/sites/21/2013/02/waste_not_want_not_full_report3.pdf)  
2517 [content/uploads/sites/21/2013/02/waste\\_not\\_want\\_not\\_full\\_report3.pdf](http://www.pacinst.org/wp-content/uploads/sites/21/2013/02/waste_not_want_not_full_report3.pdf).

2518 <sup>c</sup> Industrial wastewater generation derived from City of Richland (2004), *General Sewer Plan Update*,  
2519 industrial wastewater flow planning criteria of 2,000 gallons per acre per day, found at:  
2520 <http://www.ci.richland.wa.us/DocumentCenter/View/6215>.

2521 Key: BTU = British thermal unit; kW = kilowatt; N/A = not applicable; R&D = research and development;  
2522 TMI = target marketing industry.

2523 There is currently no sanitary sewer service within the PA. An existing 12-inch sewer line is located  
2524 at the corner of Horn Rapids Road and Kingsgate Way, but an additional trunk line would be  
2525 extended north across Horn Rapids Road to service the FSA. It is unlikely that the entire FSA could  
2526 be served by gravity flow; therefore, as the FSA is developed, new sewer lift stations, and associated  
2527 forced mains would also be required. A fiber optic data communication network serves the city of  
2528 Richland; the network would be extended to the FSA along existing and newly constructed access  
2529 roads (RGW Enterprises 2015).

2530 The city's Sandhill Crane Distribution Substation receives power from BPA's 115-kV transmission  
2531 line that runs between the BPA's White Bluffs Transmission Substation and Richland's First Street  
2532 Distribution Substation. The Sandhill Crane Substation is currently at capacity and City of Richland  
2533 plans to construct a new substation in the future on Kingsgate Way west of the Battelle Road  
2534 intersection (RGW Enterprises 2015). Depending on the rate of development within the FSA, a  
2535 second substation may be required at a future date. BPA would provide electrical transmission lines  
2536 that would be needed for any new substation. The City of Richland would construct new distribution  
2537 lines from the substations to serve the FSA. An estimated 3 miles of 115-kV transmission line and  
2538 approximately 18 miles of additional feeder lines would be constructed along existing and planned  
2539 roadways in the FSA. Power would also be extended to the north to serve the solar facility (RGW  
2540 Enterprises 2015).

2541 The City of Richland would provide solid waste disposal and recycling services to the FSA. Although  
2542 the Horn Rapids Sanitary landfill is anticipated to reach capacity by 2018, the city is exploring  
2543 alternative options for waste disposal and no effects on its ability to provide these services are  
2544 anticipated (see **Section 3.12.1**).

2545 The City of Richland would work with Cascade Natural Gas Corporation to bring natural gas service  
2546 to the conveyance area, as needed. When the City of Richland or other local jurisdiction considers a  
2547 future need for additional infrastructure, such as gas lines to serve the area, it would conduct SEPA  
2548 reviews for those actions.

#### 2549 **Operation**

2550 **Table 3-14** presents a rough estimate of the projected annual utility usage for each of the  
2551 representative facilities on the main FSA lands listed in **Chapter 2.0**. The methodology for  
2552 identifying representative facilities is described in **Appendix E**. Specific references for deriving  
2553 estimated utility usage for the representative facilities are found in the footnotes to **Table 3-14**.

2554 Following construction, the demand for these utilities would increase, but would not exceed existing  
2555 service capabilities. For example, the projected water use at full build out would be approximately  
2556 2.3 million gallons per day, which is about 16 percent of the current average daily water use and  
2557 6 percent of the City of Richland water treatment capacity. The quantity of wastewater generated  
2558 would be approximately 1.4 million gallons per day, or about 12 percent of the design capacity of the  
2559 City of Richland Wastewater Treatment Facility. Similarly, electrical demand for all proposed  
2560 facilities would be approximately 16,000 kW, or about 7 percent of the peak power demands in 2013.  
2561 Construction of the new substations to the north and south of Horn Rapids Road, when needed, would  
2562 ensure that adequate load capacity exists for future demands on the power system in that area of the  
2563 city.

2564 As explained in the bounding case assumptions in **Section 2.2.5**, all of the representative facilities,  
2565 including the multi-phased development, would begin and end construction at the same time to  
2566 address the collective short-term construction impacts. In actuality, economic development would

2567 proceed in phases over a period of several years, and the utility providers would improve the building  
 2568 infrastructure over several years, as needed.

2569 The Proposed Action would result in new, long-term demand for utility services. New infrastructure  
 2570 and services would be provided and maintained by the City of Richland, Port of Benton, BPA, and  
 2571 Cascade Natural Gas, as applicable.

2572 **Table 3-15**, “Projected Utility Usage for Solar Facilities within the 300-Acre Parcel,” presents the  
 2573 projected utility usage for the solar farm FSA. The PV panels require water periodically when they  
 2574 become coated with dust or dirt or when the energy generation for the panels drops off below some  
 2575 efficiency threshold, or 44,000 gallons per washing (NREL 2011). The projected water use of  
 2576 170,000 gallons per day is less than 5 percent of the City of Richland water treatment capacity.

2577 **Table 3-15. Projected Utility Usage for Solar Facilities within the Solar Farm FSA**

Solar Facility Type	Electrical (kW)	Natural Gas (BTUs/ year x 1,000)	Fuel Oil (BTUs/ year x 1,000)	All Major Fuels (BTUs/ year x 1,000)	Water <sup>a</sup> (gallons/ year)	Waste Water (gallons/ year)	Solid Waste Generation (tons/year)	Electrical Generation (kW)
Photo-voltaic	110	2,462,000	0	5,761,000	8,800,000	0	Minimal	42,000

2578 <sup>a</sup> The water use is prorated based upon the usage of the representative facility.  
 2579

2580 **3.10.3 Mitigation Measures**

2581 Although not obligatory or within the control of DOE, future landowners could be encouraged by  
 2582 TRIDEC and local jurisdictions through public recognition and/or economic development incentives  
 2583 to design, construct, and operate their facilities in a manner that further reduces or eliminates some  
 2584 potential environmental impacts.

2585 **3.10.4 Unavoidable Adverse Impacts**

2586 Although not necessarily an adverse impact, the Proposed Action would result in new, long-term  
 2587 demand for utility services from the City of Richland, Port of Benton, BPA, and Cascade Natural  
 2588 Gas.

2589 **3.11 Transportation**

2590 The ROI for transportation includes the PA and surrounding urban areas and perimeter roads.

2591 **3.11.1 Affected Environment**

2592 The PA is located in the Tri-Cities area, a regional transportation and distribution hub with air, rail,  
 2593 highway, and river connections.

2594 The road network in the vicinity of the PA (see **Figure 3-11**, “Transportation”) consists of several  
 2595 main roads, including:

- 2596 • State Route 240 (to the southwest of the PA) a six-lane highway that connects to Stevens  
 2597 Drive in Richland. State Route 240 is a designated freight route in the Regional  
 2598 Transportation Plan for the Tri-Cities (DKS Associates 2005).

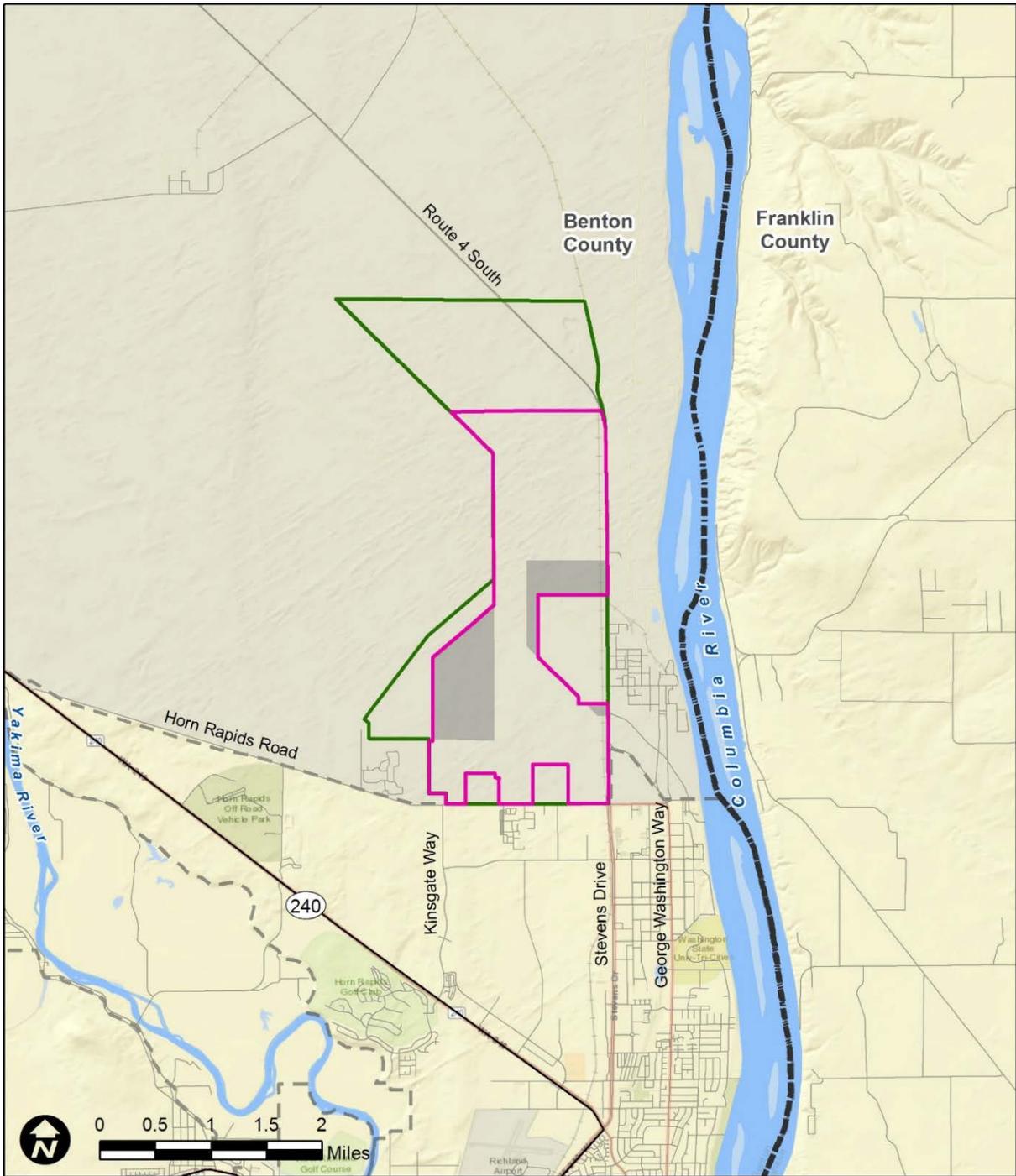
- 2599 • Route 4 South, a four-lane, north-south principal arterial that runs along the eastern border of  
2600 the PA, and then turns to the northwest in the northeastern portion of the PA.
- 2601 • Stevens Drive, a four-lane, north-south principal arterial that adjoins Route 4 South at the  
2602 Horn Rapids Road intersection.
- 2603 • George Washington Way, a principal four-lane north-south arterial through Richland that  
2604 intersects Stevens Drive east of the PA.
- 2605 • Horn Rapids Road, an east-west minor arterial on the southern border of the PA.
- 2606 • Kingsgate Way, a north-south minor arterial that ends at Horn Rapids Road about 1.5 miles  
2607 west of Stevens Drive.
- 2608 The roads that provide direct access to the PA are Stevens Drive, George Washington Way (which  
2609 terminates at Stevens Drive immediately to the east of the PA), and Horn Rapids Road (immediately  
2610 south of PA). These roads are in turn connected to the regional transportation system that serves the  
2611 Tri-Cities.
- 2612 Average daily traffic volumes for nearby intersections are shown in **Table 3-16**, “2010–2011 Average  
2613 Daily Traffic at Principal Access Route Intersections.” **Table 3-17**, “Average Daily and Peak Hour  
2614 Traffic for Principal Access Roads,” presents traffic volumes, including peak hour counts, for the  
2615 roads around the PA. While collection dates vary, the data demonstrate the dominant flows of traffic  
2616 during the peak morning and afternoon commute times when traffic is heaviest.
- 2617 The Benton-Franklin Council of Governments’ *2011-2032 Regional Transportation Plan* modeling  
2618 predicted in the 2020 “build” scenario<sup>18</sup> that peak hour traffic volumes would be well below the  
2619 capacity (i.e., peak hour volumes would be less than 50 percent of the capacity of the roadway) of  
2620 Stevens Drive, George Washington Way, and Horn Rapids Road around the PA (Benton-Franklin  
2621 Council of Governments 2012).
- 2622 The Tri-City Railroad Company maintains and operates about 12 miles of rail formerly owned by  
2623 DOE. In 1998 the Port of Benton received 750 acres of land and numerous buildings from DOE for  
2624 economic development purposes, and the railroad serves this area and the City of Richland’s Horn  
2625 Rapids Industrial Site (via a spur line built by the city in 1997) (DKS Associates 2005). The rail line  
2626 runs west of Stevens Drive south of and within the PA, and crosses Horn Rapids Road at grade just  
2627 west of Stevens Drive. The crossing is equipped with gates and signals.

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<sup>18</sup> As part of the regional transportation planning, future transportation conditions were modeled based on planned land use and transportation projects and projected changes in regional population and employment.

2628

Figure 3-11. Transportation



- Legend**
- |                 |         |                                 |
|-----------------|---------|---------------------------------|
| Project Area    | River   | Focused Study Area              |
| County Boundary | Highway | Potential Access Agreement Land |
| City Limits     | Road    |                                 |

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2630

**Table 3-16. 2010–2011 Average Daily Traffic at Principal Access Route Intersections**

Access Routes Intersection	Eastbound (daily number of vehicles)	Westbound (daily number of vehicles)
Horn Rapids Road and Stevens Drive	481	403
Horn Rapids Road and George Washington Way	1,190	1,210

Source: DOE 2013b.

2631  
2632

**Table 3-17. Average Daily and Peak Hour Traffic for Principal Access Roads**

Street Location	Direction	Year	Average Daily Traffic	AM Peak Hour Traffic	PM Peak Hour Traffic
Horn Rapids west of Stevens Drive	eastbound	2010	1,210	319	95
	westbound	2010	1,190	134	255
Route 4 South north of Horn Rapids	southbound	2001	4,325	248	1,464
	northbound	2001	4,108	1,542	168
Horn Rapids east of Stevens Drive	westbound	2001	532	46	149
	eastbound	2001	620	144	58
George Washington east of Stevens Drive	westbound	2001	474	187	41
	eastbound	2001	454	34	119
George Washington north of Horn Rapids	southbound	2001	994	189	265
	northbound	2001	1,157	321	209
Horn Rapids west of George Washington	westbound	2010	403	53	66
	eastbound	2010	481	92	65

Source: City of Richland 2015.

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**3.11.2 Environmental Consequences**

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The environmental consequences analysis of the construction and operation of the representative facilities on FSA land was conducted by estimating transportation demands of land uses and comparing them to current and anticipated future transportation conditions. Trip generation estimates for potential land uses in the FSA were developed using the Institute of Transportation Engineers common trip generation rates (ITE 2012) for the afternoon peak use period (PM peak hour) and comparing those trips to current and projected future traffic volumes. It should be noted that this is a qualitative assessment and traffic estimates for potential land uses in the FSA serve as an indicator of the magnitude of expected change. Trip generation is subject to many variables and uncertainties that would make actual trips generated by specific representative facilities higher or lower than those estimated in this analysis. As part of the development in the FSA, an approximately 2-mile new interior roadway is assumed for this analysis and it was assumed that access to developed land uses would be via that interior roadway with trips being evenly distributed to Horn Rapids Road and Stevens Drive.

**2649 3.11.2.1 No Action Alternative**

2650 Under the No Action Alternative, the FSA lands would not be conveyed and land use would not  
2651 change. As such, there would be no impacts to the transportation system under the No Action  
2652 Alternative.

**2653 3.11.2.2 Proposed Action****2654 Construction**

2655 Construction of representative industries on the main and the solar farm FSAs would result in  
2656 increases in car and truck traffic on Horn Rapids Road, Route 4 South, Stevens Drive, and other  
2657 surrounding roadways during construction.

2658 The construction of new interior roadway and access to and from Route 4 South and Horn Rapids  
2659 Road could cause temporary disruption from construction activities, delivery of material and  
2660 equipment, and construction workers traveling to and from the FSA. The number of construction  
2661 workers for each representative facility would vary depending on the size and scope, phase of  
2662 development, and other factors. Multiple construction projects occurring simultaneously would result  
2663 in traffic congestion on Horn Rapids Road, Route 4 South, Stevens Drive, and other surrounding  
2664 roadways during construction..

**2665 Operation**

2666 Upon full operation, the representative industries assessed would be expected to each contribute from  
2667 about 37 PM peak hour trips (for “Food and Agriculture A”) to about 1,095 PM peak hour trips (for  
2668 “Food and Agriculture B”). If all the representative facilities were developed (with the exception of  
2669 phase II of the Multi-Phase Development Site), about 3,000 new peak hour trips would be generated.  
2670 This volume of trips representing all industries would constitute a new load on the internal roadway  
2671 as well as on Stevens Drive and Horn Rapids Road, the primary arterials providing access to the FSA.  
2672 For illustrative purposes, if about half of the new trips were allocated to Stevens Drive (entering north  
2673 of Horn Rapids Road), it would more than double the PM peak hour volume (based on the City of  
2674 Richland’s 2001 traffic count), and would be more than five times the PM peak hour volume on Horn  
2675 Rapids Road west of Stevens Drive (based on the 2010 traffic count). While both roadways are  
2676 anticipated to have substantial peak hour capacity in the future, the addition of a large number of peak  
2677 hour trips not accounted for in the Regional Transportation Plan’s modeled 2020 build scenario  
2678 would likely affect operations on those and other roadways, including congestion and delays at  
2679 intersections (reduced level of service) and safety issues related to congestion.

2680 The multi-phased development is estimated to generate about 3,200 PM peak hour trips (for both  
2681 phase I and phase II). Effects of the multi-phased development on internal circulation and main  
2682 arterials would be similar to that described above for the development of all other potential industries  
2683 and land uses.

2684 The rail distribution center would receive two 55-car unit trains each week via the Tri-City Railroad  
2685 line in the PA. This would represent additional traffic on the rail line, and four additional crossings of  
2686 Horn Rapids Road by the unit trains each week. Vehicle delays at the crossings would depend on the  
2687 speed of the train and time of the crossings, as well as the influence of potential additional train traffic  
2688 serving the Horn Rapids Industrial Park.

2689 The solar farm would generate a few trips for operations and maintenance activities; these would not  
2690 noticeably contribute to the existing and projected future traffic volumes or affect traffic operations.

**2691 3.11.3 Mitigation Measures**

2692 Although not obligatory or within the control of DOE, this section describes certain potential  
2693 mitigation measures, which could be undertaken by a future landowner and local jurisdictions.

2694 The assumed simultaneous development of representative facilities of the scope and type as those  
2695 assessed would cause increased traffic and congestion on Horn Rapids Road, Route 4 South, Stevens  
2696 Drive, State Route 240, and other surrounding roadways that serve as the access routes to the PA.  
2697 Prior to approving specific developments, the applicable local agency would conduct a SEPA review.  
2698 A local agency could require the developer to conduct a project- and site-specific traffic impact  
2699 analysis and identify access and capacity improvements as mitigation measures to lessen or avoid  
2700 transportation impacts.

**2701 3.11.4 Unavoidable Adverse Impacts**

2702 Current development on the adjacent Horn Rapids Industrial Park and PNNL campus generates  
2703 vehicle and truck traffic on roads adjacent to the FSA. The industrial development of the FSA lands  
2704 would result in increased traffic and congestion during both construction and operations, the severity  
2705 of which would vary depending on the rate and extent of development.

**2706 3.12 Waste Management**

2707 The ROI for waste management is the PA and the waste management facilities and operations in the  
2708 city of Richland.

**2709 3.12.1 Affected Environment**

2710 The PA is currently largely undeveloped and there are no active waste generation or disposal  
2711 facilities. Solid waste management in the city of Richland is guided by the 2011 City of Richland  
2712 Solid Waste Management Plan (City of Richland 2011) and the 2006 Benton County Comprehensive  
2713 Solid Waste Management Plan (Benton County 2007). In 2013, the City of Richland generated  
2714 69,274 tons of solid waste. Of this total, 15,125 tons (approximately 22 percent) were recycled and  
2715 54,149 tons were landfilled at the City of Richland-owned and -operated Horn Rapids Sanitary  
2716 landfill (City of Richland 2014). Projections made in the 2011 solid waste management plan predicted  
2717 that the current permitted space of the landfill would be filled by 2018. The city is exploring options  
2718 for future growth, including expanding the Horn Rapids Sanitary landfill or closing the landfill and  
2719 long-hauling the waste out of the city (City of Richland 2011). Recycling in the city is collected from  
2720 voluntary curbside collection and from seven recycling drop-off centers throughout the city. The city  
2721 delivers all recycled materials to Clayton Ward Recycling in Richland, where the materials are sent to  
2722 recycling centers in Western Washington or Oregon (City of Richland 2011).

2723 Sanitary wastewater at the Hanford Site is discharged to onsite treatment facilities such as septic  
2724 tanks, subsurface soil absorption systems, and wastewater treatment plants, which treat on average  
2725 about 158,000 gallons per day of sewage. Hanford's sewer system in the 300 Area is connected to the  
2726 City of Richland's sewage treatment plant.

2727 Nonhazardous solid waste from the Hanford Site is disposed at the Roosevelt Regional Landfill near  
2728 Glendale, Washington (DOE 2012a). The Hanford Site has established target objectives for solid  
2729 waste reduction by reuse and recycling of 10 percent per year, based on a fiscal year 2010 baseline. In  
2730 fiscal year 2013, approximately 600 metric tons were generated and disposed of at the Roosevelt  
2731 Regional Landfill, while more than 1,300 metric tons of solid waste were recycled (DOE 2014c).

2732 **Section 3.10** describes current municipal solid waste handling practices for other areas of the Hanford  
2733 Site and the city of Richland. The FSA is currently undeveloped and there are no associated waste  
2734 generation or disposition activities.

### 2735 **3.12.2 Environmental Consequences**

#### 2736 **3.12.2.1 No Action Alternative**

2737 In the No Action Alternative, no construction or operations waste would be generated.

#### 2738 **3.12.2.2 Proposed Action**

##### 2739 **Construction**

2740 Solid nonhazardous waste generated by the Proposed Action during construction would most likely  
2741 be recycled or transported to the Horn Rapids Sanitary landfill for disposal. Nonhazardous  
2742 construction wastes would likely consist of solid waste such as packaging material, including wooden  
2743 crates, cardboard, and plastic; scrap material such as electrical wire, insulation, gypsum drywall, floor  
2744 tiles, carpet, scrap metal, and empty adhesive and paint containers; concrete rubble; and land-clearing  
2745 debris. These wastes would be recycled through agreement with local contractors or collected in roll-  
2746 off bins located onsite and transported to the Horn Rapids Sanitary landfill, as appropriate.

##### 2747 **Operation**

2748 Specific detail about the wastes that may be generated by the representative facilities is not available;  
2749 however, the types of anticipated uses would produce waste typical of other industrial, research, and  
2750 office park operations in the region. Wastes would be disposed at the Horn Rapids Sanitary landfill.  
2751 **Table 3-14** includes an estimate of solid waste generation for each representative facility for each  
2752 TMI category. An estimated total of 10,800 tons would be generated per year; however, at the current  
2753 diversion rate of 22 percent, about 8,400 tons per year would be disposed. This represents about  
2754 15 percent of the current disposal rate at the landfill.

2755 The City of Richland notes that the 46-hectare (114-acre) Horn Rapids Sanitary landfill could  
2756 potentially be at capacity in 2018 and is evaluating the options of expanding the permitted space or  
2757 using long-haul services to a regional landfill. Initial studies indicate the landfill could be expanded to  
2758 accommodate 7 million tons, or approximately 65,000 tons per year for 66 years, depending on the  
2759 quantity of material disposed per year. The landfill would be expanded in compliance with *Resource*  
2760 *Conservation and Recovery Act* Subtitle D regulations for sanitary landfills, and would accept  
2761 municipal solid waste for disposal.

2762 Petroleum, oils, lubricants, and chemicals would be managed in accordance with applicable State of  
2763 Washington regulations. If required by state or federal law, facilities would have a spill prevention,  
2764 control, and countermeasures plan and an emergency response plan to address the potential release of  
2765 hazardous materials.

2766 Liquid wastes from representative facilities would consist of waste process water and sanitary  
2767 sewage. Both of these wastewaters would be sent to the City of Richland's publicly owned treatment  
2768 works for processing. Process water generated from facility operations would be monitored to verify  
2769 compliance with permitted pollutant concentrations in accordance with the City of Richland  
2770 pretreatment program (City of Richland Code 17.30). Process wastewater from the representative  
2771 facilities is anticipated to be similar in composition to other industrial, research, and office park  
2772 operations in the region.

**2773 3.12.3 Mitigation Measures**

2774 Although not obligatory or within the control of DOE, the following section describes certain  
2775 potential mitigation measures, which could be undertaken by a future landowner and the local  
2776 jurisdiction.

2777 The future landowners could be encouraged by TRIDEC and local and state government through  
2778 public recognition and/or economic development incentives to design, construct, and operate their  
2779 facilities in a manner that further reduces or eliminates some potential environmental impacts by  
2780 designing industrial facilities and operations that minimize waste production and maximize waste  
2781 recycling to reduce demand on the city and county's waste management facilities. It is expected that  
2782 companies who practice the mitigation measures of waste minimization, source reduction, recycling,  
2783 and other BMPs would reduce the quantities of waste generated and the impact on the existing  
2784 disposal facilities.

**2785 3.12.4 Unavoidable Adverse Impacts**

2786 The Proposed Action would generate solid and liquid wastes that would add to existing waste  
2787 streams. The amount of wastes that would be generated is not expected to exceed the capabilities of  
2788 existing waste management systems.

**2789 3.13 Socioeconomics and Environmental Justice**

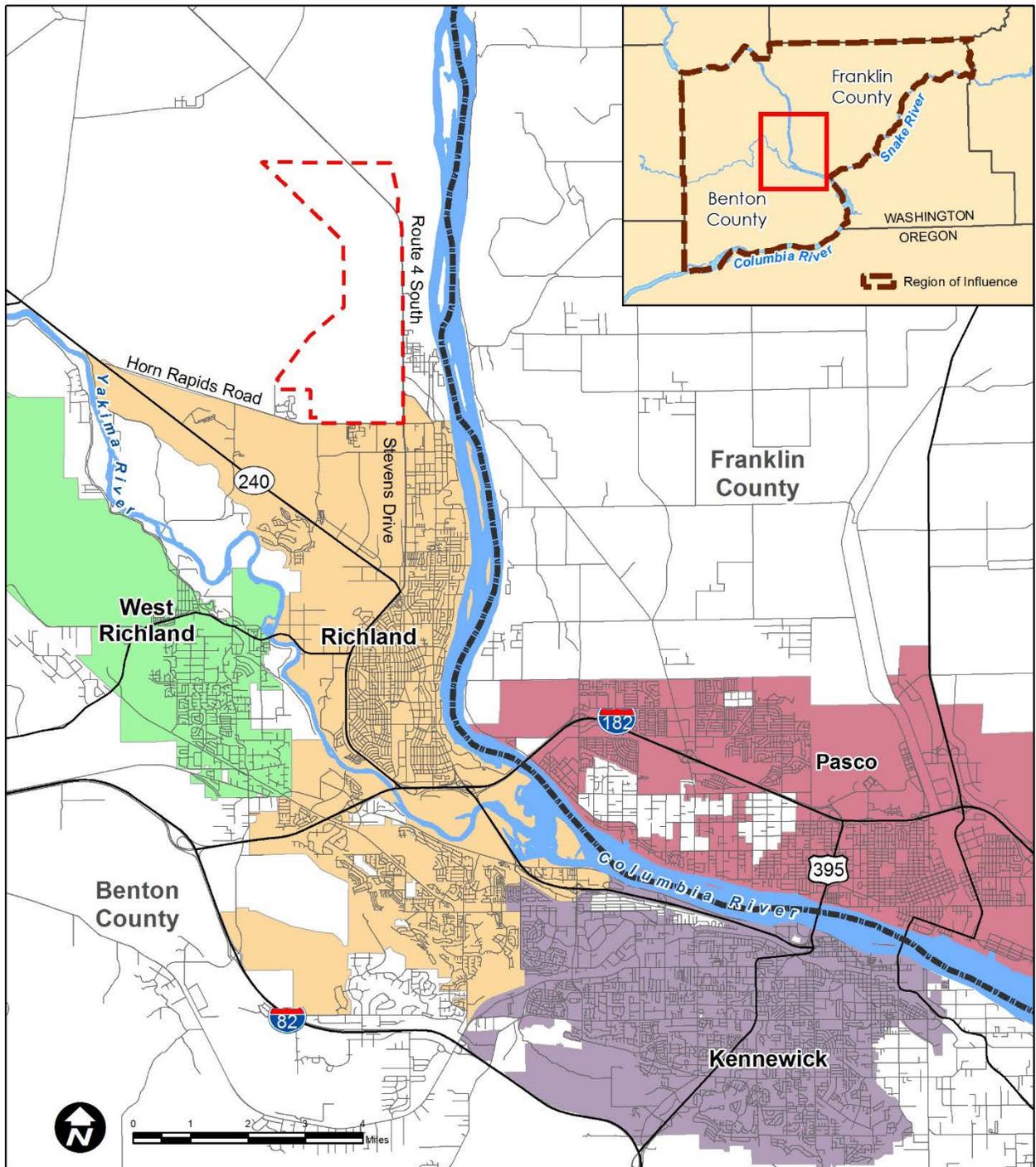
2790 The ROI for socioeconomics and environmental justice comprises Benton and Franklin counties. The  
2791 socioeconomic environment includes regional economic, demographic, housing, and community  
2792 service characteristics that could potentially be affected by the Proposed Action.

2793 The ROI, as shown in **Figure 3-12**, "Socioeconomics and Environmental Justice Region of  
2794 Influence," coincides with the statistical boundaries of the Tri-Cities (Kennewick, Richland, and  
2795 Pasco) metropolitan statistical area (MSA). The Tri-Cities area includes Kennewick, Richland, Pasco,  
2796 West Richland, and unincorporated communities within Benton and Franklin counties. Therefore, the  
2797 Tri-Cities area is the same as Benton and Franklin counties combined. The socioeconomic ROI is  
2798 defined by the areas in which people reside, work, spend their incomes, and use their benefits, thereby  
2799 affecting the social and economic conditions of the region.

2800 Foreseeable future activities analyzed include construction activities that have temporary impacts,  
2801 including expansion of facilities or construction of new facilities at PNNL, and ongoing activities  
2802 (e.g., fuel storage at the K Basins). Other non-DOE activities in the ROI could have longer-term  
2803 impacts. The non-DOE activities analyzed include management of the HRNM and increased  
2804 operations at the Perma-Fix facility. The total projected workers required for these future activities  
2805 would be approximately 3,290 (see **Appendix E**).

2806

**Figure 3-12. Socioeconomics and Environmental Justice Region of Influence**



2807

### 2808 3.13.1 Affected Environment

2809 Activities on the Hanford Site influence the socioeconomics of the Tri-Cities area. The communities  
 2810 surrounding the PA provide the people, goods, and services required by businesses and industries at  
 2811 the Hanford Site. These businesses and industries in turn create the demand for employees, goods,  
 2812 and services and acquire these resources in the form of wages, benefits, and purchases of goods and  
 2813 services.

#### 2814 3.13.1.1 Employment and Income

2815 Based on the 2007–2011 American Community Survey (ACS) data, the Tri-Cities civilian labor force  
 2816 was 118,017 and unemployment rate was 6.6 percent (USCB 2011). In comparison, the 2008–2012  
 2817 ACS data presented in **Table 3-18**, “Employment and Income,” show that the Tri-Cities civilian labor  
 2818 force (122,263) and unemployment rate (7.2 percent) have increased. **Table 3-18** also shows that the  
 2819 Tri-Cities unemployment rate is slightly higher than Benton County (6.7 percent), but lower than  
 2820 Franklin County (8.4 percent) and Washington State (8.9 percent) (USCB 2012). The Tri-Cities has a  
 2821 lower per capita income (\$25,354) than Benton County (\$28,171) and the state (\$30,661), but higher  
 2822 than Franklin County (\$19,073). In comparison, the average salary of a Hanford Site employee hired  
 2823 by the *American Recovery and Reinvestment Act of 2009* (from 2009 to 2011) was approximately  
 2824 \$77,000, not including the cost of benefits provided to the employee (DOE 2013a).

2825

**Table 3-18. Employment and Income**

Area	Civilian Labor Force	Unemployment Rate	Per Capita Income
Benton County	86,369	6.7%	\$28,171
Kennewick	36,010	6.2%	\$24,088
Richland	24,727	5.9%	\$35,119
West Richland	5,835	3.9%	\$31,310
Franklin County	35,894	8.4%	\$19,073
Pasco	27,461	8.7%	\$17,353
Tri-Cities MSA	122,263	7.2%	\$25,354
Washington	3,459,542	8.9%	\$30,661

**Source:** USCB 2012.

2826

2827 The 2008–2012 ACS data presented in **Table 3-19**, “Tri-Cities Area Employment by Industry,” show  
 2828 employment by industry for the Tri-Cities area. As shown in **Table 3-19**, the Tri-Cities workforce is  
 2829 diverse and would be capable of supporting the TMI categories being considered for future  
 2830 development in the FSA. The top three industry sector groups in the Tri-Cities area are  
 2831 (1) educational services, and health care and social assistance; (2) professional, scientific, and  
 2832 management, and administrative and waste management services; and (3) retail trade (USCB 2012).  
 2833 With the exception of the city of Pasco, where agriculture and manufacturing are the second and third  
 2834 top industry sector groups, respectively, these are also the top three industry sector groups in the cities  
 2835 of Richland, West Richland, and Kennewick (USCB 2012). Relative to other cities, Richland and  
 2836 West Richland contain a high percentage of people employed by the professional, scientific,  
 2837 management and administrative, and waste management services industry sector group.

2838

**Table 3-19. Tri-Cities Area Employment by Industry**

Industry	Estimated Labor Force	Percentage of Total Labor Force
Agriculture, forestry, fishing and hunting, and mining	8,996	7.9%
Construction	9,874	8.7%
Manufacturing	9,004	7.9%
Wholesale trade	3,500	3.1%
Retail trade	12,741	11.2%
Transportation and warehousing, and utilities	7,146	6.3%
Information	1,379	1.2%
Finance and insurance, and real estate and rental and leasing	4,339	3.8%
Professional, scientific, and management, and administrative and waste management services	16,831	14.8%
Educational services, and health care and social assistance	21,563	19.0%
Arts, entertainment, and recreation, and accommodation and food services	8,082	7.1%
Other services, except public administration	4,731	4.2%
Public administration	5,263	4.6%

2839 **Source:** USCB 2012.

2840

2841

Since the 1970s, DOE and its contractors have been one of three primary contributors to the local economy (the other two are Energy Northwest and the agricultural community) (DOE 2013c).

2842

2843

According to employee residence records from April 2007, over 90 percent of DOE contract

2844

employees of the Hanford Site lived in Benton and Franklin counties (DOE 2012b). Approximately

2845

73 percent resided in Kennewick, 36 percent in Richland, and 11 percent in Pasco. Residents of other

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areas of Benton and Franklin counties, including West Richland, Benton City, and Prosser, account

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for about 17 percent of total DOE contractor employment (DOE 2012b).

2848

Increasingly, technology-based businesses, many originating due to Hanford Site associations, have a

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role in expanding and diversifying the local private business sector. Some of the major

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technology-based businesses in the Tri-Cities area include PNNL, a research and development

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laboratory, and various food processing businesses including ConAgra Foods and Tyson Foods

2852

(TRIDEC 2014a).

2853

In 2012 the Hanford Site employed 14,900 workers (DOE 2013c). In 2013, PNNL and DOE Pacific

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Northwest Site Office employed an additional 4,380 workers (DOE 2013c).

2855

### 3.13.1.2 Population

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As shown in **Table 3-20**, "Population," the 2012 population estimates for the Benton County and

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Franklin County were 182,398 and 78,163, respectively, which is equal to the population of the

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Tri-Cities MSA (USCB 2012). From 2010 to 2012, the Tri-Cities grew at a faster rate than

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Washington State as a whole.

2860

As of July 2013, approximately 22.6 percent of the Tri-Cities area population had attended college,

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with 8.5 percent of the population holding an associate's degree, 13.5 percent holding a bachelor's

2862

degree, and 7.7 percent holding graduate degrees (TRIDEC 2014b).

2863

**Table 3-20. Population**

Area	2010	2012	Change
Benton County	175,177	182,398	4.0%
Kennewick	73,917	75,971	2.7%
Richland	48,058	51,440	6.6%
West Richland	11,811	12,663	6.7%
Franklin County	78,163	85,845	8.9%
Pasco	59,781	65,398	8.6%
Tri-Cities MSA	253,340	268,243	5.6%
Washington	6,724,543	6,897,012	2.5%

Source: USCB 2012.

### 2864 3.13.1.3 Environmental Justice

2865 Executive Order 12898, “Federal Action to Address Environmental Justice in Minority and  
 2866 Low-Income Populations,” directs federal agencies to identify and address human health or  
 2867 environmental effects of federal actions, which might have disproportionately high and adverse  
 2868 effects on minority populations and low-income populations. U.S. Census Bureau data were used to  
 2869 identify minority populations as Black or African American, American Indian and Alaska Native,  
 2870 Asian, Native Hawaiian and other Pacific Islander, other races, two or more races, and Hispanic or  
 2871 Latino.

2872 Based on the 2008–2012 ACS minority population data presented in **Table 3-21**, “Minority  
 2873 Population,” the population within the Tri-Cities includes approximately 35 percent minority persons,  
 2874 which is less than Franklin County (57 percent), but greater than Benton County and Washington  
 2875 State (25 and 28 percent, respectively) (USCB 2012). The majority of the minority population in the  
 2876 ROI consists of Hispanic and Latino, with other minority populations being relatively low. The  
 2877 Tri-Cities Hispanic and Latino population is 29 percent, which is greater than the statewide  
 2878 population (11 percent) and that of Benton County (19 percent), but lower than in Franklin County  
 2879 (57 percent). The minority population of the Tri-Cities area is most concentrated in the cities of Pasco  
 2880 and Kennewick. As shown on **Figure 3-13**, “Minority Population,” a block group (census tract  
 2881 53005010202, block group 1) with a minority population that is relatively greater (over 29 percent)  
 2882 than that of the PA and the immediately surrounding area, is located adjacent to the southeast corner  
 2883 of the PA. However, the majority of this block group does not include residences. The nearest  
 2884 residences (minority or not) are located within the southern part of census tract 53005010202, block  
 2885 group 1, and almost 2 miles southeast of the PA.

2886 The Council on Environmental Quality recommends that poverty thresholds be used to identify  
 2887 low-income individuals (CEQ 1997). Poverty status is the number of persons with income below the  
 2888 poverty level, defined by the U.S. Census Bureau as \$11,720 annual income or less for an individual  
 2889 in 2012.

2890

**Table 3-21. Minority Population**

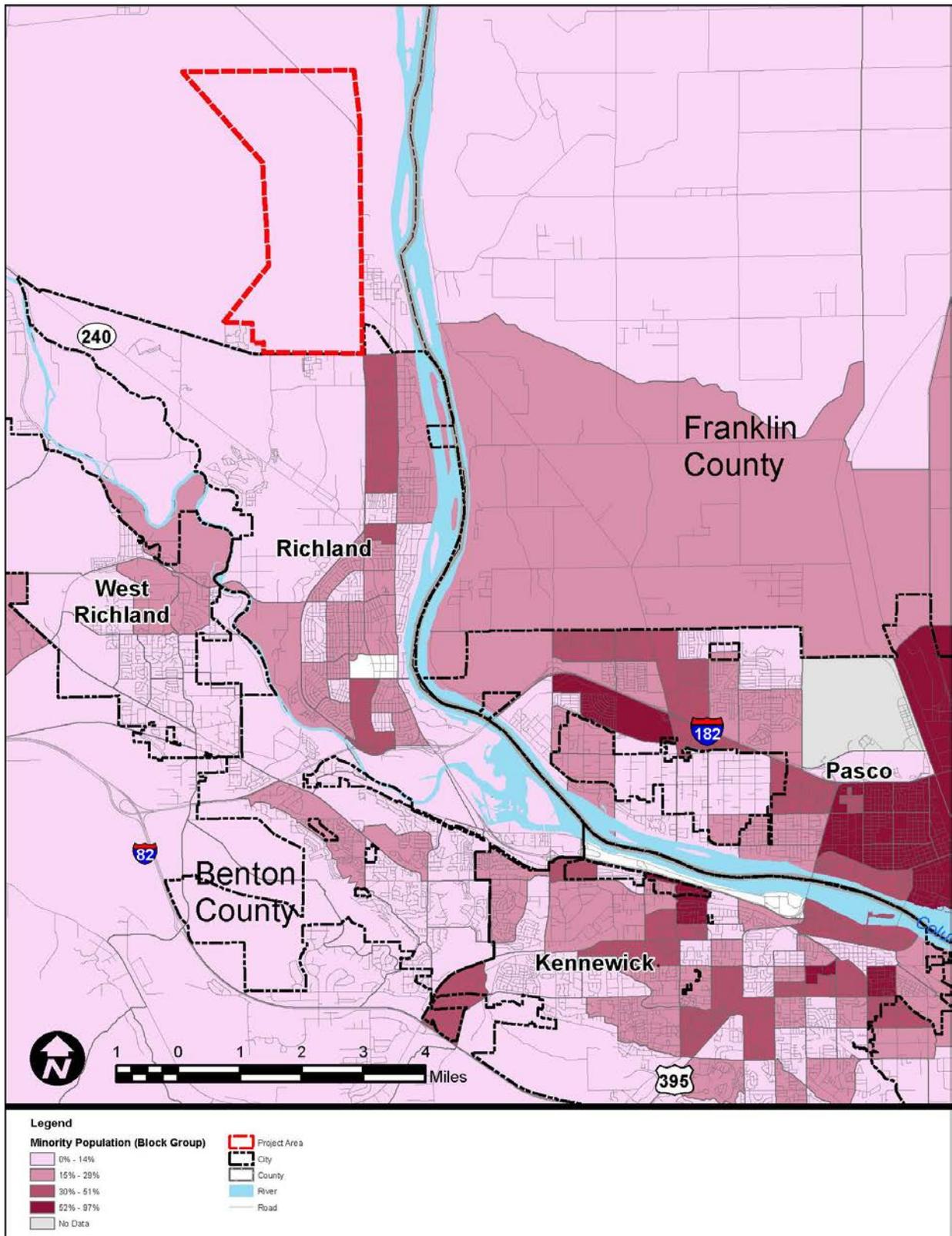
Area	Total Population	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some Other Race	Two or More Races	Hispanic or Latino	Total Minority
Benton County	175,424	75%	1%	1%	3%	0%	0%	2%	19%	25%
Kennewick	73,640	68%	2%	1%	3%	0%	0%	2%	25%	32%
Richland	48,556	82%	2%	1%	5%	0%	0%	3%	7%	18%
West Richland	11,904	88%	0%	1%	0%	0%	0%	2%	8%	12%
Franklin County	78,680	43%	2%	1%	2%	0%	0%	1%	51%	57%
Pasco	60,024	38%	2%	0%	2%	0%	0%	1%	57%	62%
Tri-Cities MSA	254,104	65%	1%	1%	2%	0%	0%	2%	29%	35%
Washington	6,738,714	72%	3%	1%	7%	1%	0%	4%	11%	28%

Source: USCB 2012.

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2892

Figure 3-13. Minority Population



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2895 Based on the 2008–2012 ACS poverty population data presented in **Table 3-22**, “Population Below  
 2896 Poverty Level,” approximately 16 percent of individuals within the Tri-Cities MSA are below poverty  
 2897 level (USCB 2012). By comparison, Benton County and Washington State have fewer individuals  
 2898 below the poverty level, with 13 percent. In Franklin County, 22 percent of individuals are below the  
 2899 poverty level. The low-income population of the Tri-Cities MSA is most concentrated in the cities of  
 2900 Pasco and Kennewick with some additional rural concentrations in unincorporated Franklin County.  
 2901 As shown on **Figure 3-14**, “Populations Living at or Below Poverty Level,” block groups with  
 2902 populations with relatively greater concentrations of poverty (over 20 percent) than that of the PA and  
 2903 surrounding area, are located over 2 miles from the PA.

2904

**Table 3-22. Population Below Poverty Level**

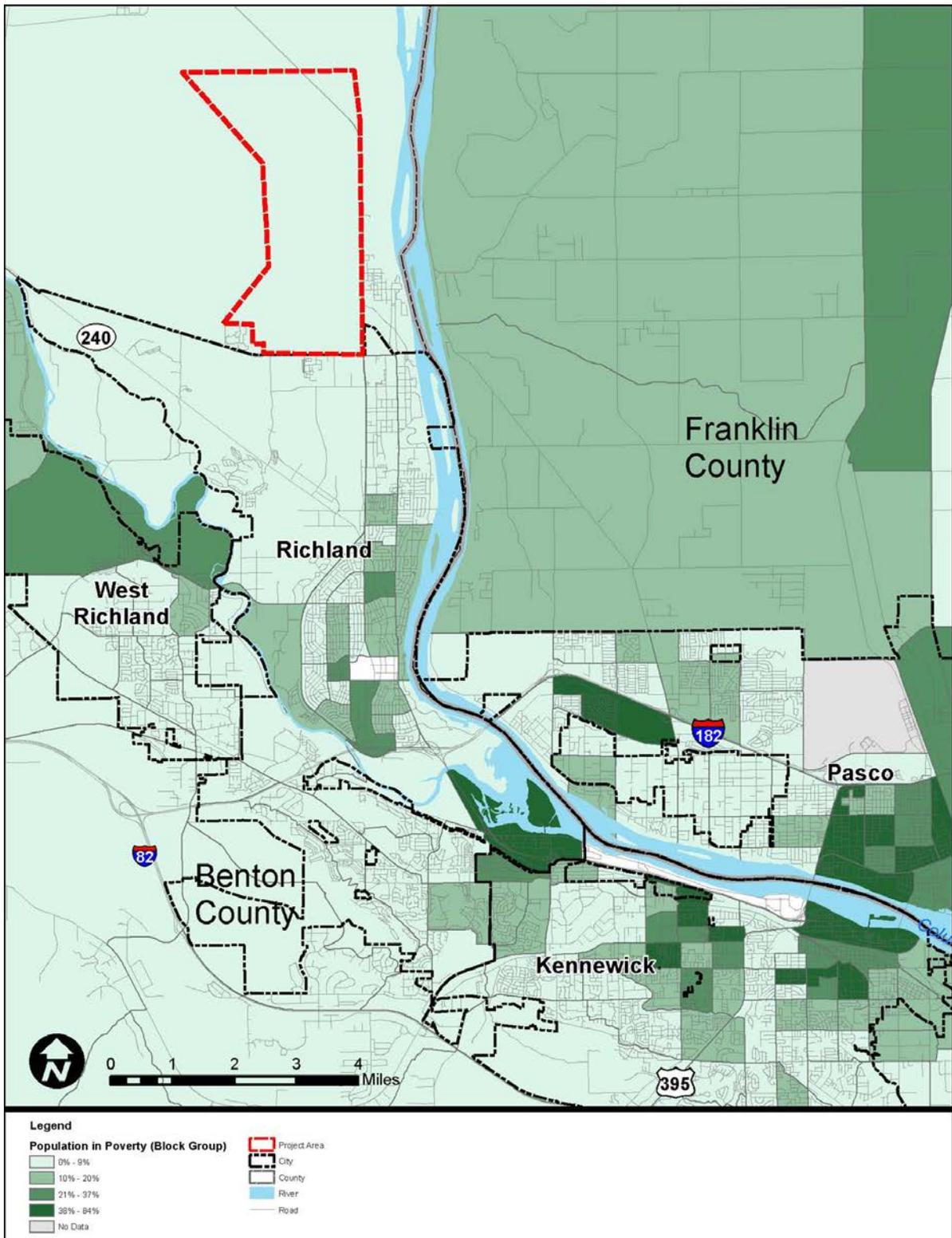
Area	Population Below Poverty Level
Benton County	13%
Kennewick	18%
Richland	9%
West Richland	10%
Franklin County	22%
Pasco	23%
Tri-Cities MSA	16%
Washington	13%

**Source:** USCB 2012.

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Figure 3-14. Populations Living at or Below Poverty Level



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2908 **3.13.1.4 Housing**

2909 **Table 3-23**, “Housing,” shows that there are 5,974 vacant housing units in the Tri-Cities, with a  
 2910 vacancy rate of 6.4 percent.

2911

**Table 3-23. Housing**

Area	Total Housing Units	Vacant Housing Units	Vacancy Rate
Benton County	68,896	4,236	6.1%
Kennewick	28,760	1,860	6.5%
Richland	20,860	1,421	6.8%
West Richland	4,282	155	3.6%
Franklin County	24,585	1,738	7.1%
Pasco	18,574	1,189	6.4%
Tri-Cities MSA	93,481	5,974	6.4%
Washington	2,884,186	264,191	9.2%

**Source:** USCB 2012.

2912

2913 **3.13.1.5 Community Services**

2914 Community services in the Tri-Cities include public schools and medical and emergency services.  
 2915 There are three public school districts (Kennewick, Richland, and Pasco). The Kennewick School  
 2916 District has 14 elementary schools, 4 middle schools, and 3 high schools. During the 2013–2014  
 2917 school year, the school district had a total student enrollment of 16,772 and a teacher-to-student ratio  
 2918 of 1 to 19 (OSPI 2015). The Richland School District has nine elementary schools, three middle  
 2919 schools, and two high schools. During the 2013–2014 school year, the school district had a total  
 2920 student enrollment of 12,136 and a teacher-to-student ratio of 1 to 21 (OSPI 2015). The Pasco School  
 2921 District has 12 elementary schools, 3 middle schools, and 4 high schools. During the 2013–2014  
 2922 school year, the school district had a total student enrollment of 16,582 and a teacher-to-student ratio  
 2923 of 1 to 16 (OSPI 2015).

2924 There are four hospitals located in the Tri-Cities, which have a total of 431 beds and 829 staff  
 2925 physicians (TRIDEC 2014b). Emergency services within Benton County include Kennewick Police  
 2926 and Fire; Richland Police and Fire; West Richland Police; Benton County Sheriff’s Office; and  
 2927 Benton County Fire Protection Districts 1, 2, and 4. Emergency services within Franklin County  
 2928 include Franklin County Sheriff’s Office; City of Pasco police, fire, and emergency medical service;  
 2929 Franklin County Fire Districts 1, 2, 3, 4, and 5; and City of Connell Police and Fire.

2930 **3.13.2 Environmental Consequences**2931 **3.13.2.1 No Action Alternative**

2932 Under the No Action Alternative, there would be no construction- or operation-related employment.  
 2933 As no new jobs would be created, there would be no related increase in annual per capita income and  
 2934 the local tax base of the Tri-Cities area. There would be no impacts to population, housing  
 2935 availability, or community services. As there would be no impacts to members of the public in  
 2936 general, there would be no disproportionately high effects on human health or environmental impacts  
 2937 to minority or low-income populations.

2938 **3.13.2.2 Proposed Action**2939 **Construction**

2940 Construction of all the single-phase representative facilities (see **Table 2-1**) in the FSA  
2941 simultaneously would employ approximately 150 to 350 construction workers over an 18-month  
2942 construction period. Construction of the multi-phased development would employ fewer construction  
2943 workers (6 to 75 in total) but those positions would last much longer due to the long-term, 20-year  
2944 planning horizon. Construction of the solar farm would employ 166 construction workers per month  
2945 over a 12-month construction period. Construction would likely result in indirect and induced  
2946 economic benefits through construction-related and employee spending on regional goods and  
2947 services. The number of workers for this analysis are rounded and derived from the identified or  
2948 estimated numbers for the representative facilities (see **Appendix E, Table E-2**). The corresponding  
2949 construction worker numbers for the air quality analysis is different because of the modeling  
2950 calculation assumptions (see **Section 3.3**).

2951 Most construction jobs would likely be filled from within the Tri-Cities labor force, resulting in a  
2952 short-term economic benefit. In addition, construction of the new facilities would likely result in  
2953 indirect and induced employment through increased business and construction worker spending on  
2954 regional goods and services. Some workers may be hired from outside of the Tri-Cities to fill more  
2955 specialized positions.

2956 As the majority of the work force would likely already reside in the Tri-Cities area, there would be  
2957 limited influx of people during construction, and short-term impacts to population, housing, or  
2958 community services. Infrastructure improvements (e.g., new utilities and fire/ambulance services)  
2959 required for the new facilities would be provided incrementally and maintained by the City of  
2960 Richland. The ability of existing utilities and public services to accommodate public needs would not  
2961 be affected.

2962 **Operation**

2963 Industry development within the FSA is estimated to result in 50 to 1,500 new jobs for the  
2964 single-phase and 2,530 new jobs for the multi-phase, increasing the annual per capita income and the  
2965 local tax base of the Tri-Cities area. Solar farm development is estimated to result in six or seven new  
2966 jobs that would also provide annual incomes and contribute to the local tax base (see **Appendix E,**  
2967 **Table E-2**). Additionally, developing the FSA would likely result in indirect and induced  
2968 employment through increased business and employee spending on regional goods and services.

2969 Jobs would primarily be filled from within the Tri-Cities labor force, resulting in a long-term  
2970 economic benefit to the Tri-Cities area. There may be a small number of specialized workers that  
2971 move into the area, resulting in minor increases in population levels. Based on 2008–2012 ACS  
2972 employment estimates, the total impact of direct employment could increase the Tri-Cities current  
2973 employment level by 2 to 4 percent. Indirect and induced employment would further increase  
2974 employment in the Tri-Cities.

2975 As there are 5,974 vacant housing units in the Tri-Cities (USCB 2012; see **Table 3-23**), there would  
2976 be adequate housing to accommodate a minor influx of new workers moving into the area.  
2977 Community services, including schools and emergency services, are also adequate to accommodate  
2978 the small population increase.

2979 **Environmental Justice**

2980 This EA has not identified any human health or environmental impacts that would adversely affect  
 2981 minority or low-income populations. The Proposed Action would not result in disproportionately high  
 2982 and adverse effects on minority or low-income populations.

2983 **3.13.3 Mitigation Measures**

2984 Because there would be no impacts, mitigation measures would not be required for the  
 2985 socioeconomics and environmental justice topics.

2986 **3.13.4 Unavoidable Adverse Impacts**

2987 There are no unavoidable adverse impacts for socioeconomics and environmental justice.

2988 **3.14 Human Health and Safety**2989 **3.14.1 Affected Environment**

2990 The ROI for human health and safety is the PA and surrounding areas. The Hanford Site is  
 2991 undergoing a large scale cleanup effort to reduce the risk of impacts on the health of public and the  
 2992 environment. During this cleanup effort, hazardous and radioactive materials will either be placed in a  
 2993 stabilized condition or removed from the site.

2994 **3.14.1.1 Radiological**2995 **United States Background Radiation**

2996 Major sources and average levels of exposure to natural background radiation and other non-site  
 2997 related sources to individuals are shown in **Table 3-24**, “Natural Background and Other Radiological  
 2998 Doses Unrelated to Hanford Operations.”<sup>19</sup> The average annual dose from these sources is  
 2999 approximately 620 millirem. The annual dose from natural background sources is approximately  
 3000 310 millirem. This dose can vary depending on geographic location, individual buildings in the  
 3001 geographic area, or age, but is essentially all from cosmic or terrestrial sources. Another source of  
 3002 annual public exposure to radiation is from medical exposure (approximately 300 millirem), including  
 3003 computed tomography, fluoroscopy, X-rays, and nuclear medicine for diagnosis and treatment. An  
 3004 additional source of exposures to the public is approximately 15 millirem from consumer products  
 3005 and other sources (e.g., nuclear power, security, and research) (NCRP 2009). All doses identified in  
 3006 **Table 3-24** are unrelated to Hanford Site operations.

3007 **Table 3-24. Natural Background and Other Radiological Doses Unrelated to Hanford**  
 3008 **Operations**

Source	Effective Dose Equivalent (millirem/yr) <sup>a</sup>
Natural background radiation	310
Medical exposure	300
Consumer, industrial, and other	15
<b>Total (rounded)</b>	<b>620</b>

3009 **Source:** NCRP 2009 <sup>a</sup>Averages for the United States.

<sup>19</sup> Average doses from background radiation in the Hanford vicinity are assumed to approximate the average dose to an individual in the United States population.

3010 **Hanford Site Radiation Sources and Background Levels**

3011 *Background Radiation Levels in the Hanford Area*

3012 The report *Hanford Site Background: Part 2, Soil Background for Radionuclides* (DOE 1996b)  
 3013 documents radioactivity levels found in various soils, as well as the vadose zone, from other  
 3014 worldwide activities.<sup>20</sup> Over the years, manmade (anthropogenic) background activity associated with  
 3015 other worldwide activities (fallout from weapons testing) has been mostly limited to measureable  
 3016 amounts of strontium-90, cesium-137, plutonium-239, and plutonium-240 in soils. Other manmade  
 3017 nuclides, such as cobalt-60 and europium-154 were considered in establishing background levels, but  
 3018 were found to be below measureable levels. The nuclides (manmade and naturally occurring)  
 3019 evaluated, along with their associated concentrations and statistical confidence of their presence, are  
 3020 shown in **Table 3-25**, “Background Soil Activity Concentrations.”

3021 **Table 3-25. Background Soil Activity Concentrations**

Analyte	Background Soil Activity (pCi/g)	
	Mean	Standard Deviation
Potassium-40	13.1	2.71
Cobalt-60	0.00132	0.00591
Strontium-90	0.0806	0.0688
Cesium-137	0.417	0.338
Europium-154	0.000826	0.0250
Europium-155	0.0234	0.0184
Radium-226	0.561	0.202
Thorium-232	0.945	0.260
Uranium-234	0.793	0.233
Uranium-235	0.0515	0.0373
Uranium-238	0.763	0.216
Plutonium-238	0.00158	0.00332
Plutonium-239/240	0.00935	0.00782
<b>Total</b>	<b>19.8</b>	<b>2.40</b>

3022 **Key:** pCi/g = picocuries (of radioactivity) per gram (of soil).

3023 **Source:** DOE 1996b.

3024

3025 Vadose zone activity levels proximal to the FSA have likewise been characterized in terms of the  
 3026 presence of nuclides found in soils across the site. As with the case of the soils, a combination exists  
 3027 of manmade, and naturally occurring nuclides within the vadose zone. Subject isotopes, along with  
 3028 their associated concentrations, are shown in **Table 3-26**, “Background Vadose Zone Activity  
 3029 Concentrations.”

3030

<sup>20</sup> The vadose zone is the unsaturated zone of the subsurface soils, where the spaces are not consistently and completely filled with groundwater.

3031

**Table 3-26. Background Vadose Zone Activity Concentrations**

Analyte	Background Vadose Zone Activity (pCi/g) <sup>a</sup>	
	Mean	Standard Deviation
Potassium-40	16.1	1.87
Cesium-137	-0.00130	0.0204
Europium-152	0.0194	0.0529
Europium-154	-0.0340	0.0861
Europium-155	0.0730	0.0700
Radium-226	0.653	0.102
Thorium-232	0.912	0.164
Thorium-238	1.27	0.210
Uranium-234	0.741	0.240
Uranium-235	0.0383	0.0473
Uranium-238	0.794	0.251

3032

<sup>a</sup>Based on measurements taken at sampling location Hanford Environmental Information System #BOC2W8.

3033

**Key:** pCi/g = picocuries (of radioactivity) per gram (of soil).

3034

**Source:** DOE 1996b.

3035

Doses associated with these background activity concentrations were estimated using the RESRAD (Residual Radioactivity) dose modeling program (DOE 1996b; ANL 2001). A conservative calculation of background dose from radionuclide data requires a detailed set of assumptions concerning exposure pathways, potential biological damage (i.e., quality factors), and other aspects of exposure for each radionuclide. The doses are evaluated based on a conservative, hypothetical residential scenario (versus proposed industrial use), which includes external exposure; inhalation of fugitive dust; inhalation of radon; ingestion of plants, meat, and milk produced on typical Hanford soil; and incidental ingestion of the soil itself. Such a residential exposure scenario (excluding ingestion of groundwater and fish) was used to generate associated dose estimates, resulting in a conservative sitewide total background dose of 97 millirem/year, as presented in **Table 3-27**, “RESRAD-Modeled Doses Derived from Background Concentrations,” with only nuclides of discernible dose contribution included (DOE 1996b). In summary, the greatest contributor to dose from background radionuclides was from the naturally occurring radon pathway, with only background levels of cesium-137 and strontium-90 noticeably contributing to dose from the domain of potential sources. It should be noted for consistency that this value is comparable to the 85 and 83 millirem/year background levels recently measured at the southern 600 Area and 618-10 burial grounds, respectively, via the Hanford Site environmental surveillance program (MSA 2015a; DOE 2014b; DOE 1996b).

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**Table 3-27. RESRAD-Modeled Doses Derived from Background Concentrations**

Analyte	Mean (millirem/yr)	Standard Deviation (millirem/yr)
Potassium-40	27.0	5.6
Strontium-90	0.49	0.42
Cesium-137	1.45	1.21
Radium-226 + daughter nuclides	45.5	16.4
Thorium-232 + daughter nuclides	22.0	6.04
Uranium-234	0.19	0.056
Uranium-235	0.045	0.032
Uranium-238	0.26	0.073
<b>Total</b>	<b>96.9</b>	<b>29.8</b>

Source: DOE 1996b.

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### *Sitewide Operations*

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Releases of radionuclides to the environment from Hanford operations provide a source of radiological exposure to members of the public in the vicinity of Hanford. A hypothetical maximally exposed individual (MEI) is a person whose place of residence and lifestyle make it unlikely that any other member of the public would receive a higher radiation dose from Hanford operational releases. This person is assumed to be exposed to radionuclides in the air and on the ground from Hanford emissions, ingestion of food grown downwind from Hanford and irrigated with water from the Columbia River downstream from Hanford, ingestion of fish from the Columbia River, and exposure to radionuclides in the river and on the shoreline during recreation. The annual dose to this MEI has ranged from about 0.1 to 0.2 millirem over the last 5 years, with this individual typically being located at the PNNL Physical Sciences Facility on Horn Rapids Road along the Hanford Site's southeastern boundary (DOE 2014b). Individuals within the FSA would be expected to receive in the same range of dose as the MEI, or less. Historically, there have been no distinct emissions generated within the FSA that have discernibly contributed to offsite public doses.

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In summary, doses to the public from the greater Hanford Site operations fall well within the limits established in 40 CFR 61, Subpart H (10 millirem/year from airborne sources) and DOE O 458.1, *Radiation Protection of the Public and the Environment*, Change 3 (DOE 2011; 100 millirem/year from all sources), and are much lower than those due to natural background radiation. In general, airborne emissions of tritium and radon-220 from the 300 Area, along with uranium-234 and uranium-238 effluents via the Columbia River, account for the vast majority of calculated dose to the MEI for the greater Hanford Site (DOE 2014b).

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### **Radiological Clearance of Land**

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Per DOE O 458.1 (DOE 2011), DOE's maximum allowable administrative (or "authorized") limit for permitting radiological clearance of lands (i.e., "real" property) to the proposed industrial workforces is 25 millirem/year. This dose limit would principally be applicable to upcoming construction and operational workforces within the FSA. Although the intended use of the FSA is industrial, DOE O 458.1 was developed to address three separate potential receptor scenarios: the intended industrial use, the low-probability use of land by a resident farmer, and the potential dose to biota (vegetation and wildlife). Soil concentration limits (authorized limits) were developed to meet the requirements of DOE O 458.1. The soil concentration values were also derived to ensure that individual doses are less than 25 millirem/year. As such, associated activity concentration administrative limits for each nuclide have been constructed to maintain compliance with the dose

3088 limiting criteria of DOE O 458.1; these are provided in **Table 3-28**, “Administrative (Authorized)  
 3089 Activity Concentration Limits to Assure Compliance with DOE O 458.1.” These values, as  
 3090 determined in the *Final Report on the Radiological Clearance of Land in the Southern 600 Area of*  
 3091 *the Hanford Site* (MSA 2015b), are the highest activity concentrations permissible for each  
 3092 radionuclide for maintaining associated dose compliance with the limits discussed above.

3093 **Table 3-28. Administrative (Authorized) Activity Concentration Limits to Assure Compliance**  
 3094 **with DOE O 458.1**

Nuclide	Administrative Limit (pCi/g soil)
Americium-241	1,400
Cobalt-60	11
Cesium-137	21
Plutonium-239/240	1,600
Strontium-90	23
Uranium-234	690
Uranium-235	200
Uranium-238	690

3095 **Key:** pCi/g = picocuries (of radioactivity) per gram (of soil).

3096 **Source:** MSA 2015b.

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### 3098 3.14.1.2 Chemical

3099 Administrative and design controls are regularly implemented at the Hanford Site to reduce hazardous  
 3100 chemical releases to the environment and to help achieve compliance with permit requirements  
 3101 (e.g., air emission permits). Baseline studies are also regularly performed to estimate the highest  
 3102 existing onsite and offsite concentrations, as well as the highest concentrations to which nearby  
 3103 workforces and members of the public could potentially be exposed. Hazardous chemical  
 3104 concentrations routinely remain in compliance with applicable regulatory guidelines.

### 3105 3.14.2 Environmental Consequences

#### 3106 3.14.2.1 No Action Alternative

3107 Under the No Action Alternative, no associated changes to human health impacts would be expected  
 3108 compared to the baseline public health impacts that are regularly assessed and provided in the  
 3109 Hanford Site annual environmental reports. The estimated total annual dose to an MEI would be  
 3110 expected to remain within the range seen in recent years (approximately 0.1 to 0.2 millirem) from all  
 3111 Hanford Site and surrounding vicinity sources, with the likely location of this individual remaining at  
 3112 the PNNL Physical Sciences Facility along Horn Rapids Road. Similarly, as discussed in further  
 3113 detail in **Section 3.14.2.2**, the dose to a member of the public within the FSA, from any potential  
 3114 Hanford residual radioactive material, would be less than 1 millirem/year. This conclusion is  
 3115 supported by the results of recent soil sampling and the gamma scanning described in the *Final*  
 3116 *Report on the Radiological Clearance of Land in the Southern 600 Area of the Hanford Site*  
 3117 (MSA 2015b).

3118 These determinations are further substantiated by the conclusions drawn in *Historical Site Assessment*  
 3119 *(HSA) – Hanford Southern 600 Area* (MSA 2015a), which projected that because the Hanford Site  
 3120 has long since ceased plutonium production activities, the primary sources for potential future  
 3121 airborne radioactivity at the southern 600 Area will be limited to (1) remediation, or other activities  
 3122 such as construction and excavation; (2) the Columbia Generating Station, although as previously

3123 discussed, the potential source term would be low (both due to the facility's location [to the  
3124 northeast]); and (3) low emissions from the nearby AREVA and Perma-Fix facilities (MSA 2015a).

### 3125 **3.14.2.2 Proposed Action**

#### 3126 **Radiological Clearance Survey**

3127 Under DOE O 458.1 (DOE 2011), in order for DOE lands to be transferred to the public domain for  
3128 commercial development, a series of radiological clearance surveys must first be performed to  
3129 measure the radiological conditions of such lands in order to determine whether they qualify for  
3130 release to the public. The *Final Report on the Radiological Clearance of Land in the Southern 600*  
3131 *Area of the Hanford Site* (MSA 2015b) was prepared to comply with DOE O 458.1. Emphasis and  
3132 evaluation was placed primarily upon the FSA. The survey process consisted of performing  
3133 radiological measurements, analyzing the data in regards to the administrative limits, and drawing  
3134 conclusions based on the results.

3135 The clearance survey report (MSA 2015b), has four distinct components: soil sampling,  
3136 gamma-scanning surveys, land feature surveys, and an as low as reasonably achievable (ALARA)  
3137 assessment. A summary of the results for each component is provided below.

3138 **Soil Sampling.** Overall, the soil sampling results indicated only a small fraction of the administrative  
3139 limit (approximately 1 percent of the limit). A value of 1 percent is deemed equivalent to an estimated  
3140 dose of 0.25 millirem/year (a value of "1" equates to the 25 millirem/year administrative limit). It is  
3141 concluded that radionuclide concentrations in southern 600 Area soils (e.g., the FSA) are at or near  
3142 natural background levels (MSA 2015b).

3143 **Gamma-Scanning Surveys.** Six areas within the FSA were chosen to perform a direct gamma scan.  
3144 The scans focused on the principal nuclides cesium-137, cobalt-60, americium-241, and  
3145 protactinium-234m. Results of the direct gamma scans were near background and a small fraction of  
3146 the authorized limits.

3147 **Land Feature Surveys.** During site reconnaissance of the PA, many features were observed, such as  
3148 old trash piles, holes in the ground, pipe protruding from the ground, buckets, and cans. Almost all of  
3149 these features found within the three separate survey units were benign. Although none showed an  
3150 obvious risk of potential radioactive contamination, a few were considered to have a higher  
3151 contamination risk than others. In the interest of prudence, a set of 12 features was chosen for a  
3152 confirmatory radiological survey using hand-held instruments and normal survey methods. The  
3153 results showed no indication of man-made radioactivity in or on any of these land features  
3154 (MSA 2015b).

3155 **ALARA Assessment.** An ALARA assessment was made to determine if the clearance of land with  
3156 current levels of potential contamination (however small) meets the ALARA principle. The  
3157 assessment concluded that, since the radioactivity levels in the soil have been found to be at or near  
3158 background levels, the radiological clearance of the land meets the ALARA principle (MSA 2015b).

#### 3159 **Clearance Survey Summary**

3160 The clearance survey resulted in the following overarching conclusions:

- 3161 • Man-made radioactivity levels in the soil in the three survey units are below 1 percent of the  
3162 authorized limits.
- 3163 • There are no elevated areas found from the gamma scans.

- 3164 • There is little chance of any radioactivity above background on any artifacts or other land  
3165 features found in the three survey units.
- 3166 • The man-made radioactivity level in the soil in the three survey units is at or near background  
3167 levels.
- 3168 • The dose to an industrial worker on this land from Hanford residual radioactivity will be less  
3169 than 1 millirem/year.

#### 3170 *Other Potentially Contributing Sources*

3171 Potential dose contributions to members of the public (e.g., FSA industrial workers) may be exposed  
3172 from non-Hanford sources (e.g., facility emissions). Non-Hanford-related potential sources of  
3173 radiological exposure include the US Ecology commercial LLW disposal site; AREVA, a nuclear fuel  
3174 fabrication plant; Perma-Fix, a commercial LLW treatment and a commercial decontamination  
3175 facility, and Columbia Generating Station operated by Energy Northwest, a commercial nuclear  
3176 power plant. The radiation dose to a member of the public on the FSA would not be expected to  
3177 exceed 0.004 millirem per year from all but Energy Northwest (DOE 2012b). In addition, an  
3178 individual would not be expected to incur a dose greater than 0.0054 millirem from operations at the  
3179 nearby Columbia Generating Station. These contributory doses would remain well within the limits  
3180 established in 40 CFR 61, Subpart H and DOE O 458.1 (DOE 2011).

#### 3181 **Chemical**

3182 As stated in **Section 3.14.1.2**, administrative and design controls will continue to be regularly  
3183 implemented at the Hanford Site to reduce hazardous chemical releases to the environment and to  
3184 help achieve compliance with permit requirements (e.g., air emission permits). Baseline studies  
3185 would continue to be regularly performed to estimate the highest existing onsite and offsite  
3186 concentrations, as well as the highest concentrations to which nearby workforces and members of the  
3187 public could potentially be exposed.

#### 3188 **Accident Impacts**

3189 The following discussion provides a summary of the accident impacts described in more detail in  
3190 **Appendix F**.

3191 DOE evaluated its facilities to determine potential accident risks to the FSA. Buildings 324 and 325  
3192 were determined to be the facilities with the highest risk potential to the FSA. Buildings 324 and 325  
3193 are located approximately 600 meters east of the FSA, and both buildings contain radioactive material  
3194 that could be released under certain accident scenarios.

3195 Building 324, a three-story building that covers approximately 102,000 square feet, was used between  
3196 1965 and 1996 to support research and development activities associated with material and chemical  
3197 processing. DOE has been preparing for the demolition of Building 324 by stabilizing and preparing  
3198 for the removal of five highly contaminated hot cells. The cells were built to allow Hanford personnel  
3199 to work with highly radioactive materials without being exposed to significant levels of radiation. The  
3200 greatest level of contamination is beneath a two-story hot cell.

3201 The bounding accident scenario evaluated for Building 324 is an elevated spill of contaminated  
3202 powder in a hot cell (WCH 2014). This accident could only occur during future remediation of the  
3203 Building 324. The building's structure and filtration system would reduce releases from the accident.  
3204 Based on a series of conservative assumptions, the estimated dose from this accident at the eastern  
3205 edge of the FSA (approximately 600 meters west of Building 324) is 0.18 rem (180 millirem).  
3206 Factoring in the estimated frequency of a spill (0.1 per year), the dose equivalent risk associated with

3207 this accident is 0.018 rem per year (18 millirem per year). DOE expects that any actual exposure from  
3208 the accident would result in a lower dose and risk.

3209 Building 325, a two-story building that covers approximately 65,000 square feet, also known as the  
3210 Radiochemical Processing Laboratory (RPL), was originally designed to provide space for  
3211 radiochemical research to support Hanford projects and programs. Today, the RPL remains a fully  
3212 operational facility of the PNNL where scientists and engineers conduct research related to national  
3213 missions in environmental management, nuclear energy, nuclear nonproliferation, homeland-security,  
3214 and science. RPL's underlying mission is to create and implement innovative processes in support of  
3215 national priority areas. Some of the work taking place at the RPL involves advancements in the  
3216 cleanup of radiological and hazardous wastes, processing and disposal of nuclear fuels, detection and  
3217 forensics of nuclear material, and production and delivery of medical isotopes.

3218 The bounding accident scenario for Building 325 is an unfiltered, ground-level seismic event, which,  
3219 based on conservative assumptions, could result in an estimated dose near the eastern edge of the FSA  
3220 (approximately 587 meters northwest of Building 325) of 11.1 rem (1,100 millirem). This has an  
3221 estimated probability of 0.01 per year or lower, resulting in an annual dose equivalent risk of  
3222 0.11 rem (110 millirem) (PNNL 2014). DOE expects that actual exposure from the postulated  
3223 accident would result in a lower dose and risk.

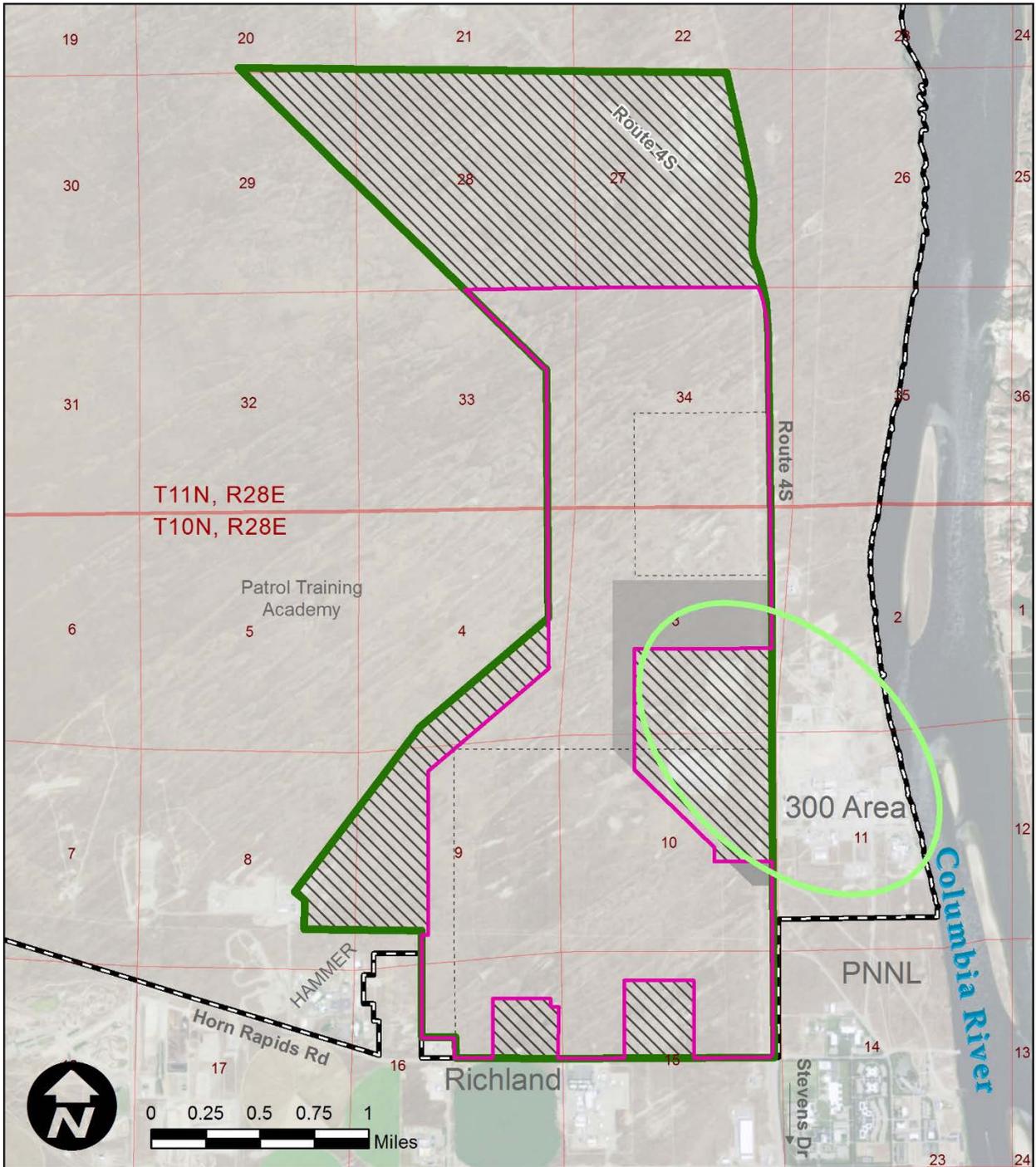
3224 The analysis of this seismic event also identifies the area over which exposures could exceed 5 rem.  
3225 A portion of this area overlaps the FSA and cannot be conveyed as unrestricted public access. As  
3226 discussed in **Appendix F**, DOE would designate this portion of the land a controlled area and  
3227 maintain it within the PAAL to ensure protection of the public. The subject controlled area would be  
3228 comprised of a total of 188 acres (see **Figure 3-15**, "DOE-Controlled Area and the Maximally  
3229 Exposed Individual Boundary").

3230 A discussion of nominal latent cancer fatality (LCF) probabilities for postulated accidents at the  
3231 Buildings 324 and 325 is presented in **Appendix F** at **Section F.3**. The LCF probabilities assume  
3232 location of an individual in the DOE-controlled area, which would not be transferred from federal  
3233 ownership. The calculated LCFs range from  $1.1 \times 10^{-4}$  to  $6.7 \times 10^{-3}$  for the various postulated  
3234 accidents considered. The LCF probabilities for individuals within the FSA would be smaller due to  
3235 distance from the Buildings 324 and 325, increased atmospheric dispersion of any release, and  
3236 application of emergency response procedures such as evacuation or shelter in place. See **Appendix F**  
3237 at **Section F.3** for more details.

3238 As the accident doses are within the DOE-controlled areas and meet applicable nuclear safety  
3239 protocols, no explicit calculation of potential dose was calculated spanning across the FSA. However,  
3240 calculated doses from both 324 and 325 Buildings will diminish across the FSA due to atmospheric  
3241 dispersion.

3242

**Figure 3-15. DOE-Controlled Area and the Maximally Exposed Individual Boundary**



**Legend**

- Project Area – 4,413 acres
- Focused Study Area – 2,474 acres
- DOE Controlled Area (PAAL) – 188 Acres
- TRIDEC Land Request – 1,641 acres
- Land Not Suitable For Conveyance
- Hanford Site
- Building 325 Maximally Exposed Individual Boundary

3243

**3.14.3 Emergency Preparedness**

3244  
3245 As required by law, DOE orders and policies, Hanford has established a comprehensive emergency  
3246 management program that provides detailed, hazard-specific planning and preparedness measures to  
3247 protect worker and public health and safety, and the environment in the event of an emergency at the  
3248 Hanford Site. Following implementation of the Proposed Action to transfer FSA lands to TRIDEC,  
3249 DOE and the local and state agencies responsible for performing the function of emergency  
3250 management would apply the same emergency planning and response actions to members of the  
3251 public in the conveyed lands as applied to the population at large.

3252 DOE maintains the *Hanford Emergency Management Plan* (DOE 2010), which addresses the full  
3253 scope of emergencies that may occur at the Hanford Site. These potential emergencies include  
3254 building and range fires, earthquakes, accidental releases of radiological and toxicological materials  
3255 from Hanford contractor-operated facilities and transportation incidents, and other external events.

3256 Predetermined protective actions are developed in accordance with the *Hanford Emergency*  
3257 *Management Plan* (DOE 2010). Protective actions are taken to preclude or reduce the exposure of  
3258 individuals following an accidental release at the Hanford Site. Emergencies at site facilities may  
3259 require actions only on the Hanford Site or may also affect offsite areas. Emergency planning zones  
3260 are designated areas, based on hazards assessments, in which predetermined protective actions may  
3261 be required. DOE develops emergency planning zones, as determined necessary by hazard  
3262 assessments, and submits them to affected states and counties for their use in emergency planning.

3263 The predetermined protective actions include the following:

- 3264 • Methods for providing timely protective action recommendations, such as sheltering,  
3265 evacuation, and relocation, to appropriate offsite agencies
- 3266 • Plans for timely sheltering and/or evacuation
- 3267 • Methods for controlling access to contaminated areas and for decontaminating personnel or  
3268 equipment exiting the area
- 3269 • Protective action criteria prepared in accordance with DOE-approved guidance applicable to  
3270 actual or potential releases of hazardous materials to the environment for use in protective  
3271 action decision making.

3272 Evacuation routes for the Hanford Site are provided in the *Hanford Emergency Management Plan*  
3273 (DOE 2010). Specific routes are determined at the time of an event based on event magnitude,  
3274 location, and meteorological conditions.

3275 DOE and adjacent counties have predetermined initial offsite protective action recommendations for  
3276 the members of the public. These initial, preplanned protective action recommendations, as indicated  
3277 by the event classification and location, are included on the initial notification of offsite agencies. The  
3278 determination of need for additional protective action recommendations are based on consequence  
3279 assessments.

3280 DOE maintains the Hanford emergency plan and implementing procedures in coordination with state  
3281 and local authorities. DOE also provides technical assistance to other federal agencies and to state and  
3282 local governments. Hanford contractors are responsible for maintaining emergency plans and  
3283 response procedures for all facilities, operations, and activities under their jurisdiction and for  
3284 implementing those plans and procedures during emergencies. The DOE, DOE contractors, state, and

3285 local government plans are fully coordinated and integrated. Emergency control centers have been  
3286 established by DOE, local, and state authorities to allow for proper response to emergency conditions.

#### 3287 **3.14.4 Mitigation Measures**

3288 Based on the description of the impacts associated with the Human Health and Safety resource area,  
3289 no mitigation measures are required.

#### 3290 **3.14.5 Unavoidable Adverse Impacts**

3291 No unavoidable adverse impacts would be expected from the proposed conveyance of land at the  
3292 Hanford Site in regard to human health. Radiological dose consequences from accidents for Buildings  
3293 324 and 325 are determined to have minimal potential accident risks to the FSA. These facilities are  
3294 located approximately 600 meters east of the FSA. The dose consequences within the FSA are  
3295 minimal and would not require any additional mitigation measures beyond safety measures normally  
3296 provided to ensure the adequate protection of the public health, safety, and environment.

#### 3297 **3.14.6 Intentional Destructive Acts**

3298 DOE considers intentional destructive acts (IDA), such as acts of sabotage or terrorism, in each  
3299 NEPA document that it prepares. Based on the reasonably foreseeable commercial and industrial uses  
3300 analyzed for the Proposed Action, the likelihood of environmental consequences associated with an  
3301 IDA is extremely low. While it is possible that random acts of theft or vandalism could happen as in  
3302 any other location, it is anticipated that security measures typical of industrial parks and other  
3303 commercial developments would be implemented. It is likely that a variety of measures to control  
3304 access and maintain security would be used by the respective facility owner(s) to protect their  
3305 facilities, personnel, and intellectual property. These could include identification badges and  
3306 proximity cards, surveillance cameras, motion sensors and other technology, and physical security  
3307 such as security guards or gates and fences.

#### 3308 **3.15 Summary of Environmental Consequences**

3309 This is a summary of the environmental consequences of the Proposed Action of transferring  
3310 approximately 1,641 acres of land to TRIDEC and constructing and operating the representative  
3311 facilities, a solar farm, and potentially providing utility corridor access through the PAAL.  
3312 Construction and operation of the representative facilities were evaluated on the main FSA, but only  
3313 about 1,341 acres would be transferred to TRIDEC for future development. The 294 acres of the main  
3314 FSA that are not transferred would stay undeveloped. It was assumed that about 10 percent of the  
3315 PAAL would be used for a utility corridor and associated maintenance road. DOE would retain  
3316 ownership of the PAAL and convey lands if needed for a utility corridor. The approximately 485  
3317 acres of the PAAL that are not conveyed would stay undeveloped.

3318 Important assumptions for construction and operation are listed at the beginning of this chapter along  
3319 with the common No Action Alternative impacts. Environmental consequences of the Proposed  
3320 Action are addressed separately for the resource topic areas, not in any priority order.

3321 **Table 3-29**, “Summary of Environmental Consequences,” provides a resource-by-resource summary  
3322 of environmental consequences that are common to all representative facilities and locations, unique  
3323 to certain representative facilities or locations, the solar farm, and utilities and infrastructure on the  
3324 PAAL.

3325  
3326**Table 3-29. Summary of Environmental Consequences**

Resource Area	No Action Alternative	Proposed Action <sup>21</sup>
<b>Geology</b>	Mining at the borrow pits would continue. Impacts to geology or soils from the Proposed Action would not occur.	<u>Construction</u> Site clearing, grading, and contouring would alter the topography in the areas developed. Soil compaction would reduce permeability and porosity. <u>Operation</u> No impacts after construction
<b>Water Resources</b>	Surface water does not exist on the project area (PA). Groundwater is not used or affected by activities on the PA. Existing groundwater monitoring (via wells) would continue. Impacts to water from the Proposed Action would not occur.	<u>Construction</u> Construction activities on the FSA would expose soil to wind and precipitation resulting in potential erosion and sedimentation from stormwater runoff. An NPDES permit may be required. <u>Operation</u> Development would create large areas of impervious surface (e.g., buildings and pavement) resulting in stormwater runoff. Development plans would likely include stormwater retention/detention ponds to manage the quantity and quality of stormwater per state regulations. For the solar FSA, less impervious surfaces would be created than for the main FSA. Water used to wash solar panels could introduce water to the vadose zone. Permits may be required depending on the amount of water and whether it is contained or discharged.
<b>Air Quality</b>	Fugitive dust and GHG emissions from mining at the borrow pits would continue. Impacts to air quality from the Proposed Action would not occur.	<u>Construction</u> Construction activities on the FSA would result in temporary effects by generating criteria pollutants, fugitive dust, and GHG air emissions from operation of mobile construction equipment and excavation activities. Facilities with a larger footprint would have a greater impact than a smaller facility. <u>Operation</u> Operation of all representative facilities would generate criteria pollutants and GHG emissions from operation of stationary and mobile equipment. Operations on the solar farm FSA would generate small amounts of fugitive dust and GHG emissions during maintenance activities.
<b>Ecological Resources</b>	Existing shrub-steppe habitat in one of the largest remaining shrub-steppe areas in the ecoregion would remain. Wildlife species would continue to use the area. If vegetation communities continue to recover from past disturbance, wildlife species not currently present could move into the area in the future. Impacts to ecological resources from the Proposed Action would not occur.	<u>Construction</u> Construction on the FSA would remove vegetation and existing habitat. Wildlife would be disturbed by noise, lighting, and human activity. Wildlife with adequate mobility would leave the area and seek replacement habitat which may or may not be available. Forced displacement may result in mortality. Shrub-steppe habitat loss may place further pressure on populations of some species that are already experiencing habitat loss in other parts of their range. <u>Operation</u> Wildlife would be subject to continued disturbances such as noise, traffic and lighting, and mortality from vehicle collisions could occur. Facilities, infrastructure, and roads would fragment habitat and impair movement through the area for some species. Facilities with nighttime operations would disturb nocturnal wildlife.
<b>Wetlands and Floodplains</b>	There are no wetlands or floodplains on the PA or within close proximity.	N/A

<sup>21</sup> Main FSA (1,635 acres), Solar FSA (300 acres), and PAAL (539 acres) = FSA (2,474 acres).

Resource Area	No Action Alternative	Proposed Action <sup>21</sup>
<b>Cultural Resources</b>	Cultural resources would remain in federal ownership. Impacts to cultural resources from the Proposed Action would not occur.	<p><u>Construction</u> Development and land-disturbing activities on the FSA such as removal of vegetation, surface soil, natural and manmade surface features, and any associated objects and materials may result in the destruction of archeological sites and may affect other cultural resources in the PA. Cultural resources may also be affected by construction noise, vibration, artificial light, and odors. Removal of vegetation would result in loss of traditional plant species. Disturbance to the NRHP-eligible Hanford Site Plant Railroad, the Richland Irrigation Canal, an archeological district and TCPs have been addressed and mitigation will be in accordance with the MOA.</p> <p><u>Operation</u> Buildings, traffic, sound, light, and odors that differ from the pre-existing ambient condition have the potential to impact cultural resources, and mitigation will be in accordance with the MOA. The Visual Resources section includes an analysis of the effect on views to some locations identified as being of importance to tribes.</p>
<b>Land Use</b>	Ongoing uses such as mining, Navy Storage Area and Load Test Site, and well monitoring would continue. Impacts to land use from the Proposed Action would not occur.	<p><u>Construction</u> The main and solar FSA land use would change from essentially undeveloped to developed industrial land use.</p> <p><u>Operation</u> Development would be consistent with local comprehensive land use plans, zoning, and ordinances. Development would foreclose opportunities for these lands to be considered for other future uses.</p>
<b>Visual Resources</b>	The natural landscape would continue to dominate. Impacts to visual resources from the Proposed Action would not occur.	<p><u>Construction</u> During construction in the FSA, equipment and activities would be visible, but visibility would diminish the farther a viewer is from the construction sites.</p> <p><u>Operation</u> Development in the FSA of primarily undeveloped area would change the visual environment and result in a change in the visual resource classification of the conveyed lands, as the buildings and infrastructure would become a primary focus for viewers. Development in the main FSA would be consistent with existing development to the east and south. To the north and west the adjacent land is primarily undeveloped and would change the visual environment. Views to some locations identified as being of importance in the tribal summaries (Gable Mountain, Rattlesnake Mountain, Saddle Mountain) would not change from an effected environment perspective as objects would not be readily discernable because of the distance. Mitigation will be in accordance with the MOA.</p>
<b>Noise, Vibration and EMF</b>	Continued development in the area surrounding the PA would result in new sources of vibration and noise, and possibly EMF from new substations. Impacts to noise, vibration, and EMF from the Proposed Action would not occur.	<p><u>Construction</u> Construction activities in the FSA such as the use of heavy equipment, pile drivers, compressors, generators, pumps, and haul trucks would result in temporary, minor changes to the ambient environment for acoustic noise and vibration. Distance from the developed areas would have a dampening effect on noise and vibration impacts. Generation of EMF from construction activities can include mobile generators, misfiring combustion engines, and temporary electrical connections. Resulting EMF levels are low, infrequent, and not of long duration. The level and intensity of noise, vibration and EMF would vary depending on factors such as the type of construction activity,</p>

Resource Area	No Action Alternative	Proposed Action <sup>21</sup>
		<p>timing, and location. Construction closer to Stevens Drive and Horn Rapids Road would have greater potential for vibration and noise to affect PNNL’s sensitive facilities. Similarly, construction in the northwest part of the FSA, closer to LIGO, would have a greater likelihood of disturbance to its operations.</p> <p><u>Operation</u>                      Certain industrial facilities, such as the rail distribution center, would generate the most noise and vibration, including from truck traffic. The biofuels manufacturing facility would also generate higher levels of noise and vibration from heavy equipment moving waste, shredding materials, and other activities. The degree of effect to PNNL and LIGO would be related to the proximity of the vibration source.                      EMF would be generated by electrical substations or magnetic induction furnaces and may need to be shielded or require other mitigation.                      Solar farms would generate little noise or vibration. Solar farm inverters, transformers, electrical substations, and power lines would generate EMF. Resulting EMF levels are not expected to affect the PNNL sensitive receptors due to the distance between PNNL and the solar FSA.</p>
<b>Utilities and Infrastructure</b>	Additional demand for utilities and infrastructure from the Proposed Action would not occur.	<p><u>Construction</u>                      See the individual resource topics for discussion of anticipated environmental impacts from construction, including utilities and infrastructure.</p> <p><u>Operation</u>                      The Proposed Action would result in new, long-term demand for utility services. New infrastructure and services would be provided and maintained by the City of Richland, Port of Benton, BPA, and Cascade Natural Gas, as applicable.                      A solar farm would have little requirement for sewer, natural gas, and waste utilities but would require 8.8 million gallons/year of water to wash panels for a PV technology.                      Estimated utility usage by representative facility is shown in Table 3-14.                      The food/agriculture and biofuels manufacturing facilities would likely use more electricity and water than the other facilities.                      Estimated utility usage for solar facilities is shown in Table 3-15.                      See the individual resource topics for discussion of anticipated impacts from operation, including utilities and infrastructure.</p>
<b>Transportation</b>	Impacts to transportation from the Proposed Action would not occur.	<p><u>Construction</u>                      Construction activities in the FSA would result in increased car and truck traffic on Horn Rapids Road, Stevens Drive, and other surrounding roadways, which could result in temporary disruptions or increases in traffic from activities such as delivery of material and equipment, and construction workers commuting to and from work areas.                      The number of construction workers for each representative facility would vary depending on the size and scope, phase of development, and other factors.</p> <p><u>Operation</u>                      Industrial development in the FSA would generate a new load on primary transportation roadways such as Stevens Drive and Horn Rapids Road. Increased traffic would likely affect operations on those and other roadways, including congestion and delays at intersections (reduced level of service) and safety issues related to congestion.</p>

Resource Area	No Action Alternative	Proposed Action <sup>21</sup>
		<p>The rail-based facility would increase traffic on the regional rail line and potentially contribute to additional vehicle delays at the Horn Rapids Road crossing.</p> <p>A solar farm would not result in a noticeable increase in commuter traffic.</p>
<b>Waste Management</b>	Impacts to waste management from the Proposed Action would not occur.	<p><u>Construction</u> Solid non-hazardous waste generated during construction in the FSA, such as packaging material, scrap material, concrete rubble, and land-clearing debris would likely be recycled or transported to the Horn Rapids Sanitary Landfill for disposal.</p> <p><u>Operation</u> Operation of all of the representative facilities would produce solid and liquid waste typical of other industrial, research, and office park operations in the region. Generated solid waste would likely represent about 15 percent of the current disposal rate at the landfill. Waste generation from operation of a solar farm is expected to be minimal.</p>
<b>Socioeconomics and Environmental Justice (EJ)</b>	Impacts to socioeconomics and EJ from the Proposed Action would not occur.	<p><u>Construction</u> Single-phase development would employ approximately 150 to 350 workers over an 18-month period. Multi-phased development would likely employ fewer workers but for a longer period of time. Construction would contribute to the economy through construction-related and employee spending on regional goods and services for the main and solar FSAs.</p> <p>Solar farm construction would employ 166 workers.</p> <p><u>Operation</u> Estimated to result in ~2,530 new jobs for the single phase and ~50 to 1,500 new jobs for the multi-phase, increasing the annual per capita income and the local tax base of the Tri-Cities area. Development would likely contribute to the economy through increased business and employee spending on regional goods and services. Housing and services are adequate to accommodate employment influges.</p> <p>Six or seven new jobs would be created for operation of a solar farm. The Proposed Action would not result in disproportionately high and adverse effects on minority or low-income populations.</p>
<b>Human Health and Safety</b>	No associated changes to human health impacts would be expected compared to the baseline public health impacts that are regularly assessed and provided in the Hanford Site annual environmental reports. Estimated total annual dose to an MEI would be expected to remain within the range seen in recent years (~0.1 to 0.2 millirem) from all Hanford Site and surrounding vicinity sources. Similarly, the dose to a member of the public within the FSA, from any potential Hanford residual radioactive material, would be less than 1 millirem/year. Impacts to human health and safety from the Proposed Action would not occur.	<p><u>Construction and Operation</u> Any localized residual sources and other Hanford-area facility emission sources would be expected to result in a total annual dose of less than 1 mrem within the FSA.</p> <p>Radiological dose consequences from accident for Buildings 324 and 325 are minimal and would not require any additional mitigation measures beyond safety measures normally provided to ensure the adequate protection of the public health, safety, and environment</p>

Resource Area	No Action Alternative	Proposed Action <sup>21</sup>
<b><i>Intentional Destructive Acts (IDA)</i></b>	No change from existing conditions.	Potential environmental consequences associated with an intentional destructive act (IDA) (i.e., acts of sabotage or terrorism) at industrial and commercial facilities such as those analyzed in this EA are extremely low because there is no pre-identified threat nor is there an identified target (DHS 2013, 2014). It is possible but highly unlikely that random acts of theft or vandalism could occur. It is anticipated that a variety of measures typical of industrial parks and other commercial development to control access and maintain security would be used by the respective facility owner(s) to protect their respective facilities.

3327

3328

**4.0 CUMULATIVE EFFECTS**

3329 Past, present, and reasonably foreseeable future actions that occur within the region of influence  
 3330 (ROI) that is defined in each resource area may contribute to cumulative impacts. Examples of past  
 3331 U.S. Department of Energy (DOE) activities include operation of the fuel fabrication plants,  
 3332 production reactors, Plutonium-Uranium Extraction Plant, other fuel reprocessing facilities,  
 3333 Plutonium Finishing Plant, and research facilities, as well as waste treatment and disposal activities.  
 3334 Current DOE activities include environmental cleanup, waste disposal, tank waste stabilization, and  
 3335 construction of the Waste Treatment and Immobilization Plant in the 200 East Area, laboratory  
 3336 operations in the 300 Area and on the Pacific Northwest National Laboratory (PNNL) Site, and  
 3337 management of portions of the Hanford Reach National Monument (HRNM). The Bonneville Power  
 3338 Administration (a part of DOE) operates and maintains five electrical substations and electrical  
 3339 transmission lines across the Hanford Site. Non-DOE activities at Hanford include the following:

- 3340 • U.S. Navy shipment of reactor compartments on Stevens Drive for transport to Burial  
 3341 Ground 218-E-12B Trench 94 in the 200 East Area, and operation of the Navy Storage Area  
 3342 and Load Test (SALT) Site
- 3343 • Energy Northwest operation of the Columbia Generating Station
- 3344 • US Ecology, Inc. operation of the commercial low-level radioactive waste (LLW) disposal  
 3345 site
- 3346 • U.S. Fish and Wildlife Service management of portions of the HRNM
- 3347 • Laser Interferometer Gravitational-Wave Observatory (LIGO)

3348 Past, present, and reasonably foreseeable future actions at the Hanford Site and in and around Benton  
 3349 County that occur in the ROIs considered in this analysis may also contribute to cumulative impacts;  
 3350 examples of such offsite activities include clearing land for urban development, waste management,  
 3351 industrial and commercial development, mining, and power generation. Activities at the Hanford Site  
 3352 and in the region surrounding the Hanford Site could include the following (DOE 2012b):

- 3353 • Future regional land use as described in local city and county comprehensive land use plans
- 3354 • Cleanup of toxic, hazardous, and dangerous waste disposal sites
- 3355 • Columbia River and Yakima River water management
- 3356 • Electric power generation and transmission line projects
- 3357 • Transportation projects
- 3358 • Future construction and operation of additional facilities and associated infrastructure on the  
 3359 PNNL Site and the rest of the Tri-Cities Research District
- 3360 • Establishment of the Manhattan Project National Historical Park (Public Law 113-291)
- 3361 • Build out of the 750-acre Horn Rapids Industrial Park including the 313,000 square-foot,  
 3362 10-story Preferred Freezer Services Facility currently under construction (Foster 2014)
- 3363 • Development of a 128-acre parcel on the northeast side of the Horn Rapids Industrial Park for  
 3364 a gravel mine (Beaver 2015) by American Rock Products

## 3365 4.1 Potential Cumulative Impacts

3366 For each resource analyzed in **Chapter 3.0**, this cumulative impacts analysis identifies (1) the ROI;  
3367 (2) the potential incremental impacts associated with the Proposed Action; (3) the potential impacts of  
3368 past, present, and reasonably foreseeable future actions that may contribute to cumulative impacts  
3369 within the ROI; and (4) the potential cumulative impacts of the Proposed Action with past, present,  
3370 and reasonably foreseeable future actions. The affected environment is described in **Chapter 3.0** and  
3371 defines the environmental baseline considered for this cumulative impacts analysis. Thus, the  
3372 environmental baseline already reflects past actions that have affected a resource area.

### 3373 4.1.1 Geology

3374 The ROI for geologic resources includes the Project Area (PA) and immediately adjacent lands.

3375 There are no active landfills, mines, or other special use areas at the Hanford Site within the PA  
3376 except for two gravel pits (6 and 9), and the Navy SALT Site in Constrained Area 2 (see  
3377 **Appendix A**, “Hanford Site Land Suitability Review”). There are other gravel pits on the Hanford  
3378 Site (Pits F, H, N, 18, 21, 23, 24, 30, and 34) that are described in this environmental assessment  
3379 (EA) for *Expansion of Borrow Areas on the Hanford Site* (DOE 2012e). Gravel from the DOE gravel  
3380 pits are used for Hanford Site projects. The Proposed Action would require sand and gravel and result  
3381 in an incremental addition to the use of geologic mineral resources but the material would come from  
3382 four existing commercial sand and gravel quarries in the Tri-Cities area with one at the southern end  
3383 of the Horn Rapids Industrial Park. All are owned and operated by American Rock Products that  
3384 recently purchased 128 acres of land from the Port of Benton for a new gravel mine across Stevens  
3385 Drive from PNNL. The Tri-Cities area has abundant sand and gravel, and although there would be a  
3386 cumulative effect on these mineral resources above the existing condition, the incremental effect of  
3387 the Proposed Action is minor.

3388 At Hanford, projected cumulative impacts on geologic resources mainly reflect demands for sitewide  
3389 cleanup and closure actions and facility decontamination and decommissioning (D&D). Future  
3390 closure actions, including cleanup and restoration of closed disposal facilities and final capping of  
3391 closed disposal facilities or facilities that have undergone D&D, but contain residual waste, represent  
3392 the largest activity demands for geologic resources (DOE 2012b). DOE has analyzed expansion of  
3393 borrow areas on the Hanford Site for sitewide cleanup, closure, and D&D operations (DOE 2012c).  
3394 The closest location on the Hanford Site where soil remediation activities are ongoing is at the 618-10  
3395 Burial Ground (see **Appendix A**).

3396 Implementation of the *Hanford Reach National Monument, Comprehensive Conservation Plan and*  
3397 *Environmental Impact Statement* (USFWS 2008) would entail construction and maintenance of new  
3398 facilities and other improvements such as interpretive sites, parking and boat access areas, trails, and  
3399 a possible visitor center. These proposed activities would require geologic resources. However, these  
3400 needs, as well as the ongoing demand for maintenance of existing assets, are not known at this time  
3401 (DOE 2012b).

3402 As discussed in **Section 3.1.1.2**, the Proposed Action’s incremental impact on soils and topography  
3403 would be temporary disturbance of soils on approximately 1,641 acres and long-term disturbance on a  
3404 smaller acreage related to a facility’s actual footprint, parking areas, and roads. Site development  
3405 effects include soil removal, soil erosion, and loss of soil productivity through soil compaction, and  
3406 mixing of soil horizons. Successful revegetation is expected following construction on the land not  
3407 covered by buildings, parking areas, and roads. To provide protection and restoration of topsoil, it is  
3408 assumed future landowners would implement best management practices during site development in  
3409 accordance with local and state regulations.

3410 After construction when the facilities are operating, no additional incremental impacts are expected to  
3411 geologic and soil resources on the main Focused Study Area (FSA). Some long-term impacts to soil  
3412 would continue on the solar farm FSA from maintenance of unimproved roads between the rows of  
3413 solar arrays.

#### 3414 **4.1.2 Water Resources**

3415 The ROI for water resources includes the PA and the immediately adjacent offsite land. This section  
3416 addresses the potential cumulative impacts of past, present, and reasonably foreseeable future actions  
3417 on water resources, including surface water, vadose zone, and the groundwater system.

3418 The cessation of liquid waste discharges to ponds, ditches, and cribs in the early 1990s at Hanford has  
3419 a beneficial impact on groundwater quality. This has slowed the migration of contaminants through  
3420 the vadose zone and into the groundwater and eliminated a large source of artificial recharges with  
3421 resultant declines in groundwater mounds beneath the waste sites and adjacent areas. The Hanford  
3422 environmental baseline already reflects past DOE and non-DOE actions that have affected existing  
3423 surface waters, such as alteration of Columbia River hydrology from past construction of dams, as  
3424 well as historical contaminant releases from DOE or other facilities that have affected surface water  
3425 and groundwater quality.

3426 Other projects at Hanford include future cleanup and facility disposition activities, and D&D actions.  
3427 Ongoing and future actions to clean up the Central Plateau, as well as individual facility D&D  
3428 actions, are not expected to affect water resources. This is because, other than the Columbia River,  
3429 surface water resources are not present at Hanford; surface-water drainage patterns are poorly  
3430 developed to convey potentially contaminated stormwater or other effluents; the depth to groundwater  
3431 across much of the site is such that any effluents would be unlikely to affect groundwater; and the  
3432 most intensive cleanup and D&D activities (on the Central Plateau) are some distance from the  
3433 Columbia River.

3434 Future non-DOE activities near Hanford, for example, new industries, agriculture, residential  
3435 development, new road construction, and other infrastructure improvements are likely to be the larger  
3436 contributors to cumulative impacts on surface water and groundwater over the timeframe considered  
3437 in this analysis. Water use by communities that utilize the Columbia River as a water source is  
3438 expected to rise commensurate with land use development and general population increases in the  
3439 region, and contemplated actions at Hanford (e.g., closure of facilities) would reduce the overall  
3440 cumulative impact on surface water and groundwater availability and quality (DOE 2012b).

3441 As discussed in **Section 3.2**, construction of the representative facilities would involve land  
3442 disturbance, which would increase the potential for soil erosion and stormwater runoff. There are no  
3443 perennial sources of surface water on the PA, but ponding likely occurs during heavy rainfall events.  
3444 Construction activities could result in soil removal, compaction, reduced porosity, and decreased  
3445 infiltration rates. Stormwater runoff, however, would be minimized by the relatively high porosity of  
3446 the undisturbed surrounding sandy soils along with high evaporation and plant transpiration rates in  
3447 the shrub-steppe semiarid desert climate that is characteristic of the area. Because of distance and  
3448 topography, it is unlikely that stormwater would carry sediments or other potential contaminants  
3449 away from the construction areas and to the Yakima or Columbia rivers. To prevent disturbance to  
3450 area hydrologic conditions that might affect transport of existing contaminants in the groundwater,  
3451 groundwater wells would not be permitted, and would be restricted through deed or other realty  
3452 instrument language.

3454 In addition, while it is not anticipated that stormwater runoff following development of the FSA  
3455 would mobilize contaminants from groundwater plumes, a deed restriction limits the locations where

3456 stormwater drainage facilities are permissible to avoid potential for elevated groundwater levels to  
3457 mobilize contamination from groundwater plumes in the vicinity of the FSA. DOE is conducting a  
3458 quantitative analysis to determine whether the deed restriction will continue to be necessary or can be  
3459 modified.

3460  
3461 The Proposed Action is not expected to contribute cumulative impact on surface water or  
3462 groundwater.

### 3463 **4.1.3 Air Quality**

3464 ROI for air quality includes the PA and surrounding urban and rural environments.

3465 DOE activities at Hanford in the 200 Area would generate fugitive dust emissions and equipment  
3466 emissions from various borrow area and construction sites; dust and equipment emissions from  
3467 ongoing construction and operation of the Environmental Restoration Disposal Facility; emissions  
3468 from canyon disposition (221-U B-Plant or PUREX closure); emissions from facility demolition and  
3469 remediation, including excavation, backfill, and capping; and emissions from above-grade structure  
3470 removal of the Plutonium Finishing Plant (see **Figure 3-3**). In the 300 Area and nearby remediation  
3471 areas such as 618-10 and 618-11, there would be fugitive dust emissions and other emissions from  
3472 closure and future uses of surplus facilities (DOE 2012b). DOE and its contractors apply best  
3473 available control technology to control fugitive dust emissions from its cleanup activities. As a result,  
3474 fugitive emissions resulting from remediation activities are minimized and localized to the area of the  
3475 specific remediation site.

3476 Existing and reasonably foreseeable non-DOE local activities that may emit fugitive dust and other  
3477 pollutants include commercial operations such as AREVA facility operation, which could have  
3478 nitrogen oxide emissions; Perma-Fix non-thermal and thermal treatment of mixed LLW, which could  
3479 have some combustion emissions; Hazardous Materials Management and Emergency Response  
3480 (HAMMER) activities, which would have negligible emissions, except for vehicular emissions; and  
3481 the pending American Rock Products mining operation. The operation of the US Ecology commercial  
3482 LLW disposal site located near the center of the Hanford Site would have fugitive dust emissions  
3483 (DOE 2012b).

3484 The Wanapa Energy Center, if built by the Confederated Tribes of the Umatilla Indian Reservation,  
3485 could be a major source of air pollutant emissions, but would not significantly deteriorate the quality  
3486 of the air surrounding the proposed site or lead to deterioration of air quality in nearby areas  
3487 (DOE 2012c). The Wanapa Energy Center would be located on about 20 acres of land east of the city  
3488 of Umatilla, along the Columbia River. The Plymouth Generating Facility, if built by Plymouth  
3489 Energy, LLC, would not significantly deteriorate the quality of the air surrounding the proposed site  
3490 based on the analysis in the *Final Environmental Impact Statement, Plymouth Generating Facility,*  
3491 *Plymouth, Washington* (Benton County and BPA 2003). The Plymouth Generating Facility would be  
3492 located on a 44.5-acre site, 2 miles west of the rural community of Plymouth in southern Benton  
3493 County. The Wanapa Energy Center and Plymouth Generating Facility projects are currently on hold  
3494 by the project proponents (DOE 2012b).

3495 Mobile source emissions in Benton County account for about 68 percent of county annual emissions  
3496 of carbon monoxide, 52 percent of nitrogen oxides, 69 percent of sulfur oxides, and 39 percent of  
3497 volatile organic compounds (DOE 2012b). In addition to the industrial sources of air pollutants  
3498 discussed above, there are industries that produce asphalt paving material and block, nitrogen  
3499 fertilizer, crushed stone, canned fruits and vegetables, frozen foods, and nonferrous metal sheet, as  
3500 well as grain storage facilities and natural gas transmission facilities (DOE 2012b).

3501 Other development in the region could result in increases in air pollutant emissions from construction  
3502 activities, vehicle traffic, and other sources related to new housing, businesses, and industries in the  
3503 Tri-Cities area. In addition, increased mining activity and reclamation of mined areas could lead to  
3504 increases in air pollutant emissions.

#### 3505 4.1.3.1 Emissions of Greenhouse Gases

3506 Greenhouse gas emissions in the Hanford Site region include carbon dioxide from multiple sources,  
3507 including the burning of natural gas and fuel oil for home and commercial heating and the use of  
3508 gasoline and diesel fuel to power automobiles, trucks, construction equipment, and other vehicles.  
3509 Generation of electricity also results in carbon dioxide emissions in parts of Washington State. In the  
3510 region near Hanford, most of the electricity (97 percent) is supplied by a combination of hydroelectric  
3511 dams, nuclear power plants, and wind turbines (DOE 2012b). These types of power production  
3512 generate little carbon dioxide. The state has implemented regulations to mitigate emissions of carbon  
3513 dioxide from certain fossil-fueled, thermal-electricity-generating facilities larger than the station-  
3514 generating capability of 25 megawatts of electricity. Recently adopted amendments to these  
3515 regulations are intended to establish goals for statewide reduction of greenhouse gas emissions and  
3516 immediately reduce greenhouse gas emissions from electric power generation. Participation of  
3517 Washington State in the Western Climate Initiative's proposed Cap-and-Trade Program may also  
3518 result in a reduction in greenhouse gas emissions (DOE 2012b).

3519 There also are emissions of chlorofluorocarbons and hydrofluorocarbons, which are used locally in  
3520 the Hanford region in refrigeration and air conditioning units at residential, commercial, industrial,  
3521 and government facilities. Opportunities for reductions in greenhouse gas emissions at Hanford have  
3522 been pursued, including the reduction and phase-out of chlorofluorocarbon use and the reduction of  
3523 carbon dioxide emissions and other trace gases through energy conservation. Other potential  
3524 mitigation technologies that are currently available and could be applicable at Hanford include  
3525 alternative fuels and renewable heat and power sources, carbon capture and storage, fuel-efficient  
3526 vehicles, cleaner diesel vehicles, hybrid vehicles, biofuels, efficient lighting and daylighting, more-  
3527 efficient electrical equipment, improved insulation, passive and active solar design for heating and  
3528 cooling, and use of alternative refrigeration fluids (DOE 2012b).

3529 During construction of the representative facilities, the Proposed Action would generate fugitive dust  
3530 (airborne particulate matter generated from a source other than a stack or chimney), and fossil-fueled  
3531 construction equipment.

3532 Air emissions from the Proposed Action construction activities are described in **Section 3.3**. Because  
3533 of the uncertainties in knowing which facilities would be constructed at a particular location,  
3534 emissions for nitrogen oxides, carbon monoxide, and particulate matter were calculated as though  
3535 they were generated by a single "prevention of significant deterioration" major source. When  
3536 constructed, emissions would be generated and be permitted by each of the independent commercial  
3537 sites. Calculations show that if all emissions were from a single source, they would slightly exceed  
3538 their prevention of significant deterioration thresholds, but as individual permittees, they would not.  
3539 There are no regulatory significance thresholds for stationary or mobile source air emissions in air  
3540 quality attainment areas like this. None of the criteria pollutant emissions would exceed the  
3541 250-ton-per-year significance threshold. Collective emissions from all the facilities for carbon dioxide  
3542 would minimally exceed the 100,000-metric tons-per-year significance threshold and lead to an  
3543 incremental impact. Based on this information, operation of the facilities would contribute emissions  
3544 in the ROI, the amount of which depends on the type, size, and number of industries.

**3545 4.1.3.2 Climate Change**

3546 Climate change is a global phenomenon that the proposed land transfer would not alter. However,  
3547 climate change would result in a new affected environment in the future. DOE considered if this new  
3548 future environmental baseline would be impacted differently by the Proposed Action than the current  
3549 baseline environment would be impacted. The most recent climate change impacts report  
3550 (GCRP 2014) issued by the U.S. Global Change Research Program (GCRP) was reviewed to  
3551 determine if plausible nexuses exist between climate change and the Proposed Action that would alter  
3552 impacts. The interagency GCRP was established under the *Global Change Research Act of 1990*  
3553 (P.L. 101-606) (15 USC 2921 et seq.) “to understand, assess, predict, and respond to human-induced  
3554 and natural processes of global change” and is the authoritative United States government source on  
3555 climate change in the United States. Most GCRP projections are expressed as a change expected  
3556 during the later part of the 21st century (2071–2099) relative to average conditions existing in the  
3557 later part of the 20th century (1970–1999). In the Pacific Northwest an increase in average annual  
3558 temperature of 3.3°F to 9.7°F is projected by 2070-2099. The temperature increases are projected to  
3559 be largest in summer. Change in annual average precipitation in the Pacific Northwest is projected to  
3560 be within a range of a 10 percent decrease to an 18 percent increase for 2070-2099. These changes  
3561 will result in earlier snowmelt and greater heat stress to plants. Although flows in the Columbia River  
3562 are highly regulated through an extensive number of dams, these changes in the climate would likely  
3563 result in some reduction in water availability in summer months. However, DOE identified no  
3564 plausible nexuses between the Proposed Action and global climate change that would alter its impact  
3565 determinations for the affected environment.

**3566 4.1.4 Ecological Resources**

3567 The ROI for ecological resources includes the PA and the adjacent Hanford Site lands.

3568 Studies have estimated that 15 million acres of shrub-steppe habitat (60 percent of the landscape)  
3569 existed in eastern Washington before land conversion began with the arrival of settlers. Recent studies  
3570 have estimated that only about 30 percent of the landscape now consists of this habitat type. Thus,  
3571 there has been a 50 percent decrease in the historical occurrence of shrub-steppe habitat in eastern  
3572 Washington since the 1840s (DOE 2012a). The Hanford Site represents one of the largest remaining  
3573 blocks of relatively undisturbed shrub-steppe habitat in the Columbia Basin ecoregion (DOE 2012c;  
3574 Poston et al. 2009).

3575 As described in **Section 3.4**, existing habitat within the PA has been disturbed in the past and is  
3576 currently subject to disturbance from human activities. Electrical transmission power lines, roads,  
3577 gravel pit quarries, train tracks, a firing range buffer zone, the Navy SALT Site, and an inactive  
3578 asbestos disposal landfill are present within the PA (see **Appendix A**). Much of the area was burned  
3579 by wildfire in 1984 and 2000 (PNNL 2011) and affected by other smaller fires before and after those  
3580 years. The majority of the PA has also been sprayed with herbicide to control weedy species in 2003,  
3581 2004, and 2006 (see **Appendix I**, “Salstrom and Easterly, Vegetation Survey of the Proposed Land  
3582 Conveyance, Central Hanford, Washington”). The entire PA consists of upland habitat, and  
3583 consequently species diversity is lower compared to the riparian areas alongside the Columbia River  
3584 to the east. None of the threatened, endangered, or candidate species listed for the county are  
3585 documented to occur within the FSA or PA (WDFW 2013; see **Appendix H**, “Wildlife Survey”).

3586 As discussed in **Section 3.4.2**, the Proposed Action would result in disturbance and loss of existing  
3587 vegetation communities and wildlife habitat on approximately 1,641 acres of land. Construction of  
3588 the representative facilities would permanently convert much of the acreage from undeveloped land to  
3589 large areas of pavement, buildings, and associated infrastructure. Operation of the facilities would  
3590 result in disturbance from noise, traffic, lighting, and human activity. Many existing wildlife species

3591 currently using the lands would be displaced to adjacent areas and be subject to competition from  
3592 same or other species that occupy the adjacent habitat. Some individual animals would not survive;  
3593 however, effects at a population level from the Proposed Action are not likely. Habitat loss from the  
3594 Proposed Action makes up approximately one-half of one percent of surrounding Hanford Site lands,  
3595 including the HRNM. Impacts to ecological resources from the Proposed Action would represent an  
3596 additive adverse impact to similar impacts occurring from regional development activities such as  
3597 transportation and transmission line projects and conversion of undeveloped land for industrial and  
3598 residential purposes.

#### 3599 **4.1.5 Wetlands and Floodplains**

3600 For floodplains and wetlands, the ROI includes the PA and the adjacent lands. Because the ROI does  
3601 not contain any floodplains or wetlands (see **Section 3.5.2**), the Proposed Action would not contribute  
3602 to cumulative impacts on floodplains and wetlands in the ROI.

#### 3603 **4.1.6 Cultural Resources**

3604 For cultural resources, the ROI for cumulative effects includes the PA and adjacent lands, which is a  
3605 larger area than the Area of Potential Effect.

3606 The protection and preservation of cultural resources is governed by a number of federal laws,  
3607 statutes, and executive orders. Cultural resource protection for lands in DOE ownership is governed  
3608 by the *Hanford Cultural Resources Management Plan* (DOE 2003b). Once transferred, Washington  
3609 regulations (RCW 27.53 and others) would provide for protection of archeological sites.

3610 In this EA, **Section 3.6.1.2** describes the process used for identifying cultural resources and historic  
3611 properties including archival research, literature research, and field investigations. DOE funded four  
3612 tribes – the Confederated Tribes of the Umatilla Indian Reservation, Confederated Tribes and Bands  
3613 of the Yakama Nation, the Nez Perce Tribe, and the Wanapum to provide traditional cultural property  
3614 (TCP) studies – the summaries of which are included in **Appendix G**, “Tribal Studies Executive  
3615 Summaries.” The tribal summaries contain information about areas of religious and cultural  
3616 significance to the tribes. The tribal summaries described potential effects that would occur from the  
3617 Proposed Action to these three properties: Laliik, Wanawish, and Gable Mountain. All three  
3618 properties are outside of the FSA and this EA describes effects to these properties in **Section 3.8**.  
3619 Following completion of the cultural resources report and through consultation, tribes provided  
3620 additional information regarding TCPs within the FSA and potential effects. As a result of  
3621 information received and consultation, five additional National Register of Historic Places  
3622 (NRHP)-eligible properties have been identified. A memorandum of agreement (MOA) was  
3623 developed through the consultation process for the Proposed Action (see **Appendix K**,  
3624 “Memorandum of Agreement”).

3625 The non-DOE activities identified in the introduction to this Cumulative Effects chapter are subject to  
3626 Washington State laws and requirements protecting archeological sites, Native American graves, and  
3627 abandoned, historic pioneer cemeteries and graves, and human remains. Not all segments of the  
3628 historic remnants of the Richland Irrigation Canal are on DOE property as some are located south of  
3629 Horn Rapids Road and potentially on the Horn Rapids Industrial Park or the Tri-Cities Research  
3630 District. In addition to the Proposed Action causing segments of the canal to be removed,  
3631 development at the Horn Rapids Industrial Park and Tri-Cities Research District could result in  
3632 additional removal of segments of the Richland Irrigation Canal. The homestead is on DOE property  
3633 but adjacent to these same two non-DOE developments. Views from the homestead location could  
3634 change as a result of private industrial development across Horn Rapids Road. The Proposed Action  
3635 would contribute incrementally to cumulative effects on the views from this location.

3636 Cultural resources could be affected by the presence of buildings, traffic, sound, light, and smell that  
3637 differs from the pre-existing ambient condition. Land conveyance and subsequent development  
3638 activities could result in adverse impacts to archeological sites or affect cultural resources located on  
3639 the FSA. Heavy machinery used during construction would generate noise and vibration well above  
3640 the current ambient background levels (see **Section 3.9**). Since construction activities include the  
3641 removal of surface vegetation, the change in the surface characteristics would also mean that  
3642 development would foreclose opportunities for tribal use of traditional plant species. The Hanford  
3643 Site includes large tracts of lands with similar plant communities with the potential to support tribal  
3644 uses.

3645 The Proposed Action would incrementally contribute to the cumulative effects of noise, vibration,  
3646 artificial light, odors, the removal of surface vegetation, changes to viewshed, and other effects  
3647 identified through consultation. The degree of the effects will depend on the type and location of the  
3648 representative facilities. The effects to historic properties and cultural resources from the Proposed  
3649 Action are mitigated through the measures contained in the MOA.

#### 3650 **4.1.7 Land Use**

3651 The ROI includes the PA and the surrounding urban and rural areas. Some activities on the Hanford  
3652 Site and within the ROI may have beneficial effects. For example, remediation efforts at Hanford  
3653 could facilitate potential reuse or restoration of land. Restoration of remediated sites would return  
3654 some land to more natural conditions (e.g., shrub-steppe habitat). The PA is largely undeveloped with  
3655 a few exceptions (e.g., borrow pits, Navy SALT Site, and others) and is bounded on the east by  
3656 DOE's 300 Area and PNNL facilities and on the southwest by HAMMER, Patrol Training Academy,  
3657 and Regional Education Training Center. Areas to the north and northwest are less developed.

3658 DOE is planning the construction and operation of additional facilities and associated infrastructure  
3659 on the PNNL Site for expanded chemical, physical, biological, nuclear, process, and material science;  
3660 instrumentation; and imaging and computational capabilities for PNNL's core capabilities and meet  
3661 DOE's research and development mission. Construction could include expansion of existing facilities  
3662 and construction of new facilities as well as infrastructure upgrades needed for the operations of the  
3663 planned facilities, including installation of new roads and utilities (e.g., water, natural gas, electric,  
3664 sewer, and communications) (DOE 2013d). Adjacent areas are under development, including the  
3665 Horn Rapids Industrial Park south of Horn Rapids Road. DOE's Hanford Comprehensive Land-Use  
3666 Plan (DOE 1999a) identifies the PA as industrial development. The recent purchase of lands located  
3667 off the Hanford Site and west of Stevens Drive across from PNNL for use as a gravel quarry shows  
3668 continuing industrialization of the area. Tri-City Development Council's target marketing categories  
3669 are also consistent with development of the area for industrial development.

3670 The Proposed Action would incrementally contribute (1,641 acres) to cumulative change in land uses  
3671 from largely undeveloped to developed industrial land use in the ROI.

#### 3672 **4.1.8 Visual Resources**

3673 Cumulative impacts related to visual resources were evaluated in an ROI that includes the PA and  
3674 offsite areas visible with the naked eye. Visual resources include the natural and man-made physical  
3675 features that give a particular landscape its character. Features that form the overall visual impression  
3676 include landforms, vegetation, water, color, adjacent scenery, scarcity, and man-made modifications.  
3677 Evaluating the aesthetic qualities of an area is a subjective process because the value that an observer  
3678 places on a specific feature varies depending on their perspective and judgment. In general, a feature  
3679 observed within a landscape can be considered as "characteristic" (or character-defining) if it is  
3680 inherent to the composition and function of the landscape.

3681 The land on and in the vicinity of the Hanford Site is generally flat with little relief. Rattlesnake  
3682 Mountain, rising to 1,060 meters (3,480 feet) above mean sea level, forms the southwestern boundary  
3683 of the Hanford Site. Gable Mountain and Gable Butte are the highest land forms within the central  
3684 Hanford Site. The Columbia River flows through the Hanford Site. Typical of the regional shrub-  
3685 steppe desert, the site is dominated by widely spaced, low-brush grasslands. The Hanford Site is  
3686 characterized by mostly undeveloped land, with widely spaced clusters of industrial buildings along  
3687 the southern banks of the Columbia River and at several interior locations.

3688 Completion of remediation and revegetation activities at Hanford has beneficial impact on the visual  
3689 environment. These activities would include, for example, decommissioning of the reactors in the  
3690 100 Area, closure of the canyon facilities in the 200 Area, and revegetation of the borrow areas  
3691 following completion of mining activities. In most cases, activities within the ROI would not change  
3692 the Bureau of Land Management visual resource management classifications because projects would  
3693 be located in or adjacent to areas that are already developed.

3694 The visual resource analysis performed focuses on the degree of contrast between the Proposed  
3695 Action and the surrounding landscape, the sensitivity levels of key observation points (KOP), and the  
3696 visibility of the Proposed Action from KOPs with regard to the FSA. The distance from a KOP to the  
3697 affected area was also considered, as distance can diminish the degree of contrast and visibility. To  
3698 determine the range of the potential visual effects, the viewshed analysis considered the potential  
3699 effects in light of the aesthetic quality of surrounding areas, as well as the visibility of possible  
3700 activities and facilities from vantage points, including vantage points identified as important to the  
3701 tribes in their summaries (see **Appendix G**). When viewed from a distance to the north or northwest,  
3702 most of the Proposed Action facilities would not be discernable against the backdrop of the existing  
3703 industrial development from an environmental analysis perspective. None of the sensitive viewer  
3704 locations provide unique views of the development area and some are blocked by topography or other  
3705 obstructions. Mitigation measures, including restrictions on the height and color of buildings and  
3706 requiring the use of native plants, are contained in the MOA.

3707 The landscape would change from largely undeveloped to developed industrial land use. The facilities  
3708 and the single solar technology, however, would likely not be discernable against the backdrop of the  
3709 existing industrial development when viewed from KOPs (see **Section 3.8**). None of the sensitive  
3710 viewer locations provide unique views of the development area and some are blocked by topography  
3711 or other obstructions.

3712 The Proposed Action would contribute incrementally to the ongoing visual effects from industrial  
3713 development of the area, the degree to which depends on the type and location of facilities.

#### 3714 **4.1.9 Noise, Vibration, and Electromagnetic Fields**

3715 Cumulative impacts related to noise were evaluated with an ROI that includes the PA and  
3716 surrounding area, including PNNL and LIGO.

3717 Noise, vibration, and electromagnetic field (EMF) impacts of activities under the Proposed Action  
3718 would result from a variety of sources from the construction and operation of the representative  
3719 facilities. Heavy equipment, pile drivers, generators, compressors, and pumps from construction all  
3720 create noticeable acoustic noise and vibration. Facilities such as the biofuels manufacturing facility  
3721 use heavy equipment like bulldozers, excavators, and front end loaders to move municipal and  
3722 cellulosic waste materials and feed it into a shredder. There are no common sensitive receptors  
3723 (e.g., schools, libraries, hospitals, or churches) near the proposed representative facilities. PNNL's  
3724 sensitive facilities could be adversely affected by increases in noise, vibration and EMF. The LIGO  
3725 facility could be affected by increases in vibration.

**3726 4.1.9.1 Background Environment**

3727 Based on available information, potential noise, and vibration impacts to the public from other DOE  
3728 activities are related primarily to vehicle traffic and some heavy equipment operating at remediation  
3729 and waste sites. Cumulative noise and vibration impacts also considered non-DOE construction and  
3730 operations activities. Noise impacts from existing non-DOE activities at Hanford (e.g., traffic noise  
3731 and vibration from workers commuting to and from the Columbia Generating Station; vibration from  
3732 regional dams; and operation noises from the AREVA facility, the Perma-Fix facility, and the  
3733 US Ecology commercial LLW disposal site) are part of the existing background sound environment  
3734 near the PA. Existing electromagnetic sources come from electric transmission and distribution lines,  
3735 electrical substations, and power transformers. These include the White Bluffs and the Sandhill Crane  
3736 substations. White Bluffs is west of the FSA on the north side of Horn Rapids Road. The Sandhill  
3737 Crane substation is southwest of the corner of Horn Rapids Road and Stevens Drive.

**3738 4.1.9.2 Future Sources**

3739 Future sources near the Hanford Site, such as new industries, agriculture, offices, schools, residential  
3740 development, new roads, and other infrastructure improvements could result in variations in the levels  
3741 of traffic noise along access roads and increased noise levels near these developments. In May 2015,  
3742 the Port of Benton sold 128 acres west of Stevens Drive and south of Battelle Boulevard to a regional  
3743 aggregate company to supply materials (i.e., gravel) for concrete and other construction projects in  
3744 the Tri-Cities Area (Beaver 2015). This new facility, when it begins operation, would use heavy  
3745 machinery to excavate gravel and sand, then haul it to the batch plant on the Horn Rapids Industrial  
3746 Park. Heavy equipment traveling down unimproved roads, and excavation of coarse material would  
3747 be a major source of noise and vibration (see **Appendix B**, “Acoustic Noise and Vibration from  
3748 Construction”). Other proposed developments in the area that are expected to result in increased noise  
3749 and vibration levels include build out of the 750-acre Horn Rapids Industrial Park including the  
3750 313,000 square-foot, 10-story Preferred Freezer Services facility currently under construction, and  
3751 expansion of activities on the PNNL Site.

3752 The Proposed Action’s initial noise and vibration impact in the region and, in particular, the effect on  
3753 PNNL and LIGO would be, for the most part, temporary for the duration of construction activities.  
3754 Impacts from the single-phased development representative facilities are assumed to conclude within  
3755 a year or so, whereas the multi-phased development could last several years, but would not be  
3756 continuous.

3757 After construction, operation of the representative facilities could generate vibration and noise with  
3758 the potential to disturb PNNL and LIGO operations, predominantly from haul trucks and heavy  
3759 equipment operation. Representative facilities with the most potential to cause this effect would be  
3760 the biofuels manufacturing and the rail distribution center facilities, although any of the representative  
3761 facilities that use heavily laden trucks would contribute to cumulative impacts on PNNL and LIGO.  
3762 Similar activities on Horn Rapids Road or the industrial park would have a cumulative effect,  
3763 including the future development of the newly-purchased rock quarry on Stevens Drive across from  
3764 PNNL.

3765 The Proposed Action would contribute incrementally to cumulative impacts in the ROI; however,  
3766 noise is less of a cumulative issue than vibration because it dissipates more readily with distance and  
3767 is regulated by the City of Richland at each facility’s site boundary whereas vibration is not.

**3768 Electromagnetic Field**

3769 EMF levels for the Proposed Action would be less than the EMF generated by the Sandhill Crane  
3770 substation just southwest of the corner of Stevens Drive and Horn Rapids Road and adjacent to

3771 PNNL. Because of being farther away, EMF from the representative facilities is not expected to affect  
3772 PNNL's identified sensitive receptors. Therefore, the Proposed Action is not expected to contribute to  
3773 cumulative effects in the ROI.

#### 3774 **4.1.10 Utilities and Infrastructure**

3775 Current levels and patterns of use of the utilities and infrastructure are an effect of the past and  
3776 present actions that have occurred within the PA and surrounding urban environment. The Proposed  
3777 Action would generate increased demand on utilities (e.g., electricity, natural gas, water, and sewer).  
3778 Potable water usage at the Hanford Site has been approximately 215 million gallons per year, which  
3779 is less than 5 percent of the capacity of the Hanford Export Water System (DOE 2012b). According  
3780 to the *City of Richland Comprehensive Land Use Plan* (City of Richland 2008), the city has water  
3781 rights to 58 million gallons per day (mgd) with an average daily water use of 14.7 mgd and a peak use  
3782 of 34 mgd (see **Section 3.10.2.2**). The rough estimate of water use for the Proposed Action at build  
3783 out is 2.3 mgd (see **Table 3-14**).

3784 The Proposed Action would not require significant amounts of electrical power or water during  
3785 construction. Once operational, the Proposed Action would contribute to cumulative demands in the  
3786 ROI on electricity and water.

#### 3787 **4.1.11 Transportation**

3788 Current levels and patterns of use of the transportation system are an effect of the past and present  
3789 actions that have occurred within the Hanford ROI. The bulk of daily traffic comes from commuters  
3790 (DOE 2012b). Traffic levels would increase following implementation of the Proposed Action and  
3791 future development of the land. The Benton-Franklin Council of Governments' 2011-2032 Regional  
3792 Transportation Plan modeling predicted in the 2020 "build" scenario<sup>22</sup> that peak hour traffic volumes  
3793 would be well below the capacity (i.e., peak hour volumes would be less than 50 percent of the  
3794 capacity of the roadway) of Stevens Drive, George Washington Way, and Horn Rapids Road around  
3795 the PA (Benton-Franklin Council of Governments 2012).

3796 The regional road network in the vicinity of the PA consists of several main roads, including:

- 3797 • State Route 240 (to the southwest of the PA) is a six-lane highway that connects to Stevens  
3798 Drive in Richland. State Route 240 is a designated freight route in the *Citywide*  
3799 *Transportation Plan* for the Tri-Cities (DKS Associates 2005).
- 3800 • Route 4 South, a four-lane, north-south principal arterial that runs along the eastern border of  
3801 the PA, and then turns to the northwest in the northeastern portion of the PA.
- 3802 • Stevens Drive, a four-lane, north-south principal arterial that adjoins Route 4 South at the  
3803 Horns Rapid Road intersection.
- 3804 • George Washington Way, a principal four-lane north-south arterial through Richland that  
3805 intersects Stevens Drive east of the PA.
- 3806 • Horn Rapids Road, an east-west minor arterial on the southern border of the PA.
- 3807 • Kingsgate Way is a north-south minor arterial that ends at Horn Rapids Road about 1.5 miles  
3808 west of Stevens Drive.

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<sup>22</sup> As part of the regional transportation planning, future transportation conditions were modeled based on planned land use and transportation projects and projected changes in regional population and employment.

3809 The Tri-City Railroad Company maintains and operates about 12 miles of rail formerly owned by  
3810 DOE. In 1998 the Port of Benton received 750 acres of land and numerous buildings from DOE for  
3811 economic development purposes, and the railroad serves this area and the City of Richland's Horn  
3812 Rapids Industrial Site (via a spur line built by the city in 1997) (DKS Associates 2005). The rail line  
3813 runs west of Stevens Drive south of and within the PA, and crosses Horn Rapids Road at grade just  
3814 west of Stevens Drive. The crossing is equipped with gates and signals.

3815 The Proposed Action incremental impacts to transportation from construction and operation of the  
3816 representative facilities would depend on the types of facilities and when they are constructed. Other  
3817 reasonably foreseeable future actions, such as continued development and operation of the Horn  
3818 Rapids Industrial Park, would also affect the primary roads serving the PA. Assessment of project-  
3819 specific impacts and improvements to the surrounding roadways that serve as the access routes to the  
3820 PA may be required and adverse impacts would be addressed by the local agency (e.g., City of  
3821 Richland). The construction of a rail distribution center would require a substantial increase in the use  
3822 of the tracks near Stevens Drive and has the potential to cause traffic delays when 55-car trains are  
3823 pulling onto the FSA lands twice a week.

3824 The roadways around the conveyance lands currently support commuter traffic to DOE, PNNL,  
3825 Energy Northwest, Environmental Restoration Disposal Facility, and other Hanford Site project  
3826 locations to the north. The same roadways also support AREVA, Perma-Fix, and other facilities on  
3827 the Horn Rapids Industrial Park that produce both commuter and truck transportation traffic. The  
3828 recently purchased rock quarry on Stevens Drive may produce additional haul truck traffic to these  
3829 same roads once it is operational. The industrial development of the FSA lands would result in  
3830 increased traffic and congestion during both construction and operation, the severity of which would  
3831 vary depending on the rate and extent of development.

#### 3832 **4.1.12 Waste Management**

3833 There are currently no waste generating or disposal activities on the FSA. Solid waste management in  
3834 the City of Richland is guided by the *City of Richland Solid Waste Management Plan* (City of  
3835 Richland 2011) and the *2006 Solid Waste Management Plan* (Benton County 2007). In 2013, the City  
3836 of Richland generated 69,274 tons of solid waste. Of this total, 15,125 tons (approximately 22  
3837 percent) were recycled and 54,149 tons were landfilled at the City of Richland-owned and -operated  
3838 Horn Rapids Sanitary Landfill (City of Richland 2014). Projections made in the 2011 solid waste  
3839 management plan predicted that the current permitted space of the landfill would be filled by 2018.  
3840 The city is exploring options for future growth, including expanding the Horn Rapids Sanitary  
3841 Landfill or closing the landfill and long-hauling the waste out of the city (City of Richland 2011).  
3842 Recycling in the city is collected from voluntary curbside collection and from seven recycling  
3843 drop-off centers throughout the city. The city delivers all recycled materials to Clayton Ward  
3844 Recycling in Richland, where the materials are sent to recycling centers in Western Washington or  
3845 Oregon (City of Richland 2011).

3846 Nonhazardous solid waste from the Hanford Site is disposed of at the Roosevelt Regional Landfill  
3847 near Glendale, Washington (DOE 2012a). The Hanford Site has established target objectives for solid  
3848 waste reduction by reuse and recycling of 10 percent per year, based on a fiscal year 2010 baseline. In  
3849 fiscal year 2013, approximately 600 metric tons were generated and disposed of at the Roosevelt  
3850 Regional Landfill, while more than 1,300 metric tons of solid waste were recycled (DOE 2014c).

3851 Construction activities associated with the Proposed Action would generate nonhazardous waste of all  
3852 types (see **Section 3.12**). The increased demand would not exceed the capacity of the existing waste  
3853 management system. Local waste disposal transporters and landfills would be used where  
3854 appropriate. However, it is anticipated that solid waste would be recycled and reclaimed to the

3855 maximum extent possible. The minimal number of workers needed for operation and maintenance  
3856 would not impact solid waste management facility use.

3857 The Proposed Action would incrementally contribute to cumulative demands in the ROI on waste  
3858 management facilities built in the FSA.

#### 3859 **4.1.13 Socioeconomics and Environmental Justice**

3860 The ROI for the cumulative socioeconomic analysis comprises Benton and Franklin counties.  
3861 Activities on the Hanford Site play a substantial role in the socioeconomics of the Tri-Cities area. The  
3862 communities surrounding the PA provide the people, goods, and services required by businesses and  
3863 industries at the Hanford Site. These businesses and industries in turn create the demand for  
3864 employees, goods, and services and acquire these resources in the form of wages, benefits, and  
3865 purchases of goods and services. Since the 1970s, DOE and its contractors have been one of three  
3866 primary contributors to the local economy (the other two are Energy Northwest and the agricultural  
3867 community) (DOE 2013c). According to employee residence records from April 2007, over  
3868 90 percent of DOE contract employees of the Hanford Site lived in Benton and Franklin counties  
3869 (DOE 2012b). Approximately 73 percent resided in Kennewick, 36 percent in Richland, and  
3870 11 percent in Pasco. Residents of other areas of Benton and Franklin counties, including West  
3871 Richland, Benton City, and Prosser account for about 17 percent of total DOE contractor employment  
3872 (DOE 2012b).

3873 As discussed in **Section 3.13.1.3**, this EA has not identified any human health or environmental  
3874 impacts that would adversely affect minority or low-income populations. The Proposed Action would  
3875 not result in disproportionately high and adverse effects on minority or low-income populations.

#### 3876 **4.1.14 Human Health and Safety**

3877 Major sources and average levels of exposure to natural background radiation and other non-site-  
3878 related sources to individuals in the Hanford vicinity are shown in **Table 3-25**.<sup>23</sup> The average annual  
3879 dose from these sources is approximately 620 millirem. About half of the annual dose is from natural  
3880 background sources (311 millirem) that can vary depending on geographic location, individual  
3881 buildings in the geographic area, or age, but is essentially all from space or naturally occurring  
3882 minerals in rock and soil. Approximately the remaining half of the dose is from medical exposure to  
3883 radiation (300 millirem), including computed tomography, fluoroscopy, x-rays, and nuclear medicine  
3884 (use of unsealed radionuclides for diagnosis and treatment). Another approximately 14 millirem are  
3885 from consumer products and other sources (e.g., nuclear power, security, research, and occupational  
3886 exposure) (NCRP 2009). All doses identified in **Table 3-24** are unrelated to Hanford site operations,  
3887 and are provided as a context for subsequent comparison (and perspective) to the *de minimis* doses  
3888 typically associated with the latter.

3889 In summary, doses to the public from greater Hanford Site operations fall well within the limits  
3890 established in 40 CFR 61, Subpart H (10 millirem per year from airborne sources) and DOE O 458.1  
3891 (DOE 2011; 100 millirem per year from all sources), and are much lower than those due to natural  
3892 background radiation. In general, airborne emissions of tritium and radon-220 from the 300 Area,  
3893 along with uranium-234 and uranium-238 effluents via the Columbia River, account for the vast  
3894 majority of calculated dose to the maximally exposed individual for the greater Hanford Site  
3895 (DOE 2014b).

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<sup>23</sup> Average doses from background radiation in the Hanford vicinity are assumed to approximate the average dose to an individual in the United States population.

3896 Compliance with the requirements in DOE O 458.1 (DOE 2011) for the control, clearance, and  
3897 release of DOE property containing potential residual radioactivity will ensure that potential  
3898 radiological sources within such property are mitigated or altogether eliminated prior to completion of  
3899 the land conveyance process. The human health and safety effects from the Proposed Action would  
3900 not contribute to cumulative impacts on human health and safety in the ROI.

3901

## 3902 5.0 APPLICABLE LAWS, REGULATIONS, AND OTHER REQUIREMENTS

3903 This chapter addresses the major laws, regulations, and other requirements required for implementing  
3904 the Proposed Action to convey lands. Most of these laws and regulations are identified and described  
3905 in the *Cross-Cut Guidance on Environmental Requirements for DOE Real Property Transfers*  
3906 *(Update)* (DOE 2005b). This guidance provides information on the environmental requirements  
3907 associated with the conveyance of real property out of the U.S. Department of Energy's (DOE)  
3908 custody and control. Other guidance is provided in the *DOE Real Estate Desk Guide* (DOE 2014d).

3909 It is assumed that the Tri-City Development Council (TRIDEC) or future landowners would comply  
3910 with all federal, state, and local statutory requirements applicable to the construction and operation of  
3911 their respective facilities.

3912 **Section 5.1** provides a description of the DOE's 10 CFR 770 implementing regulation for "Transfer  
3913 of Real Property at Defense Nuclear Facilities for Economic Development." **Section 5.2** addresses the  
3914 *National Defense Authorization Act* (NDAA) (Public Law 113-291). **Section 5.3** addresses DOE's  
3915 real property disposal authority. **Section 5.4** discusses the environmental and health and safety  
3916 requirements for real property conveyance. **Section 5.5** discusses the realty instruments relative to the  
3917 Hanford Site land conveyance.

### 3918 5.1 10 CFR 770, Transfer of Real Property at Defense Nuclear Facilities for Economic 3919 Development

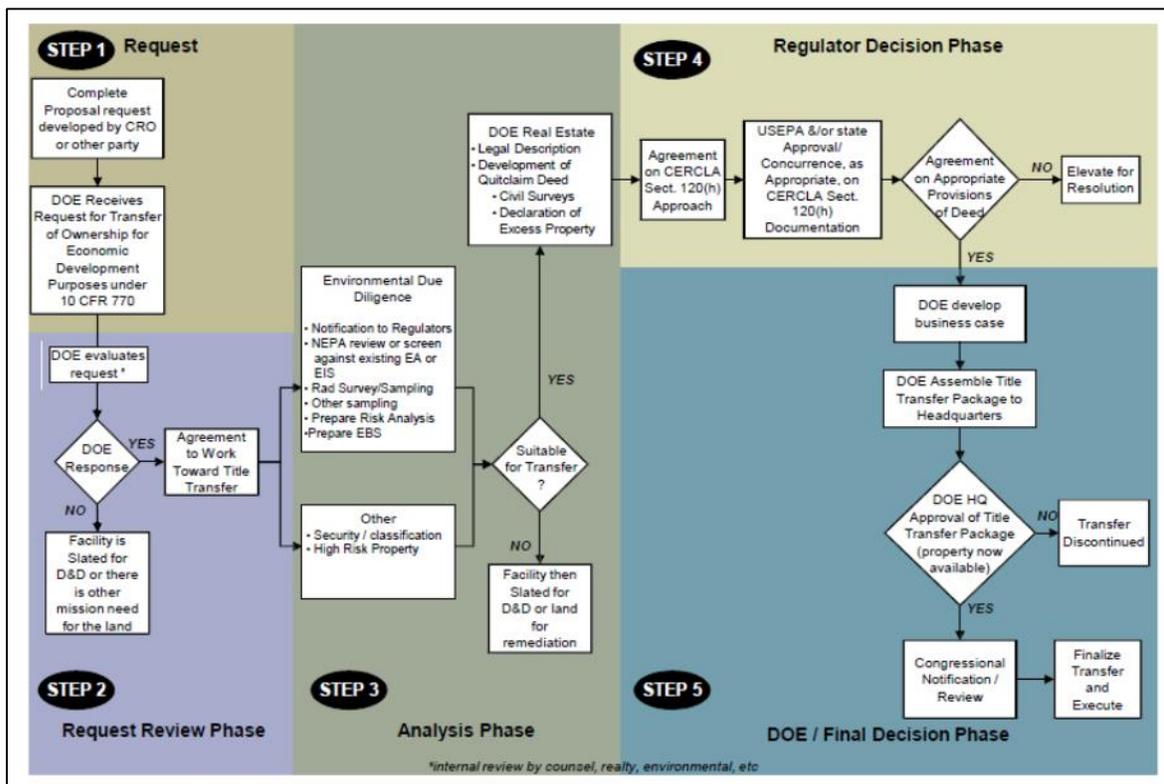
3920 TRIDEC's request for 1,641 acres was made in accordance with DOE's 10 CFR 770 implementing  
3921 regulation. 10 CFR 770 establishes how DOE will transfer, by sale or lease, real property at closed or  
3922 downsized defense nuclear facilities for economic development purposes. Section 3158 of the NDAA  
3923 directed DOE to prescribe regulations that describe procedures for the transfer by sale or lease of real  
3924 property at such defense nuclear facilities. Transfers of real property under these regulations are  
3925 intended to offset negative impacts on communities caused by unemployment from related DOE  
3926 downsizing, facility closeouts, and work force restructuring at these facilities. Section 3158 also  
3927 provides discretionary authority to the Secretary of Energy to indemnify transferees of real property  
3928 at DOE defense nuclear facilities. 10 CFR 770 sets forth the indemnification process.

3929 The overall 10 CFR 770 process can be generally described as a series of steps: request, request  
3930 review, analysis, regulator decision, and DOE final decision. **Figure 5-1**, "Overview of the 10 CFR  
3931 770 Process," is a flowchart showing these steps of the process.

3932 This environmental assessment (EA) is part of the "Environmental Due Diligence" under Step 3, the  
3933 Analysis Phase (see **Figure 5-1**).

3934

Figure 5-1. Overview of the 10 CFR 770 Process



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Source: Modified from Cooke 2012.

5.2 National Defense Authorization Act for Fiscal Year 2015

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Section 3013 of the NDAA pertains specifically to the land conveyance action, requiring that two parcels of approximately 1,341 acres and 300 acres be transferred by DOE to TRIDEC by September 30, 2015. The following is Section 3013 in its entirety as taken from the congressional website (<https://www.congress.gov/bill/113th-congress/house-bill/3979/text>).

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SEC. 3013. LAND CONVEYANCE, HANFORD SITE, WASHINGTON.

(a) Conveyance Required.--

(1) In general.--Not later than September 30, 2015, the Secretary of Energy shall convey to the Community Reuse Organization of the Hanford Site (in this section referred to as the "Organization") all right, title, and interest of the United States in and to two parcels of real property, including any improvements thereon, consisting of approximately 1,341 acres and 300 acres, respectively, of the Hanford Reservation, as requested by the Organization on May 31, 2011, and October 13, 2011, and as depicted within the proposed boundaries on the map titled "Attachment 2-Revised Map" included in the October 13, 2011, letter.

(2) Modification of conveyance.--Upon the agreement of the Secretary and the Organization, the Secretary may adjust the boundaries of one or both of the parcels specified for conveyance under paragraph (1).

(b) Consideration.--As consideration for the conveyance under subsection (a), the Organization shall pay to the United States an amount equal to the estimated fair market value of the conveyed real property, as determined by the Secretary of Energy, except that the Secretary may convey the property without consideration or

3960 for consideration below the estimated fair market value of the property if the  
 3961 Organization--  
 3962 (1) agrees that the net proceeds from any sale or lease of the property (or any  
 3963 portion thereof) received by the Organization during at least the seven-year period  
 3964 beginning on the date of such conveyance will be used to support the economic  
 3965 redevelopment of, or related to, the Hanford Site; and  
 3966 (2) executes the agreement for such conveyance and accepts control of the real  
 3967 property within a reasonable time.  
 3968 (c) Expedited Notification to Congress.--Except as provided in subsection (d)(2), the  
 3969 enactment of this section shall be construed to satisfy any notice to Congress  
 3970 otherwise required for the land conveyance required by this section.  
 3971 (d) Additional Terms and Conditions.--  
 3972 (1) In general.--The Secretary of Energy may require such additional terms and  
 3973 conditions in connection with the conveyance under subsection (a) as the Secretary  
 3974 deems necessary to protect the interests of the United States.  
 3975 (2) Congressional notification.--If the Secretary uses the authority provided by  
 3976 paragraph (1) to impose a term or condition on the conveyance, the Secretary shall  
 3977 submit to Congress written notice of the term or condition and the reason for  
 3978 imposing the term or condition.

3979 The “Attachment 2 – Revised Map” referred to in Section 3013 is **Figure 2-5** included in  
 3980 **Chapter 2.0** of this EA.

### 3981 **5.3 U.S. Department Of Energy Real Property Conveyance Authority**

3982 Although not necessarily applicable to the transfer of lands in accordance with the NDAA, DOE has  
 3983 real property conveyance authority under several laws. Some of these may also be relevant to those  
 3984 lands identified within the Potential Access Agreement Land (PAAL). The primary authorities for  
 3985 DOE to convey real property are:

- 3986 • The *Atomic Energy Act* (42 USC 2201(g)), Section 161(g) – authorizes DOE to sell, lease,  
 3987 grant, and dispose of such real property as provided in the Act. Section 161(q) allows for  
 3988 easements for rights-of-way.
- 3989 • *Atomic Energy Community Act* (42 USC 2301) – authorizes DOE to dispose of real property  
 3990 within the atomic energy communities of Oak Ridge, Tennessee; Richland, Washington; and  
 3991 Los Alamos, New Mexico.
- 3992 • *DOE Organization Act* (42 USC 7256), Sections 646(c)-(f) (together these sections are  
 3993 known as the “Hall Amendment”) – authorizes DOE to lease property.
- 3994 • *DOE Organization Act* (42 USC 7259), Section 649 – authorizes DOE to lease facilities.

### 3995 **5.4 Environmental and Health and Safety Requirements for Real Property Conveyance**

3996 The mechanics of real property conveyance for DOE involve a complex array of regulations  
 3997 promulgated by federal agencies, many of which are addressed in DOE's guidance document  
 3998 (DOE 2005b). As the guidance describes, the procedures required when real property is conveyed  
 3999 differ depending on how the property came under DOE's control (e.g., acquired or withdrawn from  
 4000 another federal agency). The lands being considered for conveyance in the Focused Study Area (FSA)  
 4001 are comprised entirely of land that was in non-federal ownership prior to acquisition by the federal  
 4002 government for the formation of the Hanford nuclear facility.

4003 Certain provisions of the *Comprehensive Environmental Response, Compensation, and Liability Act*  
4004 (CERCLA) (42 USC 9601 et seq.) are relevant to this proposed conveyance. Specifically,  
4005 CERCLA Section 120(h) requires information on the type and quantity of any hazardous substance  
4006 that was stored for 1 year or more, known to have been released, or disposed of on the property and  
4007 the time at which the substance was stored, released, or disposed. These CERCLA Section 120(h)  
4008 reporting requirements, and the amounts that trigger reporting, are codified at 40 CFR 373. CERCLA  
4009 Section 120(h) also requires identification of areas on the real property “on which no hazardous  
4010 substances and no petroleum products or their derivatives were known to have been released or  
4011 disposed of.” This identification is required when the United States intends to terminate Federal  
4012 government operations on property it owns.

4013 In accordance with CERCLA Section 120(h)(4), DOE performed the necessary reviews and  
4014 investigations to identify certain lands as “uncontaminated” (i.e., on which no hazardous substances  
4015 and no petroleum products or their derivatives were known to have been released or disposed of).

4016 The identification of uncontaminated properties is considered complete when the U.S. Environmental  
4017 Protection Agency (EPA) concurs for property on the National Priorities List (NPL), or when the  
4018 appropriate State official concurs for property not on the NPL. For the Proposed Action, all of the  
4019 property DOE identified to be uncontaminated is part of a facility on the NPL; therefore, EPA’s  
4020 concurrence was sought. On August 24, 2015, DOE submitted the *CERCLA 120(h) Documentation*  
4021 *Supporting conveyance of 1,641 Acres of Land at the Hanford Site, DOE/RL-2015-52* to EPA for  
4022 concurrence on the identification of certain lands as uncontaminated property. On September 8, 2015,  
4023 EPA provided its concurrence, which completed the CERCLA Section 120(h)(4) process.

4024 Additionally, DOE identified one Waste Information Data System site (600-386) located in the FSA  
4025 that was remediated and added to the 300 Area Final Record of Decision (ROD) as “No additional  
4026 action needed...” through the *Explanation of Significant Differences for the Hanford Site 300 Area*  
4027 *Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1*  
4028 (DOE 2015b). Lead was released as an abandoned dry cell battery. As stated, this site was remediated  
4029 under CERCLA Section 120(h) cleanup actions.

4030  
4031 In accordance with CERCLA Section 120(h)(3) and (4), DOE would include the requisite information  
4032 and covenants in the deed relative to those lands identified as uncontaminated and remediated.

4033 **Table 5-1**, “Comparison of the CERCLA Requirements for Sections 120(h)(1), (3), (4), and (5),”  
4034 compares and summarizes CERCLA Sections 120(h)(1), (3), (4), and (5) requirements (DOE 1998).

4035

**Table 5-1. Comparison of the CERCLA Requirements for Sections 120(h)(1), (3), (4), and (5)**

Requirement	Section 120(h)(1)	Section 120(h)(3)	Section 120(h)(4)	Section 120(h)(5)
Brief Description	Include in the contract for sale or transfer a notice of the types and quantities of hazardous substances stored $\geq$ 1 year, disposed of, or released on the property and the time at which these activities took place.	Report on the deed the types and quantities of hazardous substances stored for $\geq$ 1 year, disposed of, or released on the property, and the time at which these activities took place.	Identify uncontaminated parcels of land (i.e., land on which no contaminants were stored $\geq$ 1 year, disposed of, or released).	Notify states of sites that are being closed and that are encumbered by a lease beyond the closure date and are contaminated (i.e., land on which contaminants were stored $\geq$ 1 year, disposed of, or released).
Contaminants Covered	Hazardous substances as found at 40 CFR 302.4 only.	Hazardous substances as found at 40 CFR 302.4 only.	Hazardous substances or any petroleum product or its derivatives.	Hazardous substances or any petroleum product or its derivatives.
Threshold Quantities	As specified by 40 CFR 373: the greater of 1,000 kg or the RCRA RQ for storage of $\geq$ 1 year; the RQ for release or disposal; and 1 kg for acutely hazardous waste.	As specified by 40 CFR 373: the greater of 1,000 kg or the RQ for storage of $\geq$ 1 year; the RQ for release or disposal; and 1 kg for acutely hazardous waste.	Not specified; the same thresholds specified by Sections 120(h)(1) and (3) are suggested.	Not specified; the same thresholds specified by Sections 120(h)(1) and (3) are suggested.
Information Source	Departmental files only; however, it is a best management practice to follow the most stringent data gathering requirements [found at Section 120(h)(4)].	Departmental files only; however, it is a best management practice to follow the most stringent data gathering requirements [found at Section 120(h)(4)].	Reasonably obtainable federal, state, and local government records and other sources (e.g., interviews, physical inspection, sampling, and aerial photographs).	Not specified, however, it is a best management practice to follow the most stringent data gathering requirements [Section 120(h)(4)].
Types of Real Property Transfers Covered	All real property transfers regardless of whether ownership changes, including transfers between federal agencies.	All real property transfers in which ownership changes, and transfers between federal agencies.	Not specified.	Leases of real property after operations cease.

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**Key:** kg = kilogram; RCRA = *Resource Conservation and Recovery Act*; RQ = reportable quantity.

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**Source:** DOE 1998a.

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The Hanford Site is considered a single facility for purposes of the *Resource Conservation and Recovery Act* (42 USC 6901, as amended) and the *Washington State Hazardous Waste Management Act* (RCW 70.105). In accordance with these acts and their implementing regulations at 40 CFR 264, 40 CFR 265, and WAC 173-303, owners and operators of dangerous waste facilities must obtain a permit. Although no hazardous or dangerous waste facilities, or treatment, storage, or disposal facilities are on the PA, it is currently contiguous property under the control of DOE. Pursuant to WAC 173-303-830(4), the DOE will submit an application to the Washington State Department of Ecology (Ecology) to modify the legal description and operating boundary of the *Dangerous Waste Portion of the Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste, WA7890008967, Revision 8C* (Permit) removing land from the permit. Until Ecology approves the modification to the permit, DOE will continue to be responsible for fulfilling any corrective action requirements imposed by the regulations on this land. Upon successful

4051 completion of the modification, the land transferred out of DOE ownership will no longer be subject  
4052 to the requirements of the DOE permit.

4053 The *National Historic Preservation Act* (NHPA), as amended (54 USC 300101 et seq.), governs the  
4054 consideration of historic properties in real property conveyance. The regulations implementing  
4055 Section 106 of this act are located in “Protection of Historic Properties” (36 CFR 800). DOE’s  
4056 compliance with the requirements of the NHPA are discussed in **Section 3.6**. This process has  
4057 resulted in a signed memorandum of agreement (MOA; see **Appendix K**, “Memorandum of  
4058 Agreement”).

4059 DOE O 458.1, *Radiation Protection of the Public and the Environment*, Change 3 (DOE 2011),  
4060 establishes requirements to protect the public and the environment against undue risk from radiation  
4061 associated with radiological activities conducted under the control of DOE, pursuant to the *Atomic*  
4062 *Energy Act*, as amended. DOE’s compliance with this order and other applicable federal, state, or  
4063 local regulations relative to protection of the public from residual radioactive material and other  
4064 hazardous substances is discussed in **Section 3.14**. Independent verification was completed on July  
4065 21, 2015, in accordance with the DOE O 458.1, and a closeout letter (ORISE 2015) was issued on  
4066 that date.

4067 DOE’s responsibilities to protect floodplains and wetlands in real property dispositions are described  
4068 in 10 CFR 1022 (see **Section 3.5**).

## 4069 **5.5 Realty Instruments for Hanford Site Land Conveyance**

4070 Generally, DOE may convey land as a transfer of deed or other realty instruments (e.g., lease, permit,  
4071 or easement). DOE would use real estate (realty) instrument language as one potential mechanism to  
4072 preclude or minimize environmental consequences. DOE would use deed restrictions (private  
4073 agreements that restrict the use of the real estate in some way, and are listed in the deed), covenants (a  
4074 promise in a written contract to agree to something), or other forms of conditional language in the  
4075 conveyance realty instrument(s) to allow DOE to mitigate potential environmental consequences,  
4076 meet regulatory obligations, and protect mission and operational needs.

### 4077 **5.5.1 Conveyance by Deed**

4078 Upon conveyance by deed, the land would no longer be under DOE regulatory oversight. DOE would  
4079 include certain restrictions and covenants in the deed as necessary to mitigate potential impacts.

4080 **Table 5-2**, “Deed Restrictions and Covenants,” includes deed restrictions and covenants for land that  
4081 may be conveyed.

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**Table 5-2. Deed Restrictions and Covenants**

<b>Restrictions/ Covenants</b>	<b>Description</b>
Net Proceeds	All net proceeds from sale or lease of the premises (or any portion thereof) received by Grantee during the seven-year (7) period beginning on the date of this conveyance will be used by Grantee to support the economic redevelopment of, or related to, the Hanford Site consistent with the NDAA.
Boundary Monuments	Grantee is prohibited from disturbing any permanent boundary monument, symbol, stake or other marker designating the property boundary of the premises.
Groundwater	Grantee is prohibited from extracting, permitting to be extracted, consuming or otherwise accessing or utilizing any groundwater below the surface of the premises.
Groundwater Monitoring	<ul style="list-style-type: none"> <li>• Grantee is prohibited from altering, destroying or otherwise tampering with Grantor's established roads or other access routes to all groundwater monitoring wells.</li> <li>• Grantee is prohibited from developing an alternate access road or other access route to all groundwater monitoring wells without receiving Grantor's written permission, which will not unreasonably be withheld.</li> <li>• Grantee is prohibited from tampering with or damaging Grantor's groundwater monitoring or remediation systems located on the premises.</li> <li>• Grantee is prohibited from access closer than twenty (20) feet around the periphery of Grantor's groundwater monitoring wells and remediation systems, as delineated on the ground by Grantor. The designated twenty (20) feet around each groundwater well and all remediation systems is for Grantor's exclusive access only.</li> <li>• Grantee is prohibited from narrowing or shortening the minimum required width of ten (10) feet for the full length of all roads or other access routes or approved alternate access routes to Grantor's groundwater wells. The designated roads or access routes to or from Grantor's groundwater wells are non-exclusive in nature such that such roads and routes may be accessed by Grantee, with the exception of the twenty (20) feet radius around each groundwater well, which is for Grantor's access only.</li> </ul>
Stormwater Discharge	Grantee is prohibited from placement of swales, ponds, and other stormwater drainage facilities in the area between the following two lines: (a) line 1,969 feet (600 meters) north of the centerline of Horn Rapids Road, and (b) line 15,781 feet (4,810 meters) north of the centerline of Horn Rapids Road
Excavation	Any ground disturbance performed by the Grantee resulting from construction activities, construction or installation of any piping or utility system component, drilling, digging or other any excavation, of whatsoever nature and type, on any portion of the premises is prohibited below a depth of twenty (20) feet (6.1 meters) from the surface of the ground, and prohibited within 6.6 feet (2 meters) of the groundwater whichever is most restrictive, except upon the express written permission of the Grantor.
Mining	Grantee is prohibited from mining the premises including extraction or production of any coal, oil, gas, geothermal steam, associated geothermal resources, aggregate and any other minerals.
Concentrating Solar Power Farm	Grantee is prohibited from constructing and operating a concentrating solar power solar farm system on the premises.
Noise Restrictions	Grantor requires Grantee's acoustic and noise signature on the premises will not exceed current Washington State standards and exemptions for Class C industrial areas.
Vibration Restrictions	<p>The Grantee, its successors and assigns, covenants and agrees to restrict or prohibit activities on the premises that generate vibration in excess of the PNNL Vibration Standard and the LIGO Vibration Standard described below:</p> <p>(1) <u>PNNL Vibration Standard</u>. The parties are in agreement that, after the date of this conveyance, vibration impacts arising from the premises shall be limited such that:</p> <ol style="list-style-type: none"> <li>a. Any heavy reciprocating machinery must be at least three (3) kilometers from the PNNL Site boundary</li> <li>b. Any balanced non-reciprocating industrial machinery must be at least one (1) kilometer from the PNNL Site boundary</li> <li>c. Activities on the premises that result in vibrations created by continuous and/or routine blasting are prohibited. To the extent any uncertainty arises with respect to the application of this vibration standard for non-routine blasting, Article 12, Periodic Discussions and Development Plans, of Exhibit H of the Quitclaim Deed shall be utilized to mitigate those non-routine blasting activities.</li> </ol> <p>(2) <u>LIGO Vibration Standard</u>. The parties are in agreement that, after the date of this conveyance, vibration (dependent on frequency) emanating from the premises shall be consistent with non-</p>

Restrictions/ Covenants	Description
	<p>reciprocating power plant machinery or balanced industrial machinery operating above 300 RPM (5Hz) or must meet the following specifications below 300 RPM (5 Hz):</p> <ol style="list-style-type: none"> <li>a. In the frequency range from 0.3 Hz to 1.5 Hz, ground vibration levels as measured 100 meters from the source should not exceed 0.3 micrometers/ sec/root (Hz). For example, in the frequency band from 0.5 Hz to 1.5 Hz this would be equivalent to a vibration level of 0.3 micrometers/sec RMS.</li> <li>b. In the frequency range from 1.5 Hz to 2.5 Hz, ground vibration levels as measured 100 meters from the source should not exceed 0.3 micrometers/ sec/root (Hz). For example, in the frequency band from 1.5 Hz to 2.5 Hz this would be equivalent to a vibration level of 0.3 micrometers/sec root mean square (RMS).</li> <li>c. In the frequency range from 2.5 Hz to 3.5 Hz, ground vibration levels as measured 100 meters from the source should not exceed 0.5 micrometers/ sec/root (Hz). For example, in the frequency band from 2.5 Hz to 3.5 Hz this would be equivalent to a vibration level of 0.5 micrometers/sec RMS.</li> <li>d. In the frequency range from 3.5 Hz to 5 Hz, ground vibration levels as measured 100 meters from the source should not exceed 2.5 micrometers/ sec/root (Hz). For example, in the frequency band from 3.5 Hz to 5 Hz this would be equivalent to a vibration level of 3 micrometers/sec RMS.</li> <li>e. These vibration levels should be compatible with operation of motor vehicles driven on smooth pavement. However trucks driven off-pavement, over pavement in poor repair, or over speed bumps would likely cause these vibration levels to be exceeded.</li> <li>f. Reciprocating power-plant machinery, rock crushers and heavy machinery would likely cause these vibration levels to be exceeded.</li> </ol>
Electric Field & Magnetic Interference (referred to as EMF in the EA)	<p>Grantee agrees to restrict or prohibit activities on the premises that generate electrical field (EF) and magnetic (M) interferences in excess of the EF/M Interference Standard described below.</p> <p>A. <u>EF/M Interference Standard</u>. The parties are in agreement that, after the date of this deed transfer, all intentional radiators on the premises shall not exceed the Federal Communications Commission Standard at 47 CFR Part 15, Subpart C.</p>
Radionuclide Emissions	<p>By acceptance of this deed, the Grantee covenants and agrees to restrict or prohibit activities on the premises that cause airborne radionuclide emissions in excess of the Natural Occurrences and Radionuclide Emissions Standards described below.</p> <p>A. <u>Radionuclide Emissions Standard</u>. The Grantee is prohibited from activities on the premises creating or otherwise causing emissions into the airborne environment arising from the possession, use or discharge from any fissionable material, fission products or activation products.</p>
Tribal Access to Undeveloped Land	<p>Grantee is required to provide access to the premises prior to its development to members of the Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, the Nez Perce Tribe and the Wanapum Band of Indians (collectively “tribes”) for tribal activities. An access agreement will be developed between the tribes and the land owners to facilitate access.</p>
Buildings and Natural Landscaping	<ol style="list-style-type: none"> <li>(1) The Grantee agrees that the height of buildings that are constructed on the conveyed land will not exceed the height limits that are authorized pursuant to Chapter 23.28.030 of the <i>Richland Municipal Code</i> (RMC); as amended. Grantee agrees that it shall not seek a waiver of the height limitations contained in these provisions of the RMC by utilizing the variance provisions of RMC 23.70.150, or by application of any other process that may allow the Grantee to construct a building with a height greater than that explicitly allowed by RMC Chapter 23.28.030.</li> <li>(2) The Grantee agrees that buildings (including roofs) will be finished in colors that are non-reflective and that emulate those of the natural surroundings.</li> <li>(3) The Grantee agrees to xeriscaping utilizing native plants to lessen impacts to adjacent plant communities and eliminate need for supplemental watering.</li> </ol>
Cultural Resource Protection	<p>Grantee is required to comply with Washington State laws for cultural resource protection:</p> <ol style="list-style-type: none"> <li>(1) Indian Graves and Records Act (RCW 27.44);</li> <li>(2) Archaeological Sites and Resources Act (RCW 27.53);</li> <li>(3) Abandoned and Historic Cemeteries and Historic Graves Act (RCW 68.60);</li> <li>(4) Archaeological Excavation and Removal permit process (WAC 25-48); and</li> <li>(5) Human Remains (RCW 68.50).</li> </ol>

Restrictions/ Covenants	Description
Pre-Contact Archeological Materials	Grantor retains ownership of all pre-contact archeological materials. Grantee is required to return all pre-contact archeological material to Grantor for relocation in consultation with tribes.
Contaminated Pre-Contact Artifacts or Human Remains	Grantee is required to return any and all contaminated pre-contact artifacts or human remains found on the premises to Grantor for tribal consultation and reburial on the Hanford Site.
Enforcement of Deed	This restriction has been put in place to set forth the required protocol, in the event that Grantee does not comply with one or more deed restrictions of the Quitclaim Deed. On an annual basis Grantee shall submit a report to Grantor regarding Grantee’s compliance with the deed restrictions set forth in this Quitclaim Deed, and any challenges encountered during the previous year.
Cultural Resource Protection Protocol	The Grantee shall implement the Cultural Resource Protection Protocol. The Cultural Resource Protection Protocol can be amended as agreed to between Grantee and the tribes. (See <b>Appendix K</b> ).
Land Use Planning	Grantee will comply with all applicable land use planning laws, statutes, regulations, codes, ordinances and provisions, including laws of the State of Washington, Benton County and all applicable municipal authorities, and will obtain all necessary permits.
Cooperation	<ul style="list-style-type: none"> <li>• The Grantor and the Grantee agree to cooperate in good faith to minimize any conflict regarding necessary environmental investigation, monitoring, surveillance, reporting and remediation activities and Grantee's operations.</li> <li>• The Grantor and the Grantee agree that any inspection, monitoring, surveillance, reporting and survey, investigation, or other response or remedial action will, to the extent practicable, be coordinated with representatives designated by the parties.</li> </ul>
Compliance with Applicable Laws	Grantee covenants that it shall comply with all applicable federal, state and local statutes, regulations, orders, directives, administrative provisions, manuals, municipal codes and other applicable laws and will obtain all necessary permits.
Bird-Friendly Design Covenant	Grantee covenants that it will incorporate bird-friendly building design into Grantee’s design for buildings, structures and improvements on the premises to the extent it is reasonably practical to do so.
Fire Protection	Grantee agrees that within the immediate landscaped area (from the structure to approximately 30 feet), special consideration should be given that any combustible materials (e.g., lawn furniture, litter, and construction materials) should be removed or reduced in an effort to protect property (e.g., wildlands, buildings, and equipment) by minimizing fire risk.

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4085 **5.5.2 Conveyance by Realty Instrument Other Than a Deed**

4086 If DOE uses any other realty instrument for conveyance wherein DOE retains administrative  
 4087 jurisdiction, like a lease or easement, DOE could include language in non-deed realty instruments to  
 4088 protect the government’s interest since it retains ownership. Some examples of protective language  
 4089 include:

- 4090 • Access to and in some cases “reserved use” of the premises for such things as maintenance,  
 4091 repair, removal, installation and replacement of infrastructure, or ingress and egress to and  
 4092 from abutting government-owned lands and roads
- 4093 • Termination agreement for such things as nonuse, abandonment, or interference with DOE  
 4094 operations and programs
- 4095 • Indemnification from the user for any claims, costs, or liabilities arising from the user’s  
 4096 activities including but not limited to environmental indemnity
- 4097 • Compensation for destruction of government property

- 4098 • Requirement to obtain all necessary permits, licenses, certifications, and authorizations
- 4099 required for construction, occupancy, and operations while using government land
- 4100 • Requirement to pay for all federal, state, and local taxes levied for use of the government
- 4101 premises
- 4102 • Requirement to obtain a Hanford excavation permit, preserve and protect historic properties
- 4103 and cultural resources by watching for them, and when found stop work until DOE has
- 4104 assessed the significance of the find, and, if necessary, arranged for mitigation of the impacts
- 4105 to the find.

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## 6.0 CONSULTATION AND COORDINATION

4107 U.S. Department of Energy (DOE) published a notice of intent in the *Federal Register* on  
4108 September 19, 2012, (DOE 2012f) that announced its intention to prepare this environmental  
4109 assessment (EA) for the proposed conveyance of Hanford Site land. The notice of intent briefly  
4110 summarized the project, identified preliminary environmental issues, and identified the time of the  
4111 public scoping meeting, the time period for public comment, and a point of contact for questions and  
4112 comment submittal.

### 4113 6.1 Scoping

4114 The DOE held a 30-day scoping period from September 19 to October 19, 2012, during which federal  
4115 agencies; state, tribal, and local governments; special interest groups; concerned citizens; and any  
4116 other interested parties were invited to comment on the scope of this EA, including specific issues  
4117 that should be addressed in the EA. A public scoping meeting was held (October 10, 2012) at the  
4118 Richland Public Library in Richland, Washington. At the public meeting, DOE provided an overview  
4119 of the Proposed Action, an informal question-and-answer period to clarify the information presented,  
4120 and an opportunity for individuals to provide formal written or oral statements. A court reporter  
4121 recorded comments during the meeting (Bridges Reporting & Legal Video 2012). Fifty-three  
4122 individuals registered for attendance at the public meeting.

4123 The following documents were made available on the DOE Hanford *National Environmental Policy*  
4124 *Act* (NEPA) – EAs website (<http://www.hanford.gov/page.cfm/EnvironmentalAssessments>) (DOE  
4125 2012f). Those shown in bold below were provided at the scoping meeting:

- 4126 • September 12, 2012, *Federal Register* “Notice of Intent To Prepare an Environmental  
4127 Assessment (EA) for the Proposed Conveyance”  
4128 ([http://www.hanford.gov/files.cfm/Hanford\\_NOI.pdf](http://www.hanford.gov/files.cfm/Hanford_NOI.pdf))
- 4129 • Tri-City Development Council (TRIDEC) proposal (the DOE website points to the TRIDEC  
4130 website) ([http://tridec.org/images/uploads/MCEI-  
4131 Hanford%20Land%20Request%20Updated%209\\_20\\_12.pdf](http://tridec.org/images/uploads/MCEI-Hanford%20Land%20Request%20Updated%209_20_12.pdf))
- 4132 • Draft Land Conveyance EA Analysis Area  
4133 (<http://www.hanford.gov/files.cfm/HanfordDraftLCEAArea.pdf>)
- 4134 • **Land Conveyance EA Scoping Fact Sheet**  
4135 (<http://www.hanford.gov/files.cfm/ConveyanceEAScopingFact%20Sheet.pdf>)
- 4136 • **Public Scoping Meeting Agenda**  
4137 ([http://www.hanford.gov/files.cfm/Public\\_Scoping\\_Agenda101012.pdf](http://www.hanford.gov/files.cfm/Public_Scoping_Agenda101012.pdf))
- 4138 • **Public Scoping Meeting Presentation**  
4139 ([http://www.hanford.gov/files.cfm/Public\\_Scoping\\_projectoverview.pdf](http://www.hanford.gov/files.cfm/Public_Scoping_projectoverview.pdf))
- 4140 • **Key Requirements Poster** (<http://www.hanford.gov/files.cfm/KeyRequirementsPoster.pdf>)
- 4141 • Public Comments (<http://www.hanford.gov/files.cfm/ScopingMeeting101012.pdf>)
- 4142 • Letters Received (<http://www.hanford.gov/files.cfm/Scopingletters.pdf>).

4143 Displays available at the public meeting included a large map of the Hanford Site EA analysis area,  
4144 and a “key requirements” poster of the four regulatory processes that must be completed for land  
4145 conveyance: the NEPA; the *National Historic Preservation Act* (NHPA) Section 106; the

4146 *Comprehensive Environmental Response, Compensation, and Liability Act*; and DOE O 458.1,  
4147 *Radiation Protection of the Public and the Environment* (DOE 2011).

4148 During the scoping period, DOE received comments from members of the public, public agencies,  
4149 and tribes. Overall, the comments focused on topics that can be grouped into the general categories of  
4150 ecological resources, Hanford site cleanup, the human environment, the NEPA process, the physical  
4151 environment, real estate actions, and tribal concerns and cultural resources. A general comment asked  
4152 how the land transfer could be affected by or cause effects to natural resources due to potential  
4153 existing contamination or cleanup activities at the Hanford Site.

4154 General comment topics and specific concerns:

- 4155 • **Ecological resources** – threatened and endangered species, migratory birds, or fish;  
4156 mitigation plan for the entire analysis area; vegetation management plan; biological  
4157 assessment and *Endangered Species Act* Section 7 consultation (USFWS 2013); critical  
4158 habitat; wetlands.
- 4159 • **Hanford Site cleanup** – chemical or nuclear materials associated with land use, existing  
4160 waste materials and locations, and their potential to affect land use development.
- 4161 • **Human environment** – public health and safety from new industry or accidental release of  
4162 pollutants, economic viability of the transaction/should be conveyed at fair market value,  
4163 improved economic vitality to the area, burden on taxpayers for future uses, effects on roads  
4164 and traffic, compatibility with Pacific Northwest National Laboratories activities, assessment  
4165 of future mission needs, pollution depositories near or on tribal lands, environmental justice  
4166 populations within the analysis area.
- 4167 • **NEPA process** – regulation by the Washington State Department of Ecology should be  
4168 required under separate process; NEPA document should be an environmental impact  
4169 statement; confirm land uses as part of project description; include analysis of new nuclear  
4170 facilities; should not depend on or tier off of the *Final Hanford Comprehensive Land-Use  
4171 Plan Environmental Impact Statement* (DOE 1999a); a finding of no significant impact is  
4172 unacceptable.
- 4173 • **Physical environment** – air quality protection and greenhouse gases, existing radiological  
4174 and chemical contamination and potential of spread to the project area, industrial  
4175 development on uranium plume and known contaminant areas, plan for long-term storage of  
4176 nuclear material, spill prevention/mitigation, mobilization of contaminants in soil, and  
4177 discharges to water resources.
- 4178 • **Real estate actions** – *Hanford Site Biological Resources Management Plan* (DOE 2013e)  
4179 requirements for lease/deed of property, funds from lease or sale to help with cleanup, and  
4180 liability associated with existing contaminants.
- 4181 • **Tribal concerns and cultural resources** – leases follow the *Hanford Site Cultural  
4182 Resources Management Plan* (DOE 2003b); tribes not offered right of first refusal; effects on  
4183 sacred sites, sites listed on or eligible for the National Register of Historic Places (30 CFR  
4184 60), and Hanford Site-specific cultural resources; conduct traditional use survey;  
4185 disproportionate burden of loss to Confederated Tribes of the Umatilla Indian Reservation;  
4186 loss of ability to exercise treaty rights; request for government-to-government consultation;  
4187 purchase of tribal electricity or natural gas; and a site planning advisory board consisting of  
4188 DOE, cooperating agencies, and Comprehensive Land-Use Plan site planning advisory board  
4189 was not created (DOE 1999a).

4190 DOE considered comments received during public scoping in preparing the draft EA.

4191 **6.2 Agencies and Persons Consulted**

4192 DOE has been engaged in discussions with tribes and others regarding TRIDEC's proposal since  
4193 2011. DOE sent letters to the following individuals on May 1, 2012, providing "Upcoming Notice of  
4194 Intent to Prepare an Environmental Assessment for the Proposed Transfer of Land at the Hanford  
4195 Site, Washington, and Notice of National Historic Preservation Act Integration."

4196 Brooklyn Baptiste, Chairman  
4197 Nez Perce Tribe

4198 Harry Smiskin, Chairman  
4199 Confederated Tribes and Bands of the Yakama Nation

4200 Les Minthorn, Chairman  
4201 Confederated Tribes of the Umatilla Indian Reservation

4202 Allyson Brooks  
4203 State Historic Preservation Office  
4204 Washington State Department of Archaeology and Historic Preservation

4205 J. Fowler, Executive Director  
4206 Advisory Council on Historic Preservation

4207 Rex Buck  
4208 Grant County PUD – Wanapum

4209 On September 19, 2012, DOE sent a "Notice of Public Scoping Period for Environmental Assessment  
4210 (EA) for the Proposed Conveyance of Land at the Hanford Site, Washington, and National Historic  
4211 Preservation Act (NHPA) Integration" to the following individuals:

4212 Jack Bell  
4213 Nez Perce Tribe  
4214 Chairman, Hanford Site Natural Resource Trustee Council

4215 Gerald Pollet  
4216 Heart of America Northwest

4217 Tracy Bier  
4218 Washington Physicians for Social Responsibility

4219 Tom Carpenter  
4220 Hanford Challenge

4221 Perry Harvester, Regional Habitat Program Manager  
4222 Washington State Department of Fish and Wildlife

4223 Dennis Faulk, Program Manager  
4224 Hanford Project Office  
4225 U.S. Environmental Protection Agency

4226 Jane A. Hedges, Program Manager  
4227 Nuclear Waste Program  
4228 Washington State Department of Ecology

4229 Steve Hudson, Chair  
4230 Hanford Advisory Board

4231 Ken Niles, Assistant Director  
4232 Nuclear Safety Division  
4233 Oregon Department of Energy  
4234 Dan Haas, NEPA Coordinator  
4235 U.S. Fish and Wildlife Service  
4236 Mid-Columbia River National Wildlife Refuge Complex  
4237 Rick Leaumont  
4238 Lower Columbia Basin Audubon Society  
4239 Sandy Swope  
4240 Washington State Department of Natural Resources.

4241 The NHPA process was initiated simultaneously with the NEPA process through a September 19,  
4242 2012 notification from DOE to the Washington State Department of Archeology and Historic  
4243 Preservation (DAHP), the consulting tribes, and local historical societies identifying an area of  
4244 potential effect (APE) following the process detailed in 36 CFR 800.4(a)(1). On September 24, 2012,  
4245 DAHP concurred with the project's APE (Whitlam 2012).

4246 Cultural resources field studies and tribal coordination were conducted concurrently with  
4247 development of this EA. The four tribes with interest in the proposed land conveyance were identified  
4248 and invited to participate in NHPA Section 106 consultation and the NEPA process. DOE  
4249 acknowledges the special expertise of area tribes in identifying properties that may possess religious  
4250 and cultural significance to them. DOE funded each of the four tribes to complete a traditional  
4251 cultural property (TCP) study for this purpose. Each tribe provided a summary of its study to DOE  
4252 and these summaries are included in **Appendix G**, "Tribal Studies Executive Summaries." As  
4253 requested by the tribes, these summaries have not been modified in any way. The following tribes  
4254 provided an executive summary:

- 4255 • Confederated Tribes of the Umatilla Indian Reservation
- 4256 • Confederated Tribes and Bands of the Yakama Nation
- 4257 • Nez Perce Tribe
- 4258 • Wanapum

4259

4260 Between 2012 and 2015, DOE provided regular presentations and discussed the status and progress of  
4261 the NHPA and NEPA processes for this project with Tribal and DAHP staff during Hanford's  
4262 monthly cultural resource meetings, tribal working sessions and DOE management visits to tribal  
4263 elected leaders. The tribes were invited to participate in project field investigations in accordance with  
4264 DOE's Tribal Notification Matrix. Additional meetings were held to reach consensus on the terms of  
4265 a memorandum of agreement (MOA). In addition, DOE met with the Confederated Tribes of the  
4266 Umatilla Indian Reservation Board of Trustees, Confederated Tribes and Bands of the Yakama  
4267 Nation Tribal Council, the Nez Perce Tribal Executive Committee and members of the Wanapum  
4268 Community.

4269 Between 2012 and 2015, meetings were also held with:

- 4270 • Pacific Northwest Site Office
- 4271 • U.S. Environmental Protection Agency
- 4272 • Washington State Department of Ecology
- 4273 • Washington State Department of Health
- 4274 • Hanford Advisory Board

- 4275 • Tri-City Development Council
- 4276 • City of Richland, Washington
- 4277 • Port of Benton, Washington
- 4278 • Benton County, Washington
- 4279 • Laser Interferometer Gravitational-Wave Observatory

### 4280 **6.3 Draft Environmental Assessment Public Review**

4281 DOE held a 30-day public comment period on the Draft EA from July 13 through August 12, 2015.  
 4282 On July 13, 2015, DOE sent a “Notice of Public Comment Period for Environmental Assessment  
 4283 (EA) for the Proposed Conveyance of Land at the Hanford Site, Washington” to the same individuals  
 4284 and groups identified in the scoping section above as well as additional individuals that had requested  
 4285 to be added to the notification list. DOE held a public meeting on July 30, 2015, to provide  
 4286 information about the EA and to solicit comments. The Draft EA was available in the DOE reading  
 4287 room (Consolidated Information Center at Washington State University Tri-Cities), the Richland  
 4288 Public Library, and on the Hanford Site website at <http://www.hanford.gov/docs/ea/ea1915.html> and  
 4289 the DOE NEPA website at <http://www.energy.gov/nepa>.

4290 The Draft EA was also available in the following places:

- 4291 Portland State University
- 4292 Government Information
- 4293 Branford Price Millar Library
- 4294 1875 SW Park Avenue
- 4295 Portland, Oregon
- 4296 University of Washington
- 4297 Suzzallo Library
- 4298 Government Publications Department
- 4299 Seattle, Washington
- 4300 U.S. Department of Energy
- 4301 Public Reading Room
- 4302 Washington State University
- 4303 Consolidated Information Center, Room 101-L
- 4304 2770 University Drive
- 4305 Richland, Washington 99352
- 4306 Gonzaga University
- 4307 Foley Center Library
- 4308 East 502 Boone Avenue
- 4309 Spokane, Washington
- 4310 Administrative Record and Public Information Repository
- 4311 Address: 2440 Stevens Center Place, Room 1101
- 4312 Richland, Washington

4313 Commenters including private citizens, the City of Richland, the State of Oregon, Native American  
 4314 Tribes, U.S. Environmental Protection Agency (EPA), and the United States Navy provided input.  
 4315 DOE reviewed all comments received in preparing the Final EA. DOE identified 15 general comment  
 4316 themes, and developed responses to address each comment theme. DOE has provided responses to  
 4317 comments as appropriate. The comments and DOE’s responses are provided in **Appendix L**,  
 4318 “Responses to Public Comments.”

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4346 [benton-sells-128-acres.html](http://www.tri-cityherald.com/2015/05/06/3547394/port-of-benton-sells-128-acres.html) (accessed June 10, 2015).
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1 **APPENDIX A – THE HANFORD SITE LAND SUITABILITY REVIEW**

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**Table of Contents**

4

5

6 A. APPENDIX A - The Hanford Site Land Suitability Review ..... A-1

7 A.1 Introduction..... A-1

8 A.2 Type I Suitability Constraints ..... A-4

9 A.2.1 Constrained Area 1..... A-4

10 A.2.2 Constrained Area 2..... A-6

11 A.2.3 Constrained Area 3..... A-8

12 A.2.4 Constrained Area 4..... A-9

13 A.2.5 Other Non-Contiguous Operationally Constrained Areas ..... A-9

14 A.3 Type II Suitability Constraints ..... A-9

15 A.3.1 Safety Buffer Zone for the Hanford Site PTA Live Fire Range ..... A-9

16 A.3.2 PTA Range 10 Operational Area ..... A-11

17 A.3.3 DOE Controlled Area..... A-11

18 A.4 Type III Suitability Constraints..... A-12

19 A.4.1 Type III Suitability Constraints associated with PNNL..... A-12

20 A.4.2 Type III Suitability Constraints associated with LIGO..... A-13

21 A.5 Type IV Suitability Constraints ..... A-16

22 A.6 The Hanford Site Land Potentially Suitable for Conveyance ..... A-16

23 A.7 References..... A-19

24

25 **List of Figures**

26 Figure A-1. The facilities and operations that present suitability concerns. .... A-3

27 Figure A-2. Waste Information Data Systems (WIDS) site locations ..... A-4

28 Figure A-3. Burial Ground 618-10 just north of the Project Area in Section 21. .... A-6

29 Figure A-4. Features in Constrained Area 2. .... A-6

30 Figure A-5. The location of the Horn Rapids Landfill..... A-8

31 Figure A-6. Type II suitability constrained areas..... A-10

32 Figure A-7. PNNL campus zoning showing hazard areas adjacent to the Project Area..... A-11

33 Figure A-8. A schematic of the planned potential development of the PNNL campus

34 showing a 500-foot sensitive facility setback from the west side of Stevens Drive..... A-12

35 Figure A-9. An aerial view looking west from the PA toward the LIGO with Route

36 10 in the foreground. .... A-15

37 Figure A-10. The main and solar FSAs resulting from the suitability review process. ....A-18

38

39 **Abbreviations, Acronyms, and Initialisms**

DOE	U.S. Department of Energy
IPT	Integrated Project Team
FSA	Focused Study Area
Hz	hertz
LIGO	Laser Interferometer Gravitational-wave Observatory
PA	project area
PNNL	Pacific Northwest National Laboratory
PTA	Patrol Training Academy
RC	reactor compartment
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
RMS	root mean square
SALT	Storage Area and Load Test
TRIDEC	Tri-City Development Council
WIDS	Waste Information Data System

40

## 41 **A. APPENDIX A – THE HANFORD SITE LAND SUITABILITY** 42 **REVIEW**

### 43 **A.1 INTRODUCTION**

44 The U.S. Department of Energy (DOE) first mentioned “suitability” in the Notice of Intent for this  
45 environmental assessment (77 FR 58112): “DOE anticipates that there may be continuing mission  
46 needs, such as security and safety buffer zones on some of the requested lands, making them less  
47 suitable for conveyance.” As discussed in **Chapter 2.0**, these continuing mission needs guided  
48 DOE’s evaluation of the potentially suitable lands and provide explanation to any adjustment to the  
49 boundaries of the specific lands proposed for conveyance from those originally requested by the Tri-  
50 City Development Council (TRIDEC; 2011a, 2011b).

51 To identify the lands that could be conveyed, DOE established an Integrated Project Team (IPT)  
52 consisting of real estate, legal, and environmental professionals to review mission- and operation-  
53 related needs both on and off the 4,413-acre Initial Hanford Site Land Conveyance Project Area (PA)  
54 lands. The process focused on identifying PA lands that may not be presently suitable for DOE to  
55 convey. The IPT determined that “suitable” in this context had generally three distinct but important  
56 evaluation aspects: mission need or impact, environmental condition, and health and safety. These  
57 categories are also generally discussed in the *Cross-Cut Guidance on Environmental Requirements*  
58 *for DOE Real Property Transfers (Update)* (DOE 2005).

59 The suitability evaluation for safety included the results of DOE’s Radiological Clearance Process as  
60 required by DOE O 458.1 (DOE 2011). The IPT’s review addressed this order’s requirement that  
61 releases of property be consistent with the as low as reasonably achievable process as explained in  
62 **Section 3.14**. Release or clearance of property with the potential to contain residual radioactive  
63 material must be conducted in accordance with the requirements of DOE O 458.1. Property control  
64 and clearance processes must be developed and implemented in accordance with dose limits under  
65 any plausible use of the property, and as low as reasonably achievable process requirements in DOE  
66 O 458.1 must be met before property is cleared.

67 Unless alternative dose constraints are approved by issuance of a directive or memorandum by the  
68 DOE Chief Health, Safety, and Security Officer, the following dose constraints for DOE residual  
69 radioactive material must be applied to each specific clearance of property. For any actual or likely  
70 future use of the property a total effective dose<sup>1</sup> of 25 millirem (0.25 millisieverts) above background  
71 in any calendar year.

72 Property potentially containing residual radioactive material must not be cleared from DOE control  
73 unless either the property is demonstrated not to contain residual radioactive material based on  
74 process and historical knowledge, radiological monitoring or surveys, or a combination of these; or  
75 the property is evaluated and appropriately monitored or surveyed. Real property under evaluation for  
76 clearance from DOE radiological controls must be evaluated against the need for maintaining  
77 institutional controls or impacting long-term stewardship of adjacent DOE real property. Lands not  
78 meeting these requirements would, by definition, not be suitable for conveyance. These issues are  
79 discussed in **Section 3.14** and **Appendix F**, “Radiological Accidents.”

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<sup>1</sup> The total effective dose is the sum of the effective dose from external exposures and the committed effective dose equivalent from internal exposures (10 CFR 835).

80 Suitability also relates to the environmental condition of the property as mentioned in the  
81 *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, Section 120(h)  
82 (42 USC 9620, Sections 120(h)(3) to 120(h)(5)). DOE must document the environmental condition of  
83 a property and “Provide a basis for determining if property is suitable for transfer, lease or  
84 assignment” (DOE 2005) The IPT determined that some lands considered for conveyance for some  
85 uses may not be suitable based on the environmental condition.

86 Although not specifically a suitability issue, the IPT also determined that two Public Land Survey  
87 System sections, Section 28 in the northwest part of the PA and Section 8 in the southwest part, are  
88 part of Bureau of Land Management withdrawn lands. These two sections are removed from  
89 consideration for conveyance since the Bureau of Land Management has jurisdiction over transfers  
90 involving property that was acquired by DOE through withdrawal from the public domain as stated in  
91 the *Federal Land Policy and Management Act of 1976* (Public Law 94-579, as amended). These two  
92 Public Land Survey System sections are shown on **Figure A-1**, “Facilities and Operations that  
93 Present Suitability Concerns.”

94 Also not specifically a suitability issue, the IPT identified the presence of various existing easements,  
95 rights-of-way, and an “infrastructure corridor” within the PA lands (see Figure A-1). DOE will retain  
96 ownership of, and require easements and the associated right-of-ways from TRIDEC for:

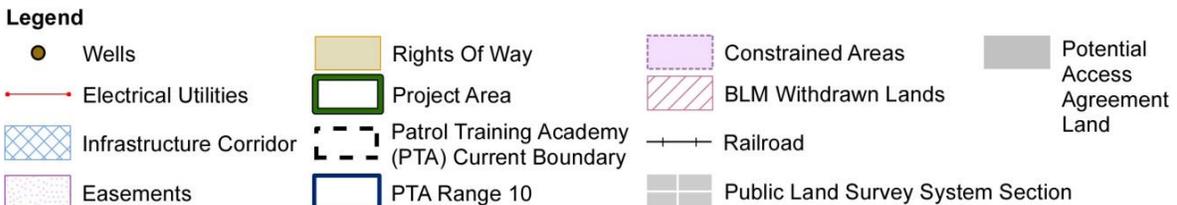
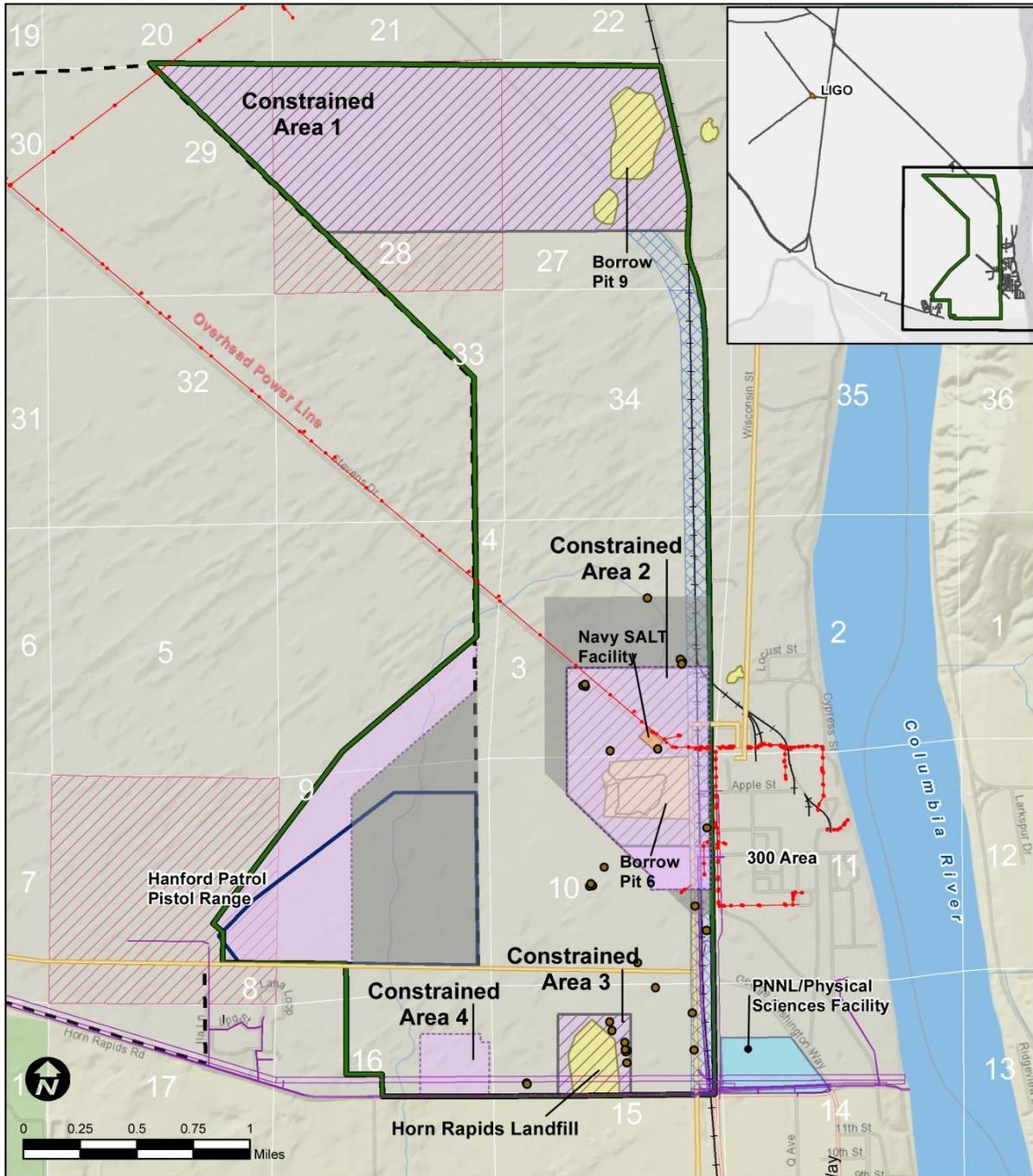
- 97 • Railroad line (i.e., the rails, ties, and all associated equipment) with a 100-foot easement  
98 width
- 99 • A 13.8 kilovolt electrical distribution line and parallel access road with a 185-foot easement  
100 width extending northwest from Pit 6
- 101 • A 115 kilovolt electrical transmission lines (owned by Bonneville Power Administration)  
102 with a 100-foot easement width running north-south along Stevens Drive on the west side,  
103 and going west from Pit 6
- 104 • Telecommunications lines paralleling Horn Rapids Road on the north side with an easement  
105 width of 50 feet adjacent to the road
- 106 • A 70-foot wide shoulder easement measured from 30 feet of the west side of the Stevens  
107 Drive pavement starting at the intersection with Horn Rapids Road and extending to the  
108 northern end of the Focused Study Area (FSA).

109 DOE is reserving the right to access and operate/maintain a 10-foot wide access route and a 20 foot  
110 radius around each groundwater well site for monitoring operations and maintenance.

111 Easements may be required for other things for which requirements have not been established at this  
112 time.

113

Figure A-1. Facilities and Operations that Present Suitability Concerns.



114

115

116

For the purpose of this environmental assessment, the IPT identified suitability concerns resulting from the three aspects of suitability constraints: (1) operating facility mission; (2) environmental

117 concerns such as cultural or ecological resource protection; and (3) health, safety, and security. The  
118 four types of suitability constraints (restrictions on the conveyance of the requested or additional  
119 lands) identified by the IPT are as follows (not in any priority order):

- 120 • **Type I** – where DOE must retain full institutional control for use by ongoing operations and  
121 related safety on lands located within the PA.
- 122 • **Type II** – where DOE must retain full institutional control by having a defined safety or  
123 security distance (buffer) from ongoing DOE operations located outside of the PA. This is  
124 where DOE and Pacific Northwest National Laboratory (PNNL) operations have a potential  
125 to affect users of the conveyed lands.
- 126 • **Type III** – where conveyed land activities could affect DOE, PNNL or the Laser  
127 Interferometer Gravitational-wave Observatory (LIGO) facility operations located outside the  
128 PA.
- 129 • **Type IV** – where the Proposed Action could affect cultural, ecological, or floodplain areas  
130 located within the PA suitable lands that must be protected under federal, state, or local law.  
131 These are not discussed in this appendix but are evaluated in **Chapter 3.0** to the extent  
132 reasonable in order to protect the respective resource.

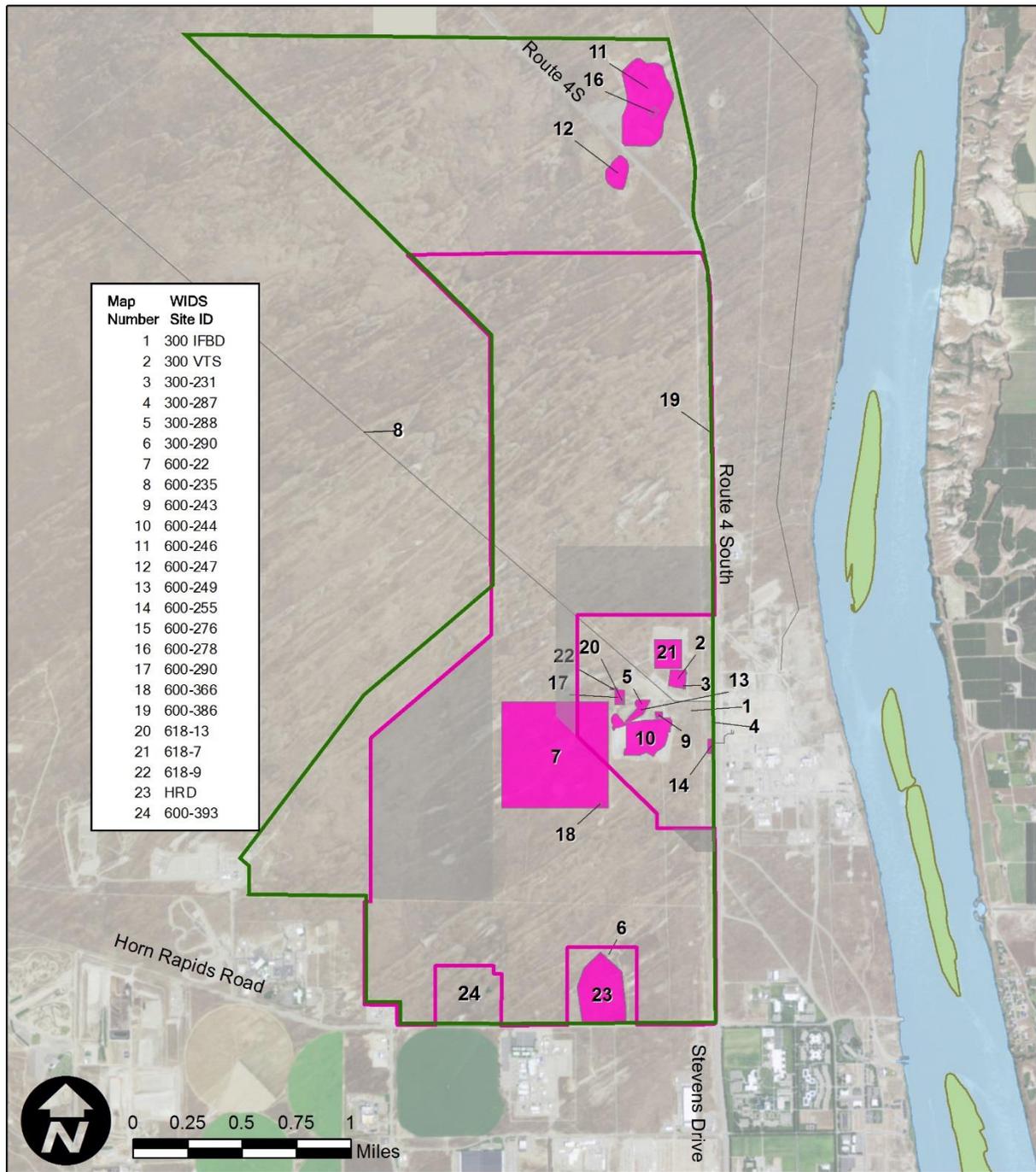
## 133 **A.2 TYPE I SUITABILITY CONSTRAINTS**

134 The **Type I suitability constraints** are shown on **Figure A-1** and described below. These  
135 “operationally” constrained areas account for 1,309 acres within the PA. Constrained Area 2 overlaps  
136 the northeast part of the 1,341-acre main TRIDEC land request area. Constrained Areas 3 and 4 lie  
137 entirely within the main TRIDEC request area. Many of these sites are related to Waste Information  
138 Data Systems (WIDS) sites that are shown on **Figure A-2**, “Waste Information Data Systems Site  
139 Locations.”

### 140 **A.2.1 Constrained Area 1**

141 This 914-acre area is used as a safety buffer zone for Burial Ground 618-10 (WIDS 618-10), and  
142 Borrow Pit 9 (WIDS 600-246) activities in the northernmost part of the PA (see Figure A-2 and  
143 Figure A-3, “Burial Ground 618-10 just North of the Project Area in Section 21”) (DOE 2014a). The  
144 burial ground is located offsite but adjacent to the northern border of the PA in Section 21, southwest  
145 of Route 4S. This site contains a broad spectrum of low- to high-level dry wastes, primarily fission  
146 products and some transuranic waste from the 300 Area. Low-level radioactive wastes are buried in  
147 trenches, and medium- to high-level beta/gamma wastes are mostly in the vertical pipe units. Some  
148 higher activity wastes were placed in concrete shielded drums and disposed in the trenches (DOE  
149 2014a). Borrow Pit 9 has also been referred to as Gravel Pit 9, a large depression where gravel is  
150 extracted. The gravel pit is also used as an inert landfill for nondangerous and nonradioactive wastes.  
151 The waste includes concrete, wood, and asphalt. Soil was removed from around fuel oil day tanks and  
152 placed in Gravel Pit 9. Soil sample results showed a plutonium spike, so the bioremediation pad was  
153 posted as a Soil Contamination Area (DOE 2014a).

Figure A-2. Waste Information Data Systems Site Locations.



156

**Figure A-3. Burial Ground 618-10 just North of the Project Area in Section 21.**

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158

159

**A.2.2 Constrained Area 2**

160 This 340-acre constrained area borders Stevens Drive directly across from the 300 Area (see Figure  
161 A-1 and Figure A-4, “Features in Constrained Area 2”). This area serves as a safety and security  
162 buffer for DOE Borrow Pit 6 (WIDS 600-244) operation and the Navy’s Storage Area and Load Test  
163 (SALT) Facility. Borrow Pit 6, also referred to as Gravel Pit 6, is a source for gravel used for bedding  
164 and backfill material. A gravel road leads into a large irregularly shaped pit area. The physical  
165 boundaries of the site are larger than the area where gravel is currently being excavated. The four  
166 corners of the pit’s largest extents are marked with posts (railroad ties installed vertically). Stock piles  
167 of gravel and excavation equipment are present, indicating active gravel pit operations. A chain link  
168 fenced equipment storage area is located in the northwest corner of Borrow Pit 6 (DOE 2014a).

169 The SALT area is used to load test transporters that transport decommissioned defueled Navy reactor  
170 compartment (RC) disposal packages and to store equipment associated with the RC disposal  
171 program. The SALT Site consists of a 2.6-acre load test area and an adjacent 4.0-acre storage area.  
172 The load test area is fenced and has a large metal load frame placed on top of concrete walls.  
173 Concrete test weights are stacked on top of the load frame to simulate the weight of an RC disposal  
174 package. The load test site allows a transporter to drive underneath the elevated load frame and lift up  
175 the frame and concrete test weights. This allows the transporter to be load-tested prior to transporting  
176 an RC disposal package. The storage area is used to store materials and equipment associated with the  
177 handling and transport of RC disposal packages. It is fenced and has an 8-foot by 30-foot mobile  
178 office. Both areas are equipped with electrical service (Arnold 2014). Transport of the RC disposal  
179 packages requires road closures on Stevens Drive.

180

Figure A-4. Features in Constrained Area 2.



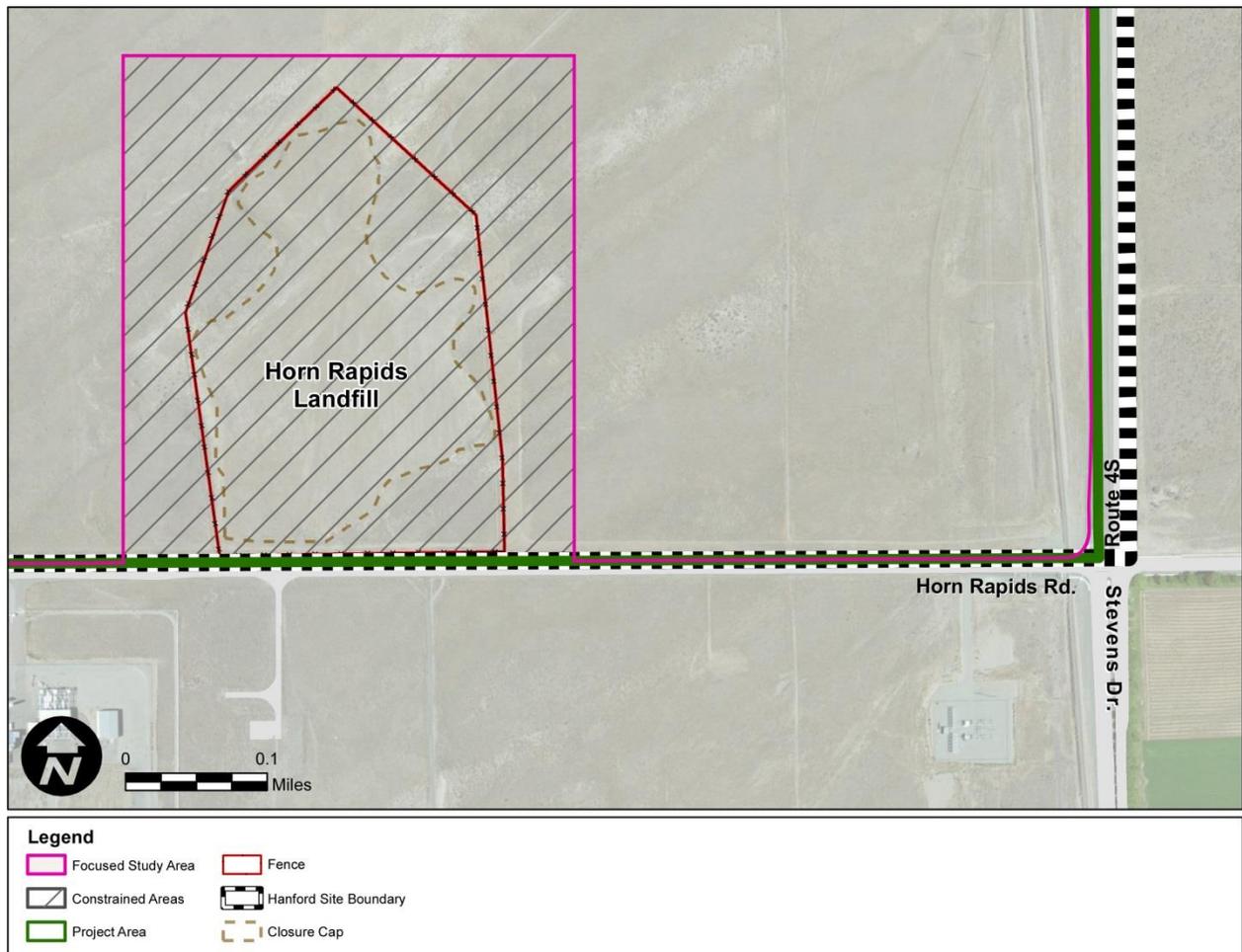
Source: PNNL 2011.

181  
182  
183

184 **A.2.3 Constrained Area 3**

185 This 75-acre area includes the inactive DOE Horn Rapids Landfill and surrounding area as a  
186 designated safety buffer zone (see Figure A-2 and Figure A-5, “Horn Rapids Landfill Location”).  
187 Originally a borrow pit for sand and gravel, the landfill was used from the late 1940s to the 1970s for  
188 disposal of office and construction waste, asbestos, sewage sludge, fly ash, and reportedly numerous  
189 drums of unidentified organic liquids (DOE 2012). The landfill is identified in WIDS as “HRD”  
190 (Horn Rapids Disposal) and designated as an inactive sanitary landfill (DOE 2014a). The constrained  
191 area also includes WIDS 300-290, designated as “Radiological Debris Area East of Horn Rapids  
192 Disposal Landfill” (DOE 2014a). This is a posted Radiological Materials Area classified in WIDS as  
193 an inactive dumping area (DOE 2014a).

194 **Figure A-5. Horn Rapids Landfill Location.**



195  
196

#### 197 **A.2.4 Constrained Area 4**

198 This area includes 53 acres of land along Horn Rapids Road east of the Hazardous Materials  
199 Management and Emergency Response Facility and west of Constrained Area 3 (see Figure A-2).  
200 This location encompasses WIDS 600-393, designated as a “Potential Battery Components Debris  
201 Area” (DOE 2014a) and a National Register of Historic Places-recommended eligible historic  
202 property. This area is a “waste disposal unit or unplanned release unit where radioactive or dangerous  
203 waste is present or possibly present” (DOE 2013). In January 2014, a “Notification of Newly  
204 Identified Solid Waste Management Units and Areas of Concern at the Hanford Facility for Calendar  
205 Year 2013” was sent to the Washington State Department of Ecology, informing them of this site’s  
206 designation (DOE 2014b). The letter was submitted to ensure compliance with *Resource*  
207 *Conservation and Recovery Act of 1976* (RCRA) Permit Condition II.Y.3.b in advance of the Tri-  
208 Party Agreement commitment among DOE, the U.S. Environmental Protection Agency, and the  
209 Washington State Department of Ecology (Ecology et al. 2015). The site is a debris area from  
210 decomposed battery components resembling battery pads. It is classified in WIDS as an inactive  
211 dumping area (DOE 2014a).

#### 212 **A.2.5 Other Noncontiguous Operationally Constrained Areas**

213 The other operationally constrained areas pertain to the Hanford Site groundwater monitoring wells  
214 (DOE 2014c) and are shown at their approximate location on **Figure A-1**. Groundwater monitoring  
215 requirements for the Hanford Site’s RCRA units fall into one of two broad categories: interim status  
216 or final status. The Hanford Site’s permitted RCRA units require final status monitoring, as specified  
217 in Washington State’s dangerous waste regulations, “Releases from regulated units” (WAC 173-303-  
218 645). RCRA units not currently incorporated into a permit require interim status monitoring (DOE  
219 2014c). The monitoring well locations shown on **Figure A-1** will need to be retained for monitoring  
220 in accordance with the Hanford groundwater monitoring program until no longer needed.

#### 221 **A.3 TYPE II SUITABILITY CONSTRAINTS**

222 The Type II suitability constraints are shown on **Figure A-6**, “Type II Suitability Constrained Areas.”  
223 These constrained areas are “mission-related” and are due to operations that are not physically located  
224 on potential conveyance lands but whose operational needs require a buffer zone that extends into  
225 them. These reflect operational needs from DOE and PNNL toward the lands to be conveyed. These  
226 include:

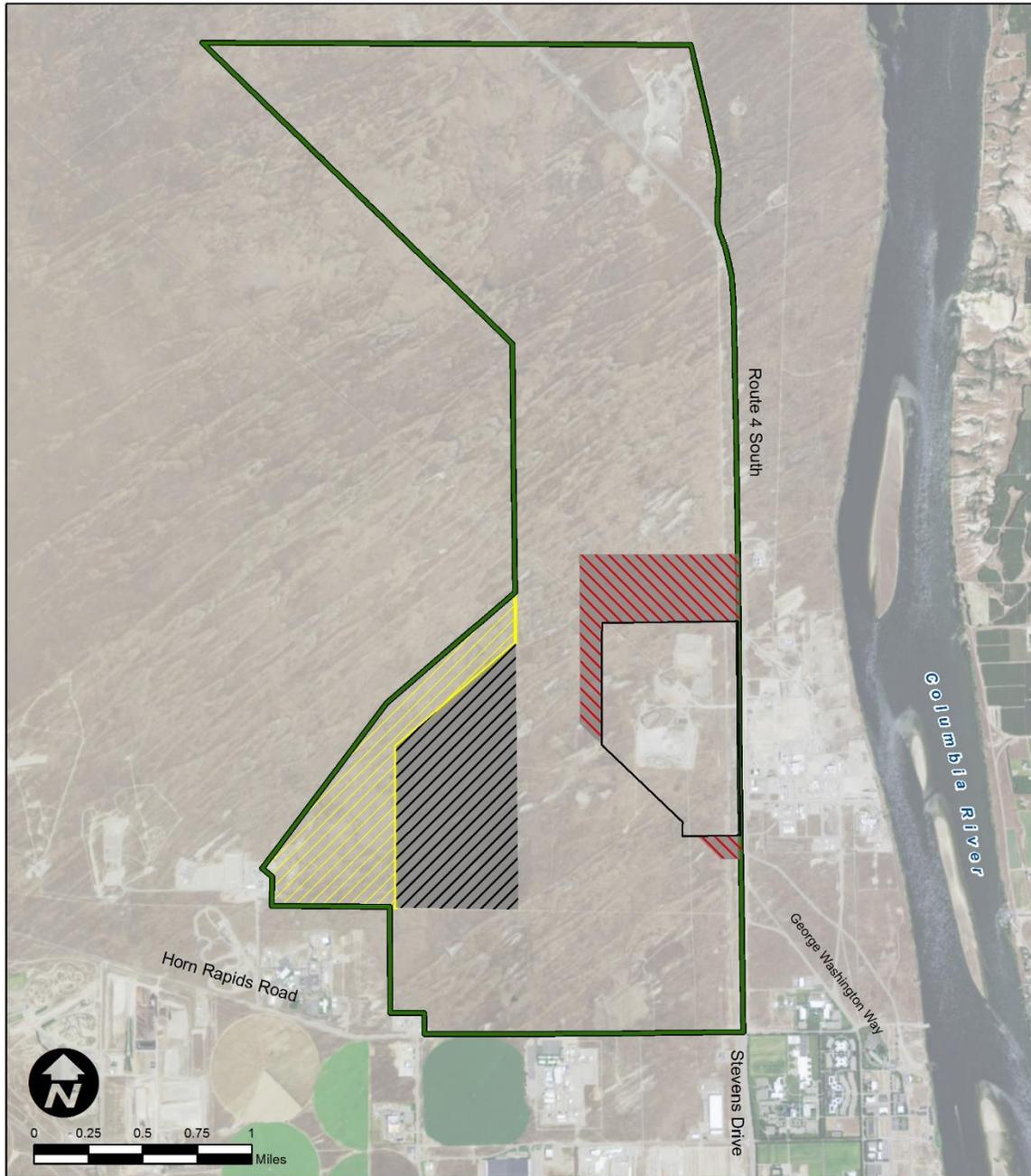
- 227 • A safety buffer zone for the Hanford Patrol Training Academy (PTA) Live Fire Range
- 228 • An open-space operational area of Hanford PTA Range 10
- 229 • A DOE-controlled area for Hanford Site Area 300 and PNNL.

#### 230 **A.3.1 Safety Buffer Zone for the Hanford Site Patrol Training Academy Live Fire Range**

231 The Hanford PTA Live Fire Range is used by DOE security personnel; other federal personnel,  
232 military personnel; and state and local law enforcement personnel. The range is situated on Hanford  
233 PTA’s campus, which occupies over 8,000 acres on the southern border of the Hanford Site  
234 (HAMMER 2015). The range, which is outside the PA, is used for target practice and includes a rifle  
235 range, a machine gun range, and a range for firing rifle-grenades. **Figure A-6** shows a proposed safe  
236 fence line for the PTA Live Fire Range. About 308 acres of buffer zone associated with the range are  
237 within the PA boundary, as indicated by the yellow hatched area on **Figure A-6**.

238

Figure A-6. Type II Suitability Constrained Areas.



Legend

- |   |  |
|---|--|
|  Project Area                    |  DOE Controlled Area                              |
|  Potential Access Agreement Land |  Patrol Training Academy Proposed Safe Fence Line |
|  Constrained Area                |  Hanford PTA Range 10 and Related Land            |

239

### 240 A.3.2 Patrol Training Academy Range 10 Operational Area

241 Hanford PTA Range 10 covers about 397 acres almost entirely within the PA (see Figure A-1);  
 242 however, the operational portion of Range 10, about 140 acres, lies within the PTA proposed safe  
 243 fence line safety buffer zone for the Hanford PTA Live Fire Range (see Figure A-5). Range 10 is a  
 244 tactical training and firearms qualification area for nonlethal training and Multiple Integrated Laser  
 245 Engagement System exercises (HAMMER 2015) and does not use live fire. The 275 acres of Range  
 246 10 to the east of the safety buffer zone represent an operational portion of the range that exists largely  
 247 as an extra laser safety buffer zone (see Figure A-1). Because this area is still operational, conveyance  
 248 of the 275-acre portion of PTA Range 10 could not occur by the *National Defense Authorization Act*  
 249 *of 2015* mandated deadline of September 30, 2015, and must be retained by DOE. This is the gray-  
 250 shaded area on the west side shown in **Figure A-6**.

### 251 A.3.3 U.S. Department of Energy Controlled Area

252 A DOE controlled area (see Figure A-6) has been established as a radiation operational buffer  
 253 between PNNL operations in the 300 Area and future users of the conveyed lands.. Potential radiation  
 254 sources include accident releases from Building 325 (Radiochemical Processing Laboratory), the  
 255 remediation of Building 324, the operation of a future potential PNNL Hazard Category 3 facility  
 256 (with a potential for only significant localized consequences) in the High Radiological Zone within  
 257 the PNNL Site, and other future and current PNNL operations (Snyder 2013; PNNL 2012). Potential  
 258 Access Agreement Lands that are within this controlled area would be restricted for only utilities  
 259 corridors and controlled road access. Realty instrument language would, for example, limit public  
 260 access to construction and maintenance activities only. While **Figure A-7**, “PNNL Campus Zoning  
 261 Showing Hazard Areas Adjacent to the Project Area,” is for planning purposes, the areas shown in  
 262 light and dark yellow, indicating “radiological, nuclear, and other higher hazards (Higher Hazards,  
 263 High Radiological),” are geographic zones where “typical operations within these laboratory facilities  
 264 require special hazard considerations and/or geographic isolation for public safety. Within this zone,  
 265 there is also a sub-zone of even higher risk functions requiring a significant stand-off from any public  
 266 way” (PNNL 2012). The DOE controlled area is the red cross-hatched area on the east side of the PA  
 267 and is shown on **Figure A-6**. This area incorporates the maximally exposed individual area of  
 268 potential impact discussed in **Appendix F** and **Section 3.14**.

269 **Figure A-7. PNNL Campus Zoning Showing Hazard Areas Adjacent to the Project Area.**



270 **Source:** PNNL 2012.  
 271

## 272 A.4 TYPE III SUITABILITY CONSTRAINTS

273 The **Type III suitability constraints** are operational constraints that cannot be shown like the others  
274 as a geographic demarcation or location. These address how operations on the conveyed lands could  
275 affect existing operations. This type of constraint comes from acoustic, vibration, and electromagnetic  
276 noise production associated with construction or operational activities on the conveyed land and their  
277 effects on PNNL and the LIGO facility operations (see Figure A-1 for the LIGO location).

### 278 A.4.1 Type III Suitability Constraints Associated with Pacific Northwest National Laboratory

279 These constraints are given as acoustic, vibration, electromagnetic energy, and radionuclide emissions  
280 threshold or tolerance levels measurable at PNNL located on the PNNL site, near Horn Rapids Road  
281 and east of Stevens Drive. PNNL contains laboratories for materials science and technology,  
282 radiological detection, and ultra-trace analysis. These buildings include, for example, a radiation  
283 portal monitoring test track with accompanying large detector laboratory, a deep underground  
284 laboratory, and a central utility plant (PNNL 2012). The energy and radionuclide sensitivity threshold  
285 levels associated with two of these PNNL facilities (the Physical Sciences Facility and the  
286 Environmental Molecular Sciences Laboratory – Quiet Wing) were provided in a memorandum from  
287 the Pacific Northwest Site Office (Snyder 2013). These levels are:

- 288 • Acoustic<sup>2</sup> (dependent on frequency) noise generation must be less than 35 to 50 decibels<sup>3</sup> per  
289 1/3 octave<sup>4</sup>.
- 290 • Vibration (dependent on frequency) must be:
  - 291 – Less than 2 micrometers per second per 1/3 octave (approximately) in the horizontal  
292 direction.
  - 293 – Less than 1 micrometer per second per 1/3 octave (approximately) in the vertical  
294 direction.
- 295 • Magnetic interference in the nonionizing spectrum from direct current through the highest  
296 microwave frequencies must be less than 20 nanoteslas<sup>5</sup> in the horizontal direction, and less  
297 than 75 nanoteslas in the vertical direction.
- 298 • Electric field interference in the nonionizing spectrum from direct current through the highest  
299 microwave frequencies must be less than 300 millivolts per meter.
- 300 • Radionuclide emissions from any industrial process should not cumulatively exceed  
301  $1 \times 10^6$  becquerels per day.<sup>6</sup>

---

<sup>2</sup> Acoustic refers to sound or the sense of hearing.

<sup>3</sup> Decibel is a unit used to express the intensity of a sound wave, equal to 20 times the common logarithm of the ratio of the pressure produced by the sound wave to a reference pressure, usually 0.0002 microbar.

<sup>4</sup> Any two sounds whose frequencies make a 2:1 ratio are said to be separated by an octave.

<sup>5</sup> A tesla is a unit of magnetic field strength or magnetic flux density. A nanotesla is one billionth of a tesla.

<sup>6</sup> Becquerel is the activity of a quantity of radioactive material in which one nucleus radioactively decays per second.

302 PNNL also stated that:

303 ...it should be noted that construction activities associated with facilities that would  
304 be located on the conveyed land parcel will need to be closely coordinated with  
305 PNNL to assure ongoing experiments are not disrupted. In particular, excavation,  
306 ground compacting, and operation of heavy equipment may impact R&D operations.  
307 PNNL's ultra-trace capabilities would be impacted by locating radiological-type  
308 activities in proximity to the PNNL Physical Sciences Facility. In particular, medical  
309 isotope production using fission-based methods, accelerator production activities,  
310 nuclear reactor (even a small modular reactor), or a reprocessing operation would  
311 present significant challenges to PNNL. Maximum radionuclide emissions of any  
312 industrial process should not exceed  $1 \times 10^6$  Bq/day. It is highly recommended that  
313 accommodations are made to ensure these types of activities are reviewed during the  
314 permitting to determine full range of impacts. Current and planned facilities have  
315 nuclear sources excluded from hazard categorization and analysis in their safety basis  
316 documentation, which depends on being isolated from sources of energetic hazards.  
317 Limiting aircraft operations (fixed wing and rotor impacts) would minimize impacts.  
318 (Snyder 2013).

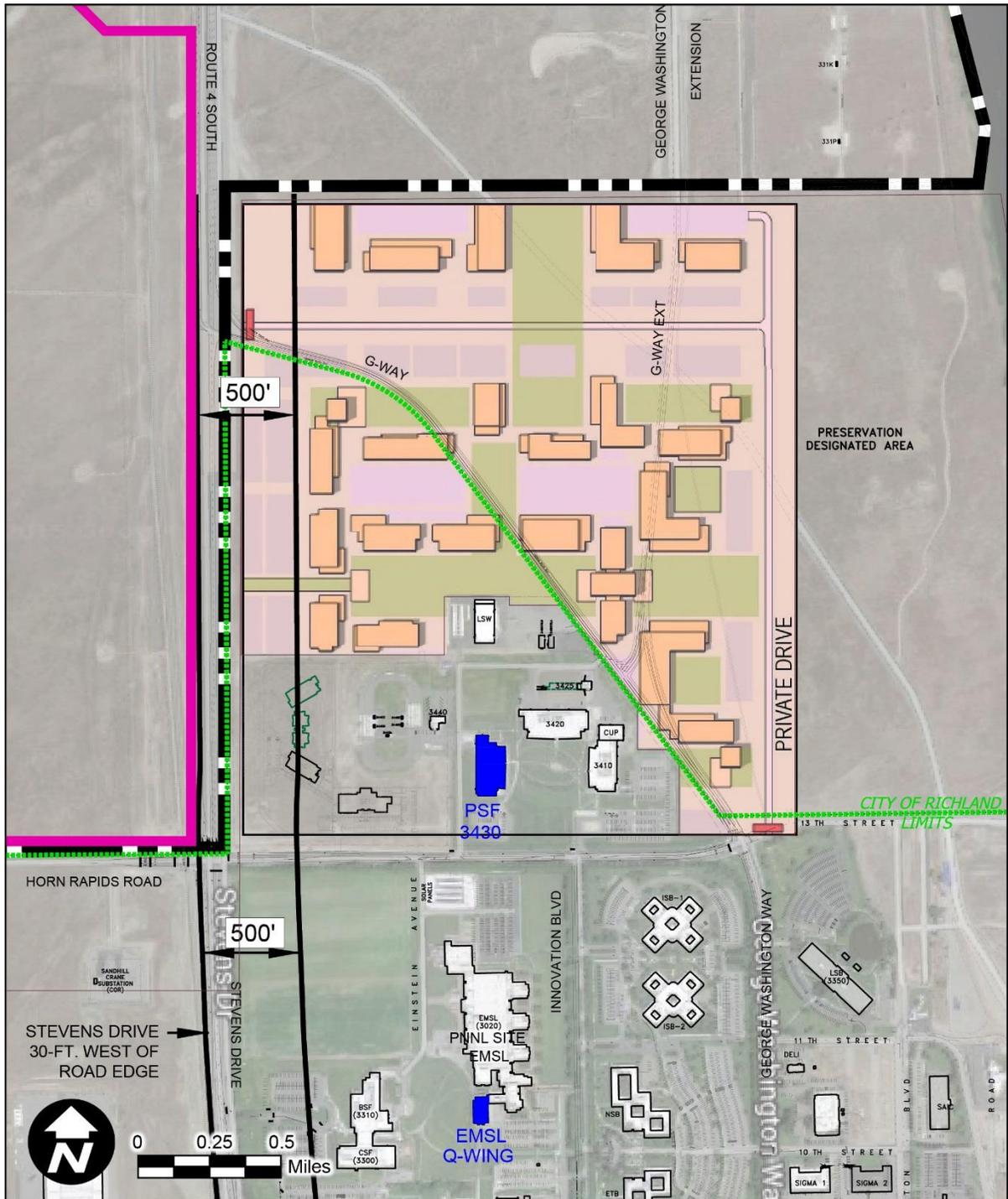
319 **Figure A-8**, “Schematic of the Planned Potential Development of PNNL Campus Showing a 500-foot  
320 Sensitive Facility Setback from the West Side of Stevens Drive,” is a schematic map of the PNNL  
321 campus plan for development (Snyder 2015). The figure shows two vertical black lines that indicate  
322 the closest that any of the PNNL future sensitive facilities would be constructed in reference to the  
323 west side of Stevens Drive. The setback is 500 feet measured from the west side of Stevens Drive to  
324 the nearest sensitive building location on PNNL (the “west side” is defined as 30 feet west of the  
325 pavement edge). The figure shows the location of the two existing PNNL operational sensitive  
326 facilities, Physical Sciences Facility and Environmental Molecular Sciences Laboratory – Quiet  
327 Wing. PNNL does not intend to construct any sensitive facilities any closer than 500 feet from the  
328 west side of Stevens Drive.

#### 329 **A.4.2 Type III Suitability Constraints associated with Laser Interferometer Gravitational-** 330 **Wave Observatory**

331 The LIGO facility (see Figure A-9, “Aerial View Looking West from the PA toward LIGO with  
332 Route 10 in Foreground”) is about 10 miles northwest of the intersection of Horn Rapids Road and  
333 Stevens Drive (see the inset in Figure A-1). It is west-northwest of the northernmost part of the PA.  
334 This facility is designed to measure gravitational waves generated by cosmic events and is ultra-  
335 sensitive to vibration.

336  
337

**Figure A-8. Schematic of the Planned Potential Development of PNNL Campus Showing a 500-foot Sensitive Facility Setback from the West Side of Stevens Drive.**



**Legend**

- Focused Study Area
- Hanford Site Boundary
- Proposed For Construction
- PSF - Physical Sciences Facility
- EMSL – Environmental Molecular Sciences Laboratory
- Q-WING – Quiet Wing

338

339  
340

**Figure A-9. Aerial View Looking West from the PA toward LIGO with Route 10 in Foreground.**



341  
342

343 The LIGO Type III constraints were provided by Dr. Fred Raab from the LIGO Facility. In his email  
344 to DOE (Raab 2014), Dr. Raab stated that the specifications he provides are for the western edge of  
345 the PA. The following was provided by Dr. Raab with added footnote:

346 **Maximum Allowable Vibration Specification:**

347 For the proposed conveyance property, with distances from LIGO instrumentation in the range of  
348 7 kilometers (4.3 miles) to 15 kilometers (9.3 miles), the constraints on vibration levels to avoid  
349 significant impacts on LIGO are:

- 350
- 351 • In the frequency range from 0.3 Hz to 1.5 Hz, ground vibration levels as measured 100  
352 meters from the source should not exceed 0.3 micrometers/seconds/root (Hz). For example, in  
353 the frequency band from 0.5 Hz to 1.5 Hz this would be equivalent to a vibration level of  
0.3 micrometers/seconds root mean square (RMS).
  - 354 • In the frequency range from 1.5 Hz to 2.5 Hz, ground vibration levels as measured 100  
355 meters from the source should not exceed 0.3 micrometers/seconds/root (Hz). For example, in  
356 the frequency band from 1.5 Hz to 2.5 Hz this would be equivalent to a vibration level of  
357 0.3 micrometers/seconds RMS.
  - 358 • In the frequency range from 2.5 Hz to 3.5 Hz, ground vibration levels as measured 100  
359 meters from the source should not exceed 0.5 micrometers/second/root (Hz). For example, in  
360 the frequency band from 2.5 Hz to 3.5 Hz this would be equivalent to a vibration level of  
361 0.5 micrometers/second RMS.
  - 362 • In the frequency range from 3.5 Hz to 5 Hz, ground vibration levels as measured 100 meters  
363 from the source should not exceed 2.5 micrometers/seconds/root (Hz). For example, in the  
364 frequency band from 3.5 Hz to 5 Hz this would be equivalent to a vibration level of 3  
365 micrometers/seconds RMS.
  - 366 • Ground vibration levels above 5 Hz are unrestricted.

## 367 A.5 TYPE IV SUITABILITY CONSTRAINTS

368 The **Type IV suitability constraints** are those associated with the Proposed Action that require  
369 protection of the human and ecological environment. These are most commonly related to cultural,  
370 ecological, and hydrological resources that require protection under federal, state, or local laws. Some  
371 of these constraints could result in the need for DOE to include deed restrictions in the event of a title  
372 transfer, or covenants in the case of a lease, to protect these resources to the extent practical.

373 In support of determining Type IV constraints in this land conveyance process, cultural surveys  
374 including those for traditional cultural properties and historic properties were conducted by the  
375 Confederated Tribes and Bands of the Yakama Nation, the Confederated Tribes of the Umatilla  
376 Indian Reservation, the Nez Perce Tribe, the Wanapum Band of Priest Rapids, and the Fort Walla  
377 Walla Museum. These were conducted in coordination with and to support the *National Historic*  
378 *Preservation Act* Section 106 process. Executive summaries of the Native American conducted  
379 surveys are provided in **Appendix G**, “Tribal Studies Executive Summaries.” Ecological surveys and  
380 floodplains assessments have also been conducted (see Appendices H through J) and the results of  
381 these are included in the respective sections in **Chapter 3.0**.

## 382 A.6 HANFORD SITE LAND POTENTIALLY SUITABLE FOR CONVEYANCE

383 The land suitability review process takes into consideration each of the four suitability constraint  
384 types described above with the intent to identify lands that:

- 385 • Most suitable for conveyance by DOE
- 386 • Most useful to TRIDEC for marketing and business development
- 387 • Fewest potential operational or environmental issues that would require some type of  
388 mitigation.

389 Following the suitability review, the IPT prepared a map showing the Hanford Site lands that have the  
390 best potential suitability for conveyance that are defined as the FSA (2,474 acres) (see Figure A-10,  
391 “FSA Resulting from the Suitability Review Process”). The subareas within the FSA are identified as  
392 the main FSA (1,635 acres), the solar farm FSA (300 acres), and Potential Access Agreement Land.  
393 This map was prepared after concluding the following:

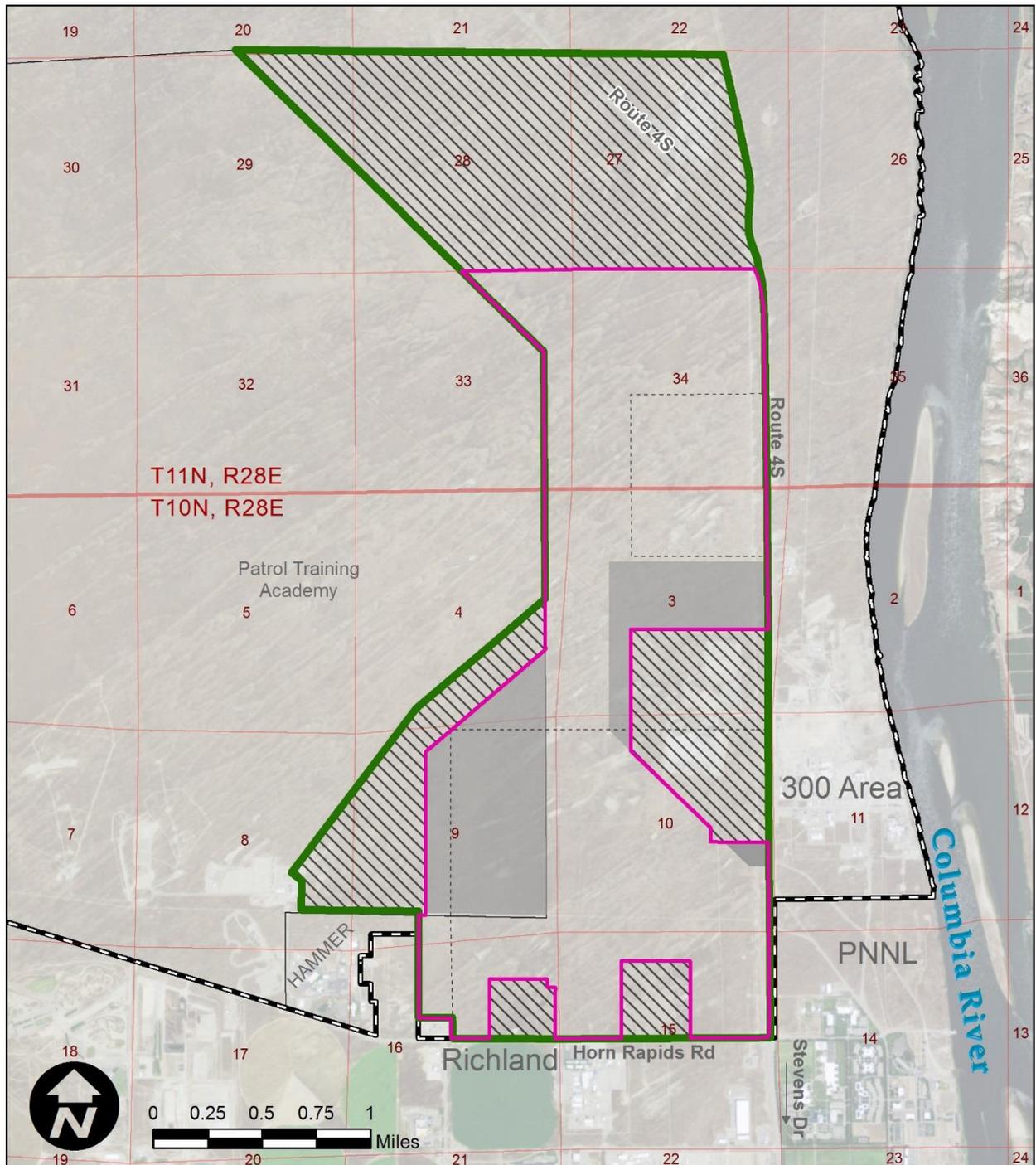
- 394 • **Type I** – None of these Constrained Areas are suitable for conveyance at this time because  
395 they must remain under institutional control for operational, safety, security, and regulatory  
396 reasons.
- 397 • **Type II** – The Hanford PTA Live Fire Range safety buffer zone is not suitable for  
398 conveyance at this time for safety reasons. The Hanford PTA Live Fire Range 10 operational  
399 area is not suitable for transfer. The DOE controlled area is evaluated in **Section 3.14** and  
400 **Appendix F** for impacts and mitigation and does not result in removal of any lands for  
401 suitability but may require mitigation. These lands are identified as Potential Access  
402 Agreement Lands that cannot be transferred but could be conveyed by other realty  
403 instruments remaining in DOE ownership.
- 404 • **Type III** – These constraints associated with the Proposed Action’s effect on PNNL and  
405 LIGO are evaluated in **Section 3.9** and do not result in removal of any lands for suitability  
406 but certain types of usage by future owners may require mitigation.

- 407 • **Type IV** – These constraints must be identified individually for each resource area according
- 408 to the TRIDEC-proposed land uses. These do not result in removal of any lands for suitability
- 409 but may require mitigation.

410

411

Figure A-10. FSA Resulting from the Suitability Review Process.



**Legend**

- Project Area – 4,413 acres
- Focused Study Area – 2,474 acres
- TRIDEC Land Request – 1,641 acres
- Potential Access Agreement Land – 539 acres
- Land Not Suitable For Conveyance
- Hanford Site

412  
413

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1 **APPENDIX B – ACOUSTIC NOISE AND VIBRATION FROM**  
2 **CONSTRUCTION**

3

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**Table of Contents**

5

6

7 B. APPENDIX B – ACOUSTIC NOISE AND VIBRATION FROM CONSTRUCTION .....B-1

8 B.1 Introduction .....B-1

9 B.2 Characteristics of Acoustic Noise .....B-1

10 B.2.1 The Characteristics of Sound and Human Sensitivity B-1

11 B.2.2 The Environmental Factors Affecting Sound Propagation B-3

12 B.3 Construction Equipment Acoustic Noise Sound Pressure Levels .....B-8

13 B.4 Construction Equipment Acoustic Noise Frequencies .....B-11

14 B.5 Construction Equipment Generation of Vibration.....B-14

15 B.6 References .....B-17

16

17 **List of Figures**

18 Figure B-1. Diagram of the standard sound weighting networks.....B-2

19 Figure B-2. Diagram of the divergence effect for a point source in a free field (no obstructions). .....B-4

20 Figure B-3. Example of the influence of ground surface effects between a source and receiver.<sup>a</sup> .....B-5

21 Figure B-4. The atmospheric effect of frequency on sound pressure level attenuation with distance .....B-6

22 Figure B-5. Wind effects on sound pressure levels with distance.....B-6

23 Figure B-6. Sound wave interference.....B-7

24 Figure B-7. Construction equipment noise ranges. ....B-11

25 Figure B-8. Envelope of sound pressure levels from 23 diesel-powered items of construction

26 equipment measured at 50 feet from the source. ....B-12

27 Figure B-9. Sound pressure levels from two bulldozers under various conditions measured at

28 50 feet from the source.....B-12

29 Figure B-10. Peak sound pressure levels from pile drivers, driving 14-inch diameter pipe piles,

30 measured at 50 feet from the source.....B-13

31 Figure B-11. Typical levels of ground-borne vibration.....B-15

32

33 **List of Tables**

34 Table B-1 Octave-band correction factors for A-weighted sound pressure levels.....B-3  
35 Table B-2. Table of approximations for the addition of sound pressure levels.....B-8  
36 Table B-3. Construction Equipment Noise Emission Reference Levels and Usage Factors .....B-9  
37 Table B-4. Source Spectra and Overall Noise Levels .....B-14  
38 Table B-5. Vibration source levels for construction equipment.....B-16  
39 Table B-6. Measured and suggested “n” values based on soil class. ....B-17  
40

## 41 **B. APPENDIX B – ACOUSTIC NOISE AND VIBRATION FROM** 42 **CONSTRUCTION**

### 43 **B.1 INTRODUCTION**

44 An analysis of environmental noise (acoustic and vibration) is based upon a source-path-receiver  
45 concept (FTA 2006). A source generates a noise. Then, along the propagation path between the  
46 source and receiver, noise levels are generally reduced (attenuated) by distance, intervening obstacles,  
47 and other factors. By the time sound reaches the receiver, noise combines from all surrounding  
48 sources and can be compounded or reduced depending upon a number of factors explained in **Section**  
49 **B.2, Characteristics of Acoustic Noise.**

50 It is expected that there will be many “sources” from construction and related equipment operation as  
51 the Focused Study Area lands are developed. There are and will be many “receivers” including the  
52 people, equipment, and buildings in the surrounding government, commercial, and industrial sites,  
53 residential and tribal members of the public, and the users of the conveyed lands. It is assumed that all  
54 construction-related activities would comply with the Washington Administrative Code (WAC) for  
55 the residential, commercial, and industrial Maximum Permissible Environmental Noise Levels (WAC  
56 173-060-040) and the associated durations and times of day. **Section 3.9** of this environmental  
57 assessment (EA) discusses compliance with the WAC. However, as mentioned in **Appendix A**, the  
58 Pacific Northwest National Laboratory (PNNL) and the Laser Interferometer Gravitational-Wave  
59 Observatory identified scientific equipment sensitivity to acoustic noise and vibration at levels that  
60 are not protected by the WAC regulations as their threshold levels of concern are, for the most part,  
61 not generally perceptible to humans.

### 62 **B.2 CHARACTERISTICS OF ACOUSTIC NOISE**

63 “Noise” is generally understood as unwanted sound. Normally we think of sound propagating through  
64 air but it also propagates through solid media such as geologic materials, or wood and even liquids  
65 such as water. Through air, sound propagates as a compression wave and travels as fluctuations of air  
66 pressure above and below atmospheric pressure. Sound can also be described in terms of a “wave” of  
67 vibrating air particles where, at certain points along the wave, air particles are compressed and, at  
68 other points, the air particles are spread out. The height of the wave is its amplitude and the distance  
69 between two peaks of the wave is the wavelength. The human ear perceives sound as tones or  
70 frequencies. Shorter wavelengths are higher tones/frequencies and longer wavelengths are lower  
71 tones/frequencies. The sound pressure level is related to the amplitude of the wave, which we  
72 perceive as loudness. Noise may consist of a single or range of frequencies.

#### 73 **B.2.1 The Characteristics of Sound and Human Sensitivity**

74 Human hearing is not equally sensitive to sound at all frequencies within the audible frequency range.  
75 At best, that frequency range is 20 to 20,000 hertz (one hertz (Hz) is one cycle or wavelength per  
76 second) for young adults with good hearing. A frequency-dependent sound pressure rating scale was  
77 developed with values given in decibels<sup>1</sup> (dB) to reflect the variations in human sensitivity. This is

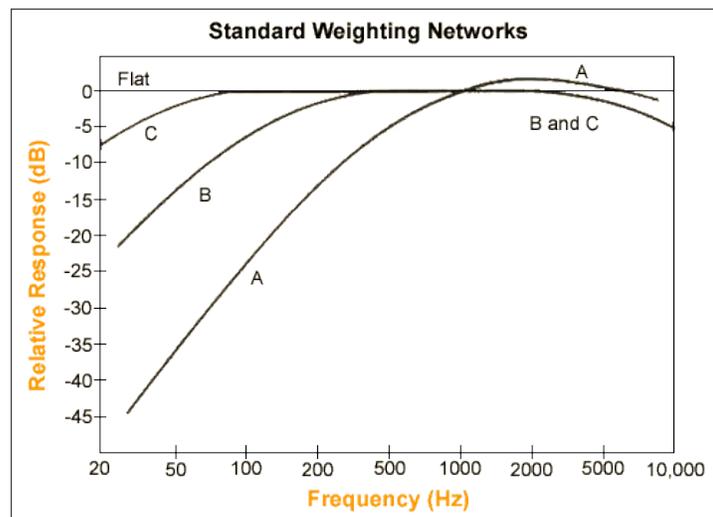
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<sup>1</sup> Decibel is a unit used to express the intensity of a sound wave, equal to 20 times the common logarithm of the ratio of the pressure produced by the sound wave to a reference pressure, usually 0.0002 microbar. The logarithm of a number is how many times a number, called a base, must be multiplied by itself to get that number. In the case of the “common logarithm,” as specified in this definition, the base is 10. An example is  $10 \times 10 \times 10 = 1,000$ , so the common logarithm of 1,000 is 3.

78 referred to as the A-weighted dB (dBA) scale (a curve relating relative response to frequency shown  
 79 in Figure B-1) and developed to compensate by approximating human hearing sensitivities. The lower  
 80 threshold of human hearing is 0 dBA at 1,000 Hz and the human threshold of pain is somewhere  
 81 around 130 dBA (DOL 2015).

82 Therefore, A-weighted dBA values are appropriate to use when the receiver is a human, but as shown  
 83 on the figure, un-weighted dB values (the flat line on Figure B-1) are appropriate when the receiver  
 84 is, for example, sensitive scientific equipment. The figure shows that A-weighted values  
 85 underestimate the sound pressure levels at frequencies less than about 1,000 and more than about  
 86 7,000 Hz and overestimate them at the frequencies in between. Any two sounds whose frequencies  
 87 make a two to one ratio are said to be separated by an octave. An octave band is named for its center  
 88 frequency<sup>2</sup>. Each octave band can be broken into three smaller bands called the 1/3 octave bands  
 89 (upper, center, and lower). The 1/3 octave bands are important to addressing the potential acoustic  
 90 noise impact to sensitive equipment at PNNL’s Physical Sciences Facility. **Table B-1** shows the 1/3  
 91 octave-band correction factors for the A-weighting (FHWA 2011a).

92 **Figure B-1. Diagram of the standard sound weighting networks.**



Source: DOL 2015.

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 95

<sup>2</sup> The center frequency is the geometric mean calculated as  $f_c = (f_1 f_2)^{1/2}$ , where  $f_c$  is the center frequency, and  $f_1$  and  $f_2$  are the lower and upper frequency limits, respectively.

96

**Table B-1 Octave-band correction factors for A-weighted sound pressure levels.**

One-Third Octave-Band Center Frequency (Hz)	Correction Factor, relative to 1,000 Hz	One-Third Octave-Band Center Frequency (Hz)	Correction Factor, relative to 1000 Hz
20	-50.5	800	-0.8
25	-44.7	1,000	0
31.5	-39.4	1,250	0.6
40	-34.6	1,600	1
50	-30.2	2,000	1.2
63	-26.2	2,500	1.3
80	-22.5	3,150	1.2
100	-19.1	4,000	1
125	-16.1	5,000	0.5
160	-13.4	6,300	-0.1
200	-10.9	8,000	-1.1
250	-8.6	10,000	-2.5
315	-6.6	12,500	-4.3
400	-4.8	16,000	-6.6
500	-3.2	20,000	-9.3
630	-1.9	—	—

97

Source: FHWA 2011a.

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99

**B.2.2 The Environmental Factors Affecting Sound Propagation**

100 This EA addresses acoustic noise (sound pressure level in dBs and the associated frequencies) that is  
 101 propagated or transmitted in the outdoor environment. This is significantly complicated by the sound-  
 102 absorbing and sound-reflecting characteristics of the natural and man-made environment. Major  
 103 studies have been performed to address sound propagation outdoors by the U.S. Department of  
 104 Transportation's Federal Transit Administration (FTA) (FTA 2006) and Federal Highway  
 105 Administration (FHWA 2011a). The following general discussion relies on these studies.

106 The environmental factors that affect noise propagation are:

- 107 1. Type of source (point or line source)
- 108 2. Distance to be traveled from the source (the receiver location)
- 109 3. Ground surface characteristics (natural or man-made)
- 110 4. Atmospheric conditions (temperature, humidity, wind, precipitation)
- 111 5. Obstructions (natural or man-made).

112 These factors can be described as divergence effects, ground effects, atmospheric or meteorological  
 113 effects, shielding effects (FHWA 2011a), and one other effect that relates to the interaction of  
 114 different sources of sound, sound interference.

115 **Divergence** is the spreading of the sound waves over distance and is either spherical (point source) or  
 116 cylindrical (line source) (FHWA 2011a). In a free field, which is a location with no obstructions,  
 117 sound radiates uniformly in all directions and the sound level is reduced by what is called the inverse-  
 118 square law. The sound pressure intensity level (in dB) at equal spherical distances from a point source

119 is the same. The sound level decreases by 6 dB for every doubling of the distance from a stationary  
 120 point source. For a line or mobile source such as traffic noise, the decrease is less and varies between  
 121 3 and 4 dB with the doubling distance (FHWA 2011a). The divergence effect is one of the most  
 122 important to consider as it results in an attenuation of sound as the receiver is farther and farther away  
 123 from the source. Some construction noise would be considered a point source (stationary) while  
 124 others would be a line source (mobile equipment).

125 To calculate a sound pressure level in a field with no obstructions (free field) for a point source the  
 126 equation is (DOL 2015):

$$127 \quad Lp_2 = Lp_1 - 20 \log_{10}(r_2/r_1)$$

128 where  $Lp_1$  is the sound level pressure (in dBs) at distance  $r_1$  (in feet) from the point source and  $Lp_2$  is  
 129 the sound level pressure (in dBs) at a different distance,  $r_2$  (in feet), from the source.

130 An example is for a point source with a measured sound pressure level of 100 dB at a distance of 10  
 131 feet away. The calculated sound pressure level in dBs at the doubling distance of 20 feet from the  
 132 same source would be:  $100 - 20 \log (20/10)$  or 94 dB (see Figure B-2).

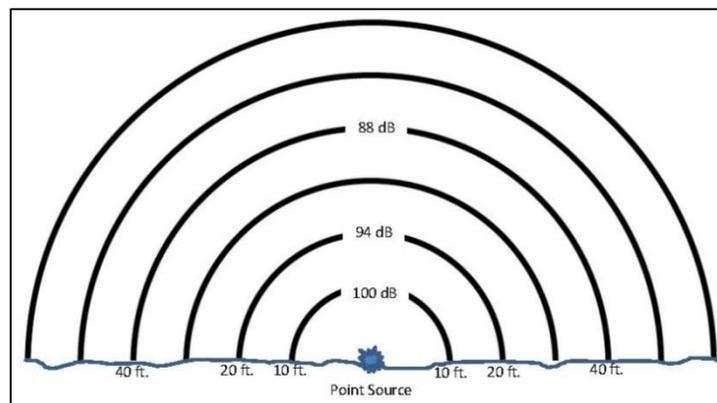
133 To calculate the same sound pressure level for a line source with no obstructions (free field), the  
 134 equation is (FHWA 2011a):

$$135 \quad Lp_2 = Lp_1 - 10 \log_{10}(r_2/r_1)$$

136 where  $Lp_1$  is the sound level pressure (in dBs) at distance  $r_1$  (in feet) from the point source and  $Lp_2$  is  
 137 the sound level pressure (in dBs) at a different distance,  $r_2$  (in feet), from the source.

138 An example is for a line source with a measured sound pressure level of 100 dB at a distance of 10  
 139 feet away. The calculated sound pressure level in dBs at the doubling distance of 20 feet from the  
 140 same source would be:  $100 - 10 \log (20/10)$  or 97 dB.

141 **Figure B-2. Diagram of the divergence effect for a point source in a free field (no obstructions).**



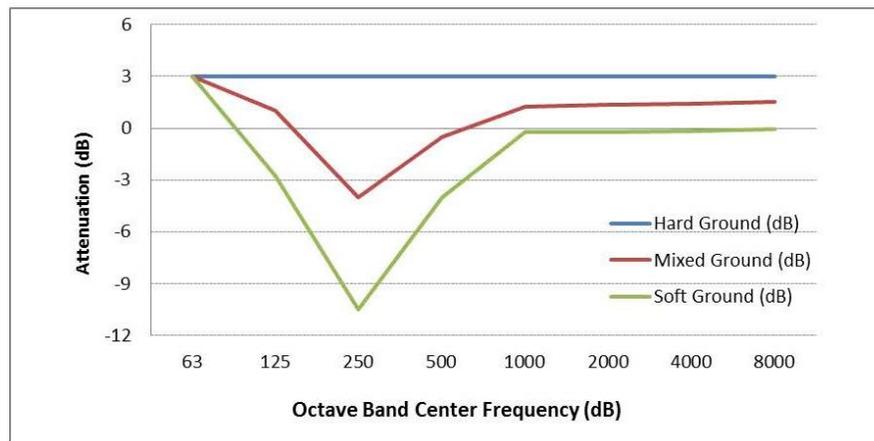
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144 **Ground effects** refer to the change in sound level due to the ground between the source and the  
 145 receiver. It is a very complex acoustic phenomenon and a function of the ground characteristics,  
 146 geometry between the source and receiver, and the frequency spectrum of the source. Hard ground  
 147 refers to any highly reflective surface such as water, asphalt, and concrete that preserves or increases  
 148 sound energy. Soft ground refers to any absorptive surface in which the sound energy is diminished  
 149 due to, for example, dense vegetation or freshly fallen snow (FHWA 2011a). Absorption is less

150 significant at lower frequencies. Mixed surfaces are a combination of hard and soft. See **Figure B-3**  
 151 for a graphic example of these effects.

152 A commonly used rule-of-thumb is that: (1) for propagation over hard ground, the  
 153 ground effect is neglected; and (2) for propagation over acoustically soft ground, for  
 154 each doubling of distance the soft ground effect attenuates the sound pressure level at  
 155 the receiver by an additional 1.5 dB(A). This extra attenuation applies to only  
 156 incident angles of 20 degrees or less. For greater angles, the ground becomes a good  
 157 reflector and can be considered acoustically hard. Keep in mind that these  
 158 relationships are quite empirical but tend to break down for distances greater than  
 159 about 30.5 to 61 m [meters] (100 to 200 ft [feet]). (FHWA 2011a).

160 **Figure B-3. Example of the influence of ground surface effects between a source and receiver.<sup>a</sup>**



<sup>a</sup> Using data from BKSVM 2001.

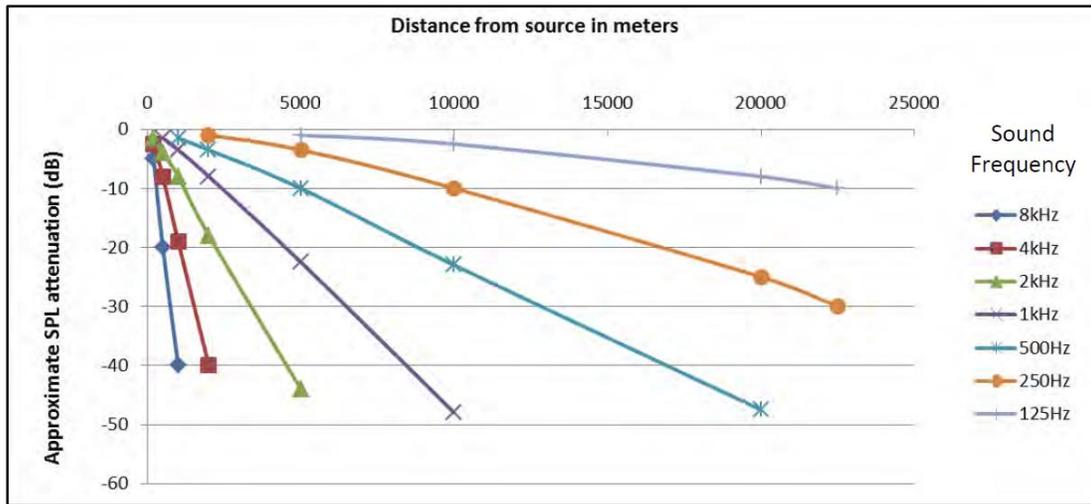
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**Meteorological effects** result from three different atmospheric conditions (FHWA 2011a). These include (1) atmospheric absorption by air and water vapor, (2) atmospheric refraction caused by temperature and wind gradients, and (3) air turbulence.

- 167
- Atmospheric **absorption by air and water vapor** over distances greater than 100 feet can substantially reduce sound levels especially at high frequencies. The effect of atmospheric absorption does not appreciably attenuate lower frequencies (see Figure B-4) (BKSVM 2001).
  - Atmospheric **refraction** is the bending of sound waves due largely to **near-ground wind effects** (see Figure B-5). Sound propagation against the direction of the wind (upwind) refracts sound waves upward reducing sound levels. Sound propagation in the direction of the wind (downwind) refracts sound towards the ground resulting in an increase in sound levels at the receiver. Side winds also affect noise propagation.
  - **Temperature** effects on sound propagation show that when the air **near the ground** is warm it results in sound refracting upward away from the ground and decreasing sound levels at the receiver. Conversely, sound propagation when the air near the ground is cold (e.g., nighttime conditions) results in sound refracting downward and an increase in sound levels at the receiver. Refraction effects due to temperature do not substantially influence sound levels within 200 feet of the source.
  - Effects on sound propagation due to air **turbulence** are largely unpredictable but can be significant within 400 feet of the source.
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**Figure B-4. The atmospheric effect of frequency on sound pressure level attenuation with distance**

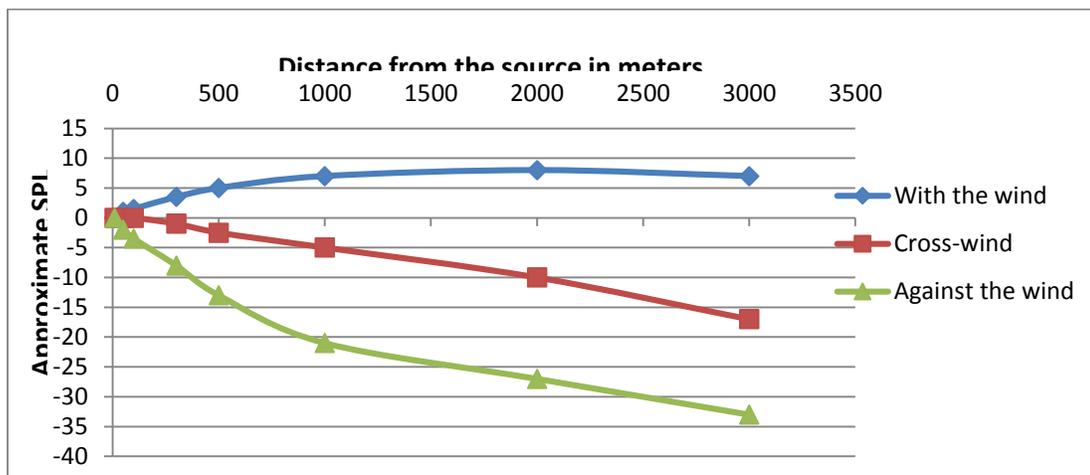


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Source: Using data from BKSJ 2001.

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**Figure B-5. Wind effects on sound pressure levels with distance.**



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Source: Using data from BKSJ 2001.

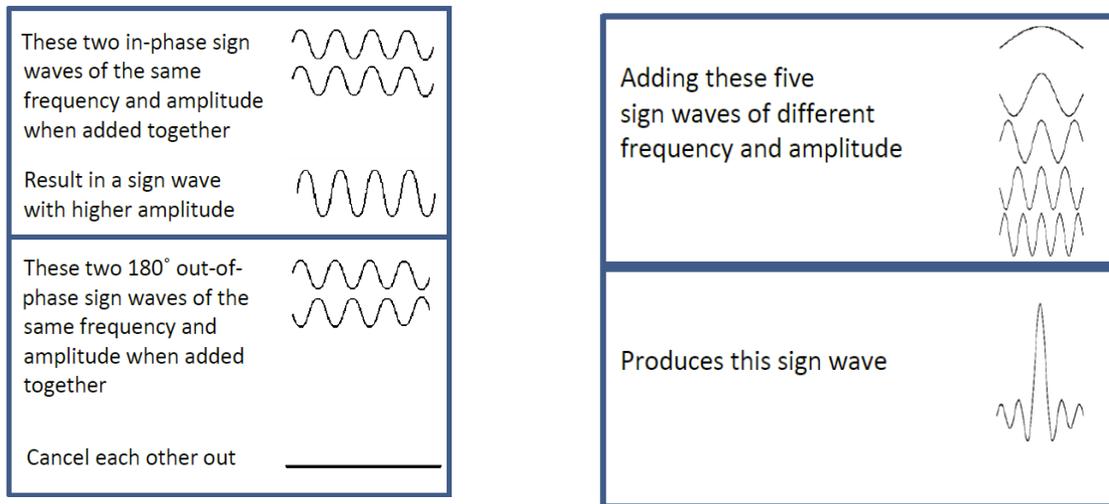
192 **Shielding effects** from natural and man-made structures such as trees and buildings attenuate or  
 193 reduce sound levels as a function of the object’s size, shape, density, and the frequency of the sound  
 194 source (FHWA 2011 a). For example, for transportation sound sources, the FHWA found that  
 195 vegetation over 15 feet high and 100 feet wide and dense enough to completely obstruct line-of-sight  
 196 between the source and receiver could provide up to 5 dBA of noise reduction, and that the maximum  
 197 reduction could be as much as 10 dBA. They found for buildings grouped in a row with small gaps  
 198 between them could result in a 3 dBA reduction with additional rows behind them resulting in an  
 199 added decrease of about 1.5 dBA for each row. For longer buildings or buildings spaced closer  
 200 together, the effect could be more like a noise barrier.

201 **Sound wave interference** results in constructive, destructive (reduction), or complete cancellation  
 202 when sound waves are either in or out of phase with each other (as shown in Figure B-6). One of the

203 most noticeable effects is **constructive interference** when sound waves are in phase and they add  
 204 together. This results in **sound addition**. When sound waves are completely out of phase (that is, 180  
 205 degrees) they can cancel each other out resulting in no sound or **sound cancellation**. When different  
 206 sound waves interact that are not completely in-phase or out-of-phase they result in **destructive**  
 207 **interference**. The result is a sound that is intermittently louder or softer giving us the impression of  
 208 pulses or beats in the sound. The new sound wave combines by both addition and subtraction to result  
 209 in a new sound wave of different frequency and sound pressure level from the initial waves.

210 Where multiple sources of sound in the same frequency range have sound pressure levels within nine  
 211 dBs of each other, there is generally a noticeable increase in sound pressure levels due to **sound**  
 212 **addition** (DOL 2015) (see Table B-2). To accurately add sound values it would be necessary to  
 213 convert the sound pressure level in dBs (a logarithmic value) back into the energy values they  
 214 represent, perform the addition (or subtraction) as appropriate, and then convert the energy values  
 215 back to dBs. However noise analysts have found a straightforward method to add or subtract dBs that  
 216 closely approximate the longer process. This is shown in **Table B-2**. So when two sounds within, for  
 217 example, one dB of each other interact they produce a sound that is 3 dBs higher than the highest  
 218 sound pressure level of the two. An increase of 1 dB is just noticeable, to 3 dBs is noticeable, 3 to 6  
 219 dBs is obvious, and 6 to 10 dBs or more is significant (BKSVM 2001).

220 **Figure B-6. Sound wave interference.**



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**Table B-2. Table of approximations for the addition of sound pressure levels.**

When two dB values differ by (dB)	Add to the higher value (dB)	Example
0 to 1	3	50 + 51 = 54
2 to 3	2	62 + 65 = 67
4 to 9	1	65 + 71 = 72
10 or more	0	55 + 65 = 65

224

Source: FHWA 2011a..

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226

### B.3 CONSTRUCTION EQUIPMENT ACOUSTIC NOISE SOUND PRESSURE LEVELS

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228 Noise levels created by construction equipment vary greatly depending on such factors as the type of  
 229 equipment, the power source (engines), the operation being performed, the age and condition of the  
 230 equipment, and whether it is stationary or mobile. In addition, the proximity of the equipment to  
 231 noise-and vibration-sensitive locations like PNNL and the Laser Interferometer Gravitational-Wave  
 232 Observatory, duration of the activity (months or years), the days of the week, and time of day will  
 233 influence the effects of construction noise.

234 Stationary equipment consists of equipment that generates noise at mainly one location, although  
 235 some can be moved around a site as they are needed at different locations. These include items such  
 236 as pumps, generators, and compressors. They operate at a more-or-less constant noise level (sound  
 237 pressure) under normal operation and are classified as non-impact equipment. Other types of  
 238 stationary equipment such as pile drivers, jackhammers, pavement breakers, blasting operations,  
 239 produce variable and intermittent noise levels and produce what we perceive as hammering or  
 240 impact-type noises. Impact equipment generates impulse noise. Impulse noise is defined as noise of  
 241 short duration (generally less than one second), high loudness or intensity (sound pressure level), with  
 242 an abrupt onset and rapid decay, often quickly changing frequency composition. The noise produced  
 243 by “impact” equipment results from the striking of a heavy mass on a surface, typically repeating  
 244 cyclically over time.

245 Mobile equipment naturally moves around a construction site. This equipment (often called “heavy”  
 246 equipment) includes dozers, scrapers, excavators, and graders that may operate in a cyclic fashion in  
 247 which a period of full power is followed by a period of reduced power. These are generally very large  
 248 and heavy, often creating considerable acoustic noise and ground vibration as they move.

249 As discussed in *Construction Noise and Vibration Impact on Sensitive Premises* (Roberts 2009), “An  
 250 additional factor of great importance is the presence of low frequency noise (< 200 Hz) in the source  
 251 sound spectra of many items of equipment for which the ‘true’ annoyance capability at sensitive  
 252 receptors is not reflected either in the measurement or prediction using the overall A-weighted sound  
 253 pressure level, or dB(A).”

254 **Table B-3** provides example values of noise (sound pressure level) measured in A-weighted dBs  
 255 associated with the operation of stationary and mobile construction equipment measured at a distance  
 256 of 50 feet from the source of the equipment. These data come from the Central Artery/Tunnel Project  
 257 (CA/T) known as the “Big Dig” in Boston, MA (FHWA 2011b). The reason for presenting these data  
 258 is to show both reasonable sound levels associated with various types of construction equipment from  
 259 the regulatory and actual use perspective.

260 The Permissible Limit was developed for the CA/T project to be consistent with the local noise code  
 261 and is based upon manufacturer information and actual measurement to ensure that equipment could  
 262 meet those specifications.  $L_{\max}$  represents the maximum sound pressure level. The sound pressure  
 263 noise values in this table are considered reasonable and characteristic for construction equipment for  
 264 this EA. Where no “actual measured” values are shown, the “Permissible Limit” value should be  
 265 considered a representative maximum.

**Table B-3. Construction Equipment Noise Emission Reference Levels and Usage Factors.**  
 (2 pages)

<b>Equipment Description</b>	<b>Impact Device?</b>	<b>Permissible Limit <math>L_{\max}</math> at 50 feet</b>	<b>Actual Measured <math>L_{\max}</math> at 50 feet (averaged value from multiple samples)</b>
All other equipment >5 horsepower	No	85	N/A
Auger drill rig	No	85	84
Backhoe	No	80	78
Bar bender	No	80	N/A
Blasting	Yes	94	N/A
Boring jack power unit	No	80	83
Chain saw	No	85	84
Clam shovel (dropping)	Yes	93	87
Compactor (ground)	No	80	83
Compressor (air)	No	80	78
Concrete batch plant	No	83	N/A
Concrete mixer truck	No	85	79
Concrete pump truck	No	82	81
Concrete saw	No	90	90
Crane	No	85	81
Dozer	No	85	82
Drill rig truck	No	84	79
Drum mixer	No	80	80
Dump truck	No	84	76
Excavator	No	85	81
Flat bed truck	No	84	74
Front end loader	No	80	79
Generator	No	82	81
Generator (<25 KVA, VMS signs)	No	70	73
Gradall	No	85	83
Grader	No	85	N/A
Grapple (on backhoe)	No	85	87
Horizontal boring hydraulic jack	No	80	82
Hydra break ram	Yes	90	N/A
Impact pile driver	Yes	95	101
Jackhammer	Yes	85	89
Man lift	No	85	75
Mounted impact hammer (hoe ram)	Yes	90	90
Pavement scarifier	No	85	90
Paver	No	85	77

**Table B-3. Construction Equipment Noise Emission Reference Levels and Usage Factors.**  
(2 pages)

Equipment Description	Impact Device?	Permissible Limit $L_{max}$ at 50 feet	Actual Measured $L_{max}$ at 50 feet (averaged value from multiple samples)
Pickup truck	No	55	75
Pneumatic tools	No	85	85
Pumps	No	77	81
Refrigerator unit	No	82	73
Rivit [sic] buster/chipping gun	Yes	85	79
Rock drill	No	85	81
Roller	No	85	80
Sandblasting (single nozzle)	No	85	96
Scraper	No	85	84
Sheers (on backhoe)	No	85	96
Slurry plant	No	78	78
Slurry trenching machine	No	82	80
Soil mix drill rig	No	80	N/A
Tractor	No	84	N/A
Vacuum excavator (vac-truck)	No	85	85
Vacuum street sweeper	No	80	82
Ventilation fan	No	85	79
Vibrating hopper	No	85	87
Vibratory concrete mixer	No	80	80
Vibratory pile driver	No	95	101
Warning horn	No	85	83
Welder/torch	No	73	74

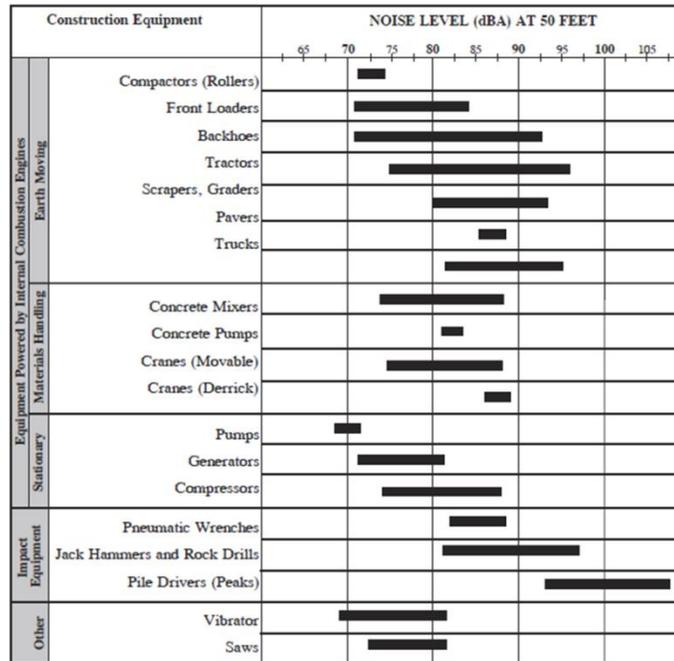
266 **Source:** FHWA 2011b.

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268 **Figure B-7** is taken from a literature study done by the U.S. Environmental Protection Agency (EPA)  
 269 (EPA 1971) published in 1971, *Noise from Construction Equipment and Operations, Building*  
 270 *Equipment, and Home Appliances* (December 31). The figure provides some similar sound pressure  
 271 levels in dBA at 50 feet from construction equipment.

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**Figure B-7. Construction equipment noise ranges.**



Source: EPA 1971, Figure 1.

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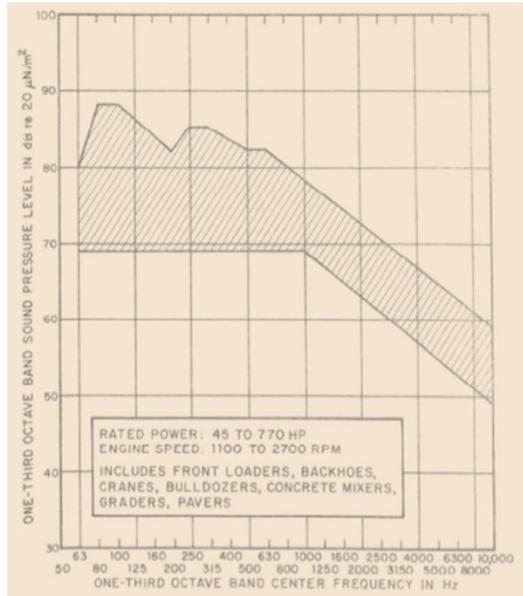
**B.4 CONSTRUCTION EQUIPMENT ACOUSTIC NOISE FREQUENCIES**

277 Acoustic noise maximum permissible environmental noise levels such as those from the State of  
278 Washington (WAC 173-060-040) are based upon sound pressure levels in dBA and are designed to be  
279 protective of humans. However, equally important to this EA is the impact of noise to sensitive  
280 scientific equipment. For this sensitive equipment the frequency of the noise and, in particular, the  
281 one-third octave band frequencies, are an important consideration (see Appendix A, Section A.4.1).  
282 To demonstrate the frequency range and associated sound pressure levels, this section includes  
283 figures and tables or data taken from recognized authoritative sources on this subject.

284 **Figure B-8** from the EPA construction equipment treatise (EPA 1971) shows the envelope of one-  
285 third octave band center frequency sound pressure levels for 23 different pieces of diesel-powered  
286 equipment. EPA acknowledged in that report that the diesel engine equipment “constitute the  
287 predominant noise sources.” The diesel-powered equipment in this figure was rated between 45 and  
288 770 horsepower and was operating between 1,100 and 2,700 revolutions per minute. The noise data  
289 were obtained by making measurements of this equipment at various peripheral locations and  
290 demonstrate various degrees of loading (power utilization), ranging from none (engine idling) to  
291 heavy use. The equipment also varied in the degree of exhaust muffling.

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**Figure B-8. Envelope of sound pressure levels from 23 diesel-powered items of construction equipment measured at 50 feet from the source.**



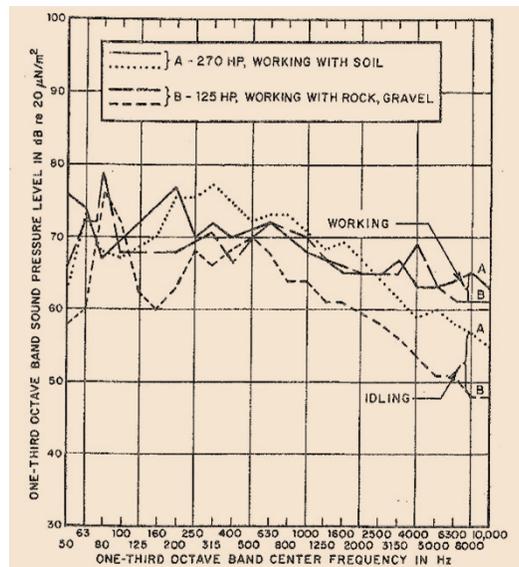
Source: EPA 1971, Figure A.1.

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**Figure B-9** illustrates the sound noise frequency spectra for two “continuous track”<sup>3</sup> diesel-engine bulldozers. These spectra reflect not just the engine noise but also some noise due to the metal track tread, gears, and scraping of metal against rock. Gasoline engine vehicles exhibit similar spectra (EPA 1971).

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**Figure B-9. Sound pressure levels from two bulldozers under various conditions measured at 50 feet from the source.**



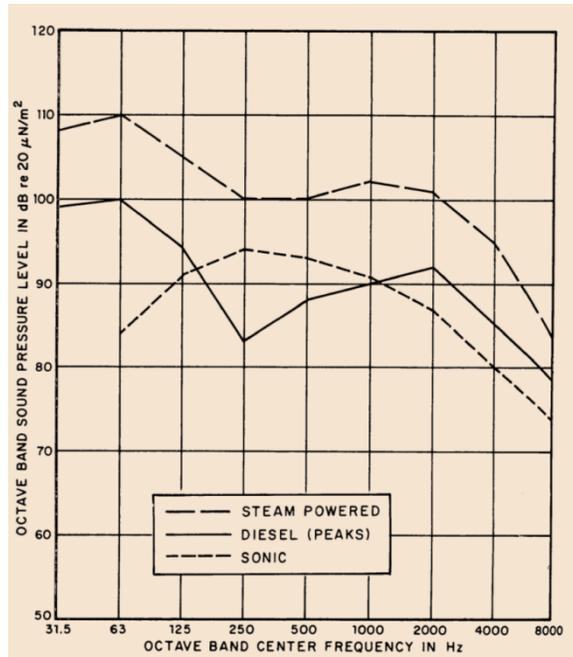
Source: EPA 1971.

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<sup>3</sup> Continuous track refers to the vehicle’s tread propulsion system. Typically, a track is a long band of joined modular steel plates that distribute the vehicle’s weight and make it easier to traverse soft ground.

305 **Figure B-10** shows pressure levels from impact equipment producing impulse sound. This example  
 306 shows the “peak sound pressure”<sup>4</sup> levels from pile drivers driving a 14-inch diameter pipe pile into  
 307 the ground, measured at 50 feet from the source (see Figure B-10). The noise from conventional pile  
 308 drivers is characterized by intense peaks (the steam and diesel drivers in the figure) associated with  
 309 the impacts of the hammer against the pile. The noise from the sonic pile driver is non-impact/non-  
 310 impulse and, because it is driven by sonic vibration, it generates a lower level of acoustic noise sound  
 311 pressure.

312 **Figure B-10. Peak sound pressure levels from pile drivers, driving 14-inch diameter pipe piles,**  
 313 **measured at 50 feet from the source.**



Source: EPA 1971, Figure A.8.

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317 Table B-4 shows source frequency spectra and overall noise levels for three pieces of construction  
 318 equipment from Construction Noise and Vibration Impact on Sensitive Premises (Roberts 2009). The  
 319 table shows one-third octave band frequencies between 31.5 and 250 Hz in the first 10 rows of the  
 320 table, then shows the overall sound pressure levels in Z-weighted<sup>5</sup> decibels (dBZ) and A-weighted  
 321 decibels (dBA) in the bottom two rows. The overall sound pressures were measured or derived from  
 322 the full audio frequency range from 31.5 to 10 kilohertz.

<sup>4</sup> The peak sound pressure is the maximum value reached and is the true peak of the sound pressure wave and is usually either C-weighted or unweighted (that is, measured dB not dBA).

<sup>5</sup> Z-weighting stands for zero-weighting or no-weighting and is a measurement with equal emphasis of all frequencies.

323

**Table B-4. Source Spectra and Overall Noise Levels**

One-Third Octave Band Frequency (Hz)	Measured in Decibels at:		
	10 meters	10 meters	15 meters
	Excavator on Dirt Pile	Front-End Loader Driving	Caterpillar-Scraper - Unsilenced
31.5	89	95	86
40	93	101	83
50	96	100	76
63	96	106	83
80	104	108	103
100	104	108	87
125	97	115	82
160	100	106	81
200	100	107	82
250	100	108	75
Overall - 31.5 to 10,000 (dBZ)	112	120	103
Overall - 31.5 to 10,000 (dBA)	106	114	90

324

**Source:** Roberts 2009, Table 4.

325

326

**B.5 CONSTRUCTION EQUIPMENT GENERATION OF VIBRATION**

327

Vibration is an oscillatory motion which can be described in terms of displacement, velocity, or acceleration. Ground-borne vibration can cause building floors to shake, windows to rattle, hanging pictures to fall off walls, and in some cases damage buildings. Like noise, vibration from a single source may consist of a range of frequencies. The magnitude of vibration is commonly expressed as the peak particle velocity (PPV) in the unit of inches per second (in/sec). The PPV is the maximum instantaneous vibration velocity experienced by any point in a structure during a vibration event and indicates the magnitude of energy transmitted through vibration. PPV is an indicator often used in determining potential damage to buildings from vibration associated with blasting and other construction activities.

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Because the net average of a vibration signal is zero (it goes positive and negative), the root mean square (RMS) amplitude is used to describe the "smoothed" vibration amplitude. The root mean square of a signal is the square root of the average of the squared amplitude of the signal. The average is typically calculated over a one-second period. The vibration velocity, like noise, is given in decibels but with the abbreviation of "VdB." In the United States all vibration levels are referenced to  $1 \times 10^{-6}$  in/sec.

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Vibration from construction projects is caused by general equipment operations, and is usually highest during pile-driving, soil compacting, jack hammering, demolition, and blasting activities. Although it is conceivable for ground-borne vibration from construction projects to cause building damage, the vibration from construction activities is almost never of sufficient amplitude to cause even minor cosmetic damage to buildings. According to the FTA in *Transit Noise and Vibration Impact Assessment* (FTA 2006), "It is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Some common sources of ground-borne vibration are trains, buses on rough roads, and construction activities such as blasting, pile-driving and operating heavy earth-moving equipment."

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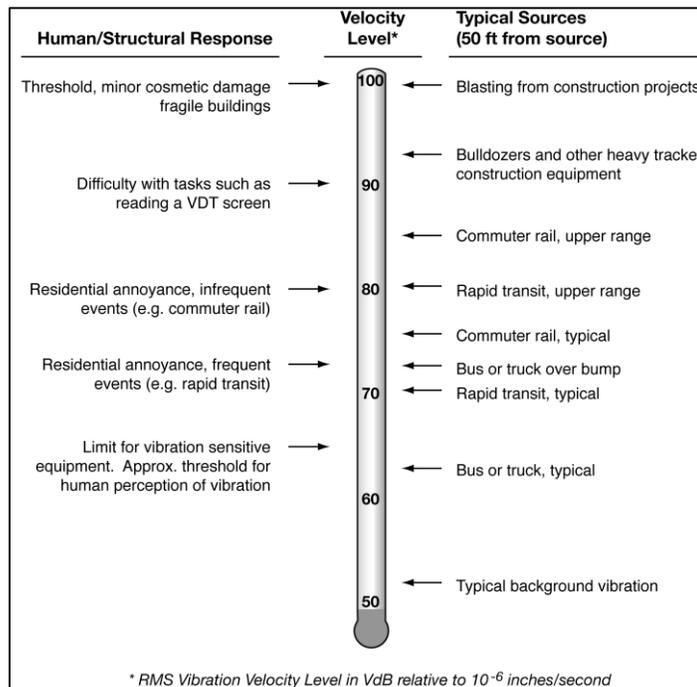
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349

351 As stated by the FTA (2006), “In contrast to airborne noise, ground-borne vibration is not a  
 352 phenomenon that most people experience every day. The background vibration velocity level in  
 353 residential areas is usually 50 VdB or lower, well below the threshold of perception for humans which  
 354 is around 65 VdB. Most perceptible indoor vibration is caused by sources within buildings such as  
 355 operation of mechanical equipment, movement of people or slamming of doors. Typical outdoor  
 356 sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and  
 357 traffic on rough roads. If the roadway is smooth, the vibration from traffic is rarely perceptible.”  
 358 **Figure B-11** illustrates common sources of vibration and the human/structural responses to it. Note  
 359 that the human threshold of perception to vibration is about 65 VdB.

360

**Figure B-11. Typical levels of ground-borne vibration.**



361  
 362  
 363

**Source:** FTA 2006, Figure 7-3

364 Various types of construction equipment were measured for the FTA (2006) analysis under a wide  
 365 variety of construction activities with an average of source levels reported in terms of velocity as  
 366 shown in **Table B-5**. The FTA notes that, although the table gives one level for each piece of  
 367 equipment, there is a considerable variation in reported ground vibration levels from construction  
 368 activities. The data provide a reasonable estimate for a wide range of soil conditions.

369 Like acoustic noise, vibration is attenuated as it traverses media such as ground. The mechanics of  
 370 this are very complicated and beyond the scope of this analysis.

371

**Table B-5. Vibration source levels for construction equipment.**

Equipment		PPV at 25 ft (in/sec)	Approximate $L_v^\dagger$ at 25 ft
Pile Driver (impact)	upper range	1.518	112
	typical	0.644	104
Pile Driver (sonic)	upper range	0.734	105
	typical	0.170	93
Clam shovel drop (slurry wall)		0.202	94
Hydromill (slurry wall)	in soil	0.008	66
	in rock	0.017	75
Vibratory Roller		0.210	94
Hoe Ram		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

<sup>†</sup> RMS velocity in decibels (VdB) re 1 micro-inch/second

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**Note:**  $L_v$  is the velocity level in decibels. RMS is the “root mean square” which is the square root of the average of the squared amplitudes. A micro-inch is  $10^{-6}$  inches.

**Source:** FTA 2006, Table 12-2.

The California Department of Transportation, in Chapter 7 of their *Transportation- and Construction-Induced Vibration Guidance Manual* (Caltrans 2004), provides equations to calculate the vibration amplitudes for various construction equipment at a given distance. Below are the equation and an example problem for a pile-driver provided by Caltrans (2004):

381

$$PPV_{\text{Vibratory Pile Driver}} = PPV_{\text{Ref}} (25/D)^n \text{ (in/sec)}$$

382

where:

383

$$PPV_{\text{Ref}} = 0.65 \text{ in/sec for a reference pile driver at 25 feet}$$

384

$$D = \text{distance from pile driver to the receiver in feet}$$

385

$$n = 1.1 \text{ (the value related to the attenuation rate through ground)}$$

386

387

388

389

**Example:** An 80,000 foot-pound pile driver will be operated at 100 feet from a new office building and 100 feet from a historic building known to be fragile. Evaluate the potential for damage to the buildings and annoyance to the building occupants. No information on the soil conditions is known. In the absence of soil information, use  $n = 1.1$  (see Table B-6).

390

$$PPV = 0.65 (25/100)^{1.1} \times (80,000/36,000)^{0.5} = 0.21 \text{ in/sec}$$

391

**Table B-6. Measured and suggested “n” values based on soil class.**

Soil Class	Description of Soil Material	Value of “n” measured by Woods and Jedele	Suggested Value of “n”
I	Weak or soft soils: loose soils, dry or partially saturated peat and muck, mud, loose beach sand, and dune sand, recently plowed ground, soft spongy forest or jungle floor, organic soils, top soil. (shovel penetrates easily)	Data not available	1.4
II	Competent soils: most sands, sandy clays, silty clays, gravel, silts, weathered rock. (can dig with shovel)	1.5	1.3
III	Hard soils: dense compacted sand, dry consolidated clay, consolidated glacial till, some exposed rock. (cannot dig with shovel, need pick to break up)	1.1	1.1
IV	Hard, competent rock: bedrock, freshly exposed hard rock. (difficult to break with hammer)	Data not available	1.0

392

393

**Source:** Caltrans 2004.

394

395 The U.S. Bureau of Reclamation, in *Klamath Facilities Removal Environmental Impact*  
 396 *Statement/Environmental Impact Review* (BOR 2012), used this methodology to calculate the effects  
 397 of construction vibration at different receptor locations.

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1 **APPENDIX C – ACOUSTIC NOISE AND VIBRATION FROM**  
2 **FACILITY OPERATIONS**

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5 Table of Contents

6

7 C. APPENDIX C – ACOUSTIC NOISE AND VIBRATION FROM FACILITY

8 OPERATIONS ..... C-1

9 C.1 Introduction ..... C-1

10 C.2 Acoustic Noise from Facility Operations ..... C-3

11 C.2.1 Acoustic Noise from Heating, Ventilation, and Air Conditioning Systems ..... C-4

12 C.2.2 Acoustic Noise from Automotive Vehicles ..... C-7

13 C.2.3 Acoustic Noise from Railway Trains ..... C-11

14 C.2.4 Acoustic Noise from Emergency Generators ..... C-16

15 C.2.5 Acoustic Noise from Electrical Energy Transmission ..... C-17

16 C.2.6 Acoustic Noise from Solar Energy Equipment ..... C-22

17 C.3 Vibration from Facility Operations ..... C-22

18 C.3.1 Vibration from Automotive Vehicles ..... C-23

19 C.3.2 Vibration from Railway Trains ..... C-26

20 C.3.3 Vibration from Operating Facility Equipment ..... C-30

21 C.4 References ..... C-34

22

23 **List of Figures**

24 Figure C-1. Packaged HVAC rooftop unit ..... C-4

25 Figure C-2. Photo of HVAC rooftop unit on commercial building roof. .... C-5

26 Figure C-3. HVAC outdoor concrete slab installation. .... C-5

27 Figure C-4. HVAC outdoor concrete slab photo. .... C-5

28 Figure C-5. Sound frequency ranges for various components of HVAC equipment. .... C-6

29 Figure C-6. FHWA Traffic Noise Model output of predicted sound pressure spectral levels for a flat

30 site, with no noise barriers, and acoustically soft ground. Curves represent different

31 distances and louder and quieter pavement. .... C-9

32 Figure C-7. A-Weighted noise emission levels for vehicles at different highway speeds. .... C-10

33 Figure C-9. A passby railway train blowing its horn while passing an idling train. .... C-13

34 Figure C-10. Baseline sound pressure levels for one-third octave frequencies for a power generator

35 without acoustical insulation. .... C-17

36 Figure C-11. Baseline sound pressure levels for one-third octave frequencies for a second power

37 generator without acoustical insulation. .... C-17

38 Figure C-12. Basic structure of the electrical energy transmission system. .... C-18

39 Figure C-13. Typical one-third octave frequency spectrum of transmission line noise showing the

40 “corona” effect. .... C-19

41 Figure C-14. Photo of the existing transmission line where Table C-9 data were collected..... C-20

42 Figure C-15. Photo of the substation in north central Nevada where Table C-10 SPL data were  
 43 collected..... C-21

44 Figure C-16. Typical frequency spectrum of acoustic noise produced by a 60-Hz transformer. .... C-21

45 Figure C-17. Frequency spectrum and SPLs in un-weighted dBs for two PV array  
 46 inverter/transformer pads measured 10 feet from the source. .... C-22

47 Figure C-18. Amplitudes observed for different source types of seismic road vibration..... C-24

48 Figure C-19. Sources of vibration caused by a truck going down the highway. .... C-24

49 Figure C-20. Traffic-calming features introducing road surface unevenness. .... C-25

50 Figure C-21. Vibration measurements for a freight train with 5 railcars traveling at 80 km/hour  
 51 measured 20 meters from the center of the railway tracks in the X, Y, and Z direction.  
 52 ..... C-28

53 Figure C-22. Vibration measurements for a freight train with 21 railcars traveling at 98 km/hour  
 54 measured at 10 meters from the center of the railway tracks in the X, Y, and Z  
 55 direction. .... C-29

56 Figure C-23. Comparison of generator source vibration spectra for five generators. .... C-33

57 Figure C-24. The velocity amplitudes of a rotary screw compressor before (a) and after (b) repair. ....  
 58 ..... C-33

59

60 **List of Tables**

61 Table C-1. Sound pressure levels at 30 feet from the source for four different chiller manufacturers  
 62 and models. .... C-6

63 Table C-2. Sound pressure levels at 80 feet from source for four different chiller manufacturers and  
 64 models. .... C-7

65 Table C-3. Maximum noise emission levels allowed by EPA for in-use medium and heavy trucks  
 66 with gross vehicle weight rating over 10,000 pounds engaged in interstate commerce. ....  
 67 ..... C-8

68 Table C-4. Overall A-weighted source power levels for a proposed truck warehouse distribution  
 69 center. .... C-10

70 Table C-5. Regulations governing railroad noise emissions. .... C-11

71 Table C-6. Summary of line-haul measurement regulatory requirements (FRA 2009). .... C-11

72 Table C-7. Z- and A-weighted sound pressure levels and octave band frequencies for average passby  
 73 and idling railway trains, and average horn from passby trains at a distance of 100 feet.  
 74 ..... C-14

75 Table C-8. Summary of rail yard operation regulatory requirements. .... C-15

76 Table C-9. Example sound pressure level measurement data along an existing transmission line route  
 77 in north central Nevada at the 80 foot right-of-way edge. .... C-19

78 Table C-10. Example sound pressure level measurement data along an existing substation property  
 79 line at a north central Nevada site. .... C-20

80 Table C-12. Vibration at different distances for three traffic-calming features. .... C-25

81 Table C-13. Factors that influence levels of ground-borne vibration and noise. .... C-26

82 Table C-14. Criteria for annoyance caused by ground-borne vibration from Part 2 of ISO Standard  
 83 2631 (1974) and ANSI Standard S3.29-2001. .... C-31

---

84 Table C-15. Structural categories according to the Swiss Standard SN 640312..... C-31

85 Table C-16. Acceptance criteria from the Swiss Standard SN 640312 to protect structures based on

86 their structural category..... C-32

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## 91 C. APPENDIX C – ACOUSTIC NOISE AND VIBRATION FROM 92 FACILITY OPERATIONS

### 93 C.1 INTRODUCTION

94 The Tri-City Development Council (TRIDEC) target marketing industry (TMI) category facility types  
95 described in this environmental assessment (EA) (Chapter 2) are commercial operations and they  
96 must follow federal, state, and local laws and regulations governing worker and public safety as well  
97 as protection of the environment. The facilities that could be constructed would, of necessity, be  
98 designed and built to comply with these regulations and building codes so as not to incur fines,  
99 penalties, or other potential costs associated with civil actions against them. Therefore, both the  
100 regulators and the regulated are interested in knowing what if anything about the facility operations  
101 could exceed limits for noise or vibration. This, it is not uncommon for facilities that are likely to  
102 have environmental noise issues to prepare a noise impact analysis, report, or mitigation plan. They  
103 may even be required to prepare one by a local city or county ordinance for facilities similar to those  
104 evaluated in this EA. Some examples of these noise plans are:

- 105 • *LRI and BioFuels Energy Landfill Gas to Energy Facilities, Noise Mitigation Plan, Tacoma,*  
106 *WA (SCS 2012)*
- 107 • *Noise Impact Analysis, Cott Beverage Facility, San Bernardino County, CA (LSA 2012)*
- 108 • *Noise Impact Feasibility Study Canadian Tire Distribution Centre, Bolton, Ontario, Canada*  
109 *(HGC 2013)*
- 110 • *Noise Impact Analysis, California State University Long Beach, Foundation Retail Project,*  
111 *City of Long Beach, Los Angeles County, CA (LSA 2013a)*
- 112 • *Noise Impact Analysis, Bloomington Truck Terminal, Long Beach, CA (LSA 2013b)*
- 113 • *Noise Assessment for Proposed Dartmouth Street Zone Substation, Queensland, Australia*  
114 *(EEC 2011)*
- 115 • *Noise Assessment: Borrego 1 Solar Project, Borrego Springs, CA (LDN 2011).*

116 Once these noise impact analyses raise the important issues, architects and industrial design engineers  
117 incorporate appropriate environmental noise control and mitigation strategies into facility planning.  
118 Understandably it is not in the best interest of a company to use equipment that emits a lot of acoustic  
119 noise or vibration because of the related health and safety and equipment maintenance costs. But  
120 when they must, it is most likely they would locate as much of the potentially noise-offending  
121 equipment as possible within acoustical noise and vibration-dampened rooms or enclosures to comply  
122 with federal and state occupational safety and environmental regulations. The equipment in these  
123 buildings are primarily of concern for worker health and safety, but it is the stationary and mobile  
124 equipment located outside (on top of and around buildings) that are of most concern in this EA since  
125 noise from these sources would be the most likely to propagate to potential receivers on- and off-site.

126 As explained in Chapter 2, facility operations relevant to this EA are those associated with the  
127 TRIDEC TMI categories. The categories include warehousing and distribution, research and  
128 development, technology manufacturing, food and agriculture, back office, and energy. The  
129 operations within these categories include such things as manufacturing, food processing, and  
130 material handling (see Figure 2-2 in Chapter 2, *TRIDEC's General Current and Projected Target*  
131 *Marketing Industries*), but it is the equipment used by these facilities and operations that generate the  
132 environmental noise (acoustic and vibration).

133 Facility equipment and operations that generate environmental noise can generally be classified into  
134 three categories. These are:

- 135 1. **Stationary equipment** that may include a very wide range of equipment including  
136 generators, pumps, compressors, crushers (of plastics, stone or metal), grinders, screens,  
137 conveyers, storage bins, and electrical equipment
- 138 2. **Mobile equipment** that may include drilling, haulage, pug mills, mobile treatment units, and  
139 service operations
- 140 3. **Transportation equipment** for movement of products, raw material, or waste that may  
141 include truck traffic on the operating facility grounds, loading and unloading trucks, and  
142 movement in and out of a facility

143 In general, the most environmental noise from facility operations comes from equipment such as  
144 heating, ventilation, and air conditioning systems (HVAC); generators; compressors; transformers;  
145 and trucks. The equipment associated with the representative facility types overlap one another, and  
146 some equipment is common to all facility types. For example, all facility types have buildings and  
147 parking lots for their employees or customers. Therefore, these all have environmental noise from  
148 building mechanical equipment (for example, HVAC and emergency generators) and automotive  
149 vehicles. It should be noted that the Commerce Center is not a facility type unto itself but is a mixture  
150 of warehouse and distribution, food and agriculture, and back office-related type facilities.

151 The major environmental noise sources for TRIDEC TMI facility types have been described as  
152 follows:

- 153 • **Warehouse distribution centers** – these facilities require arriving/departing hauling trucks,  
154 shunter trucks<sup>1</sup>, exhaust fans and HVAC systems, and testing of emergency generators  
155 (HGC 2013).
- 156 • **Research and development** – these facilities could use equipment found in any of the other  
157 five industry types shown here, although in much lesser quantities, because the purpose of  
158 research and development is innovation not production.
- 159 • **Technology and manufacturing** – these facilities have general industrial noise classified as  
160 impact (punch presses, stamping machines, and hammers), mechanical (machinery  
161 unbalance, resonant structures, gears and bearings), fluid flow (fans, blowers, compressors,  
162 turbines, and control valves), and combustion (furnaces and flare stacks) (EPA 1971).
- 163 • **Food and agriculture** – these are primarily food/agriculture processing facilities with some  
164 warehousing and distribution operations and equipment such as conveyor belts, vibrating  
165 tables, pneumatic systems, and trucks (WDOLI 2001).
- 166 • **Back office** – these facilities have general building noise (HVAC and emergency generators)  
167 and automotive vehicles.

168 Energy was added as a category to the original five listed above because of TRIDEC's amended  
169 request and interest. In these facilities, the equipment used and the noise generated are specific to a  
170 particular operation, such as:

- 171 • **Solar energy operations** – these facilities utilize equipment such as solar dish engines, pumps,  
172 solar tracking devices (electric motors), electrical substations (transformers and switchgears) and

---

<sup>1</sup> A shunter truck is a semi-tractor used to move semi-trailers within a cargo yard or warehouse facility.

173 transmission lines, employee and maintenance vehicular traffic, and maintenance facilities  
174 (DOI 2015a).

- 175 • **Biofuels processing facilities** – these facilities require equipment such as biomass power plant  
176 heat recovery systems, milling rooms and boilers, wood chippers, steam turbine generators,  
177 exhaust stacks, mechanical-draft cooling systems, electrical substation switchgear, transmission  
178 lines, vehicular traffic, and maintenance facilities (DOI 2015b).

179 As described in Appendix B, an analysis of construction environmental noise (acoustic and vibration)  
180 is based upon a source-path-receiver concept. The same concept applies to facility operations. There  
181 will be many sources from facility operations as the Focused Study Area lands are developed. There  
182 will also be many receivers including the people, equipment, and buildings in the surrounding  
183 government, commercial, and industrial sites, residential and tribal members of the public, and other  
184 users of the conveyed lands.

185 It is assumed that the facility operation employers on the Focused Study Area lands transferred, once  
186 developed, would protect their employees and comply with the Washington Department of Labor and  
187 Industries, Division of Occupational Safety and Health, “General Safety and Health Standards”  
188 (WAC 296-24). It is also assumed that all operations-related activities would comply with the  
189 Washington Administrative Code for the residential, commercial, and industrial maximum  
190 permissible environmental noise levels (WAC 173-060-040) and the associated durations and times  
191 of day. **Sections 3.9** and **3.14** of this EA discuss compliance with the Washington Administrative  
192 Code for human health and safety. Similarly, vibration in the workplace would be kept within  
193 ergonomic standards because of the U.S. Occupational Health and Safety Administration’s (OSHA’s)  
194 “General Duty Clause” (*Occupational Safety and Health Act of 1970*, Section 5(a)(1)) requiring  
195 employers by reference to comply with the American Conference of Governmental Industrial  
196 Hygienists’ Threshold Limit Values for Physical Agents ergonomic standard for whole-body  
197 vibration and any “known” vibration-related health issues.

198 These state, federal, and organizational standards are for the comfort and protection of humans, and  
199 this EA assumes that by complying with these standards, the future site workers and members of the  
200 public will be protected since that is the intent of the standards. However, as mentioned in **Appendix**  
201 **A**, the Pacific Northwest National Laboratory (PNNL) and Laser Interferometer Gravity-wave  
202 Observatory (LIGO) identified equipment sensitivity to acoustic noise and vibration at levels that are  
203 not protected by these regulations as their threshold levels of concern (see Appendix A) and that are  
204 below levels perceptible to humans. Therefore, this appendix focuses on providing supporting  
205 information to address acoustic noise and vibration important to determining impacts to PNNL and  
206 the LIGO operations. Also, as mentioned above, it is the stationary and mobile equipment located  
207 outside (on top of and around) that are of most concern to this EA since noise from these sources  
208 would be the most likely to propagate their sound and vibrational energy to potential receivers on-  
209 and off-site.

## 210 **C.2 ACOUSTIC NOISE FROM FACILITY OPERATIONS**

211 The characteristics of sound and human sensitivity presented in **Appendix B** apply equally to  
212 construction or facility operations. The environmental factors affecting sound propagation presented  
213 in **Appendix B** are also directly relevant to facility operations. Construction and operations have  
214 some equipment in common, but most of the acoustic noise sources for operations are different. An  
215 example of where some construction heavy equipment would be used in facility operations is the  
216 biofuels processing facility.

217 This section focuses on the major acoustic noise sources for facility operations that are not used in  
 218 construction. These are predominantly located outside of buildings. These account for six main noise  
 219 sources:

- 220 1. HVAC systems (Section C.2.1)
- 221 2. Automotive vehicles (Section C.2.2)
- 222 3. Railroad trains (Section C.2.3)
- 223 4. Emergency generators (Section C.2.4)
- 224 5. Electrical energy transmission equipment (Section C.2.5)
- 225 6. Solar energy equipment (other than electrical transmission equipment) (Section C.2.6).

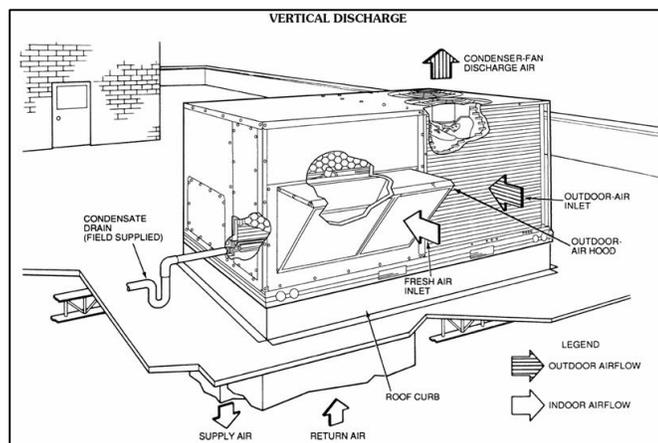
226 Railroad trains are included because they are integral to the operation of one of the warehouse and  
 227 distribution representative examples, the Railex<sup>®</sup> facility. They also have the potential to be used in  
 228 other facility types, but are not integral to them.

### 229 C.2.1 Acoustic Noise from Heating, Ventilation, and Air Conditioning Systems

230 One of the most-recognized acoustic noise-generating pieces of equipment for buildings is the HVAC  
 231 system. Recognized components of these systems are electric or thermal chillers, cooling towers, air  
 232 distribution systems (such as fans), and water distribution systems (such as cooling coils, pipes and  
 233 pumps). Moving gases and fluids generates the acoustic noise. The larger the facility, the bigger or  
 234 greater amount of equipment, and the more noise generated. Inside buildings, parts of the HVAC  
 235 systems are enclosed in sound reduction rooms. Outside buildings, the other parts are placed on the  
 236 roof (see Figures C-1 and C-2) or on outdoor concrete slabs in enclosures separated from the  
 237 buildings to isolate the noise from workers and customers (see Figures C-3 and C-4).

238

**Figure C-1. Packaged HVAC rooftop unit.**



Source: Brandemuehl 2015.

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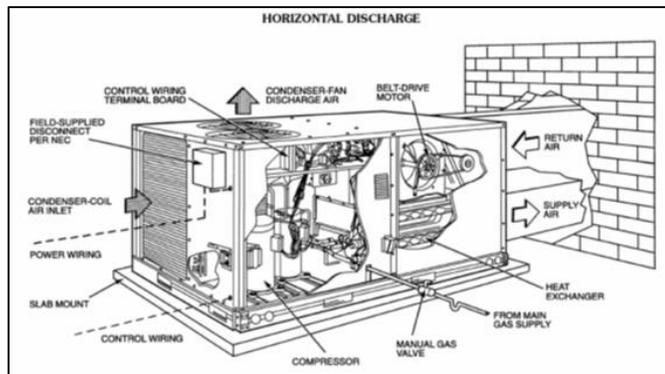
**Figure C-2. Photo of HVAC rooftop unit on commercial building roof.**



Source: BRD 2015.

243  
244  
245  
246

**Figure C-3. HVAC outdoor concrete slab installation.**



Source: Brandemuehl 2015.

247  
248  
249  
250

**Figure C-4. HVAC outdoor concrete slab photo.**

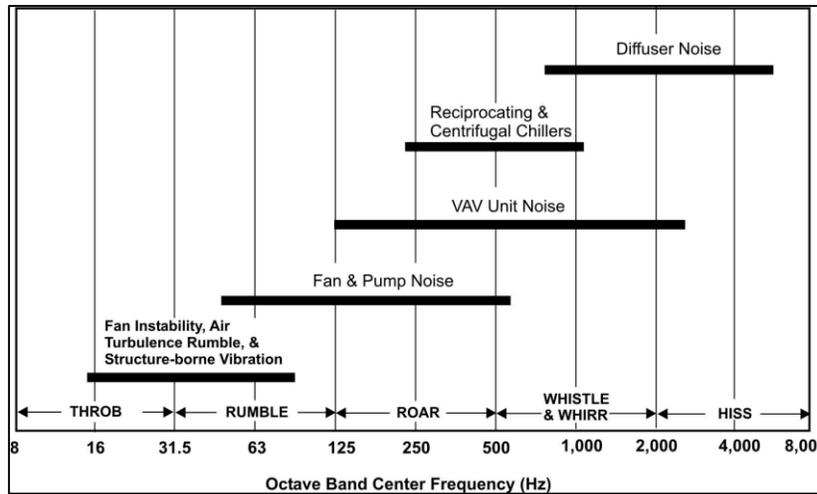


Source: BRD 2015.

251  
252

253 **Figure C-5** is a horizontal bar chart showing the acoustic noise frequency ranges for various types of  
 254 HVAC equipment by octave band center frequency. The diffuser and variable air volume (labeled as  
 255 “VAV” in the figure) are building interior HVAC components and not important to this discussion.  
 256 Note that the audible sound descriptors (that is, throb, rumble, roar, and whistle & whirr) are mostly  
 257 in the low frequency ranges associated with an octave band (McQuay 2004) and are what an  
 258 individual hearing these would experience. As fan components wear from nearly continuous use,  
 259 some become worn and unstable, creating additional noise in the low octave bands (fan instability).

260 **Figure C-5. Sound frequency ranges for various components of HVAC equipment.**



Source: McQuay 2004

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**Tables C-1 and C-2** provide some indication of the sound pressure levels (SPL) associated with the different octave band center frequencies at 30 and 80 feet, respectively, from four example HVAC chillers (BRD 2015). Since these are measured values, they would consider both fan and pump noise internal to the chillers.

268 **Table C-1. Sound pressure levels at 30 feet from the source for four different chiller manufacturers and models.**  
269

	Sound Pressure Levels (dBA) Measured at 30 Feet from the Source								Overall A-Weighted (dBA)
	Octave Band Center Frequency (Hz)								
	63	125	250	500	1000	2000	4000	8000	
<b>1</b>	70	67	65	70	63	61	57	55	70
<b>2</b>	75	76	72	72	71	67	60	57	75
<b>3</b>	40	43	52	56	62	64	61	53	68
<b>4</b>	66	72	70	73	70	64	61	53	74

270 **Source:** BRD 2015.  
 271 **Key:** dBA = A-weighted decibel; Hz = hertz.  
 272

273 Notice that, for the “overall” measurement, there is on the order of a 10-dBA drop between 30 and 80  
 274 feet for each of the four chiller examples. However, it is important to remember that this drop is a  
 275 function of the site environmental characteristics (such as soft or hard ground, reflections, directivity).  
 276 The closer the receiver is to the source, the less impact that site characteristics have on the noise  
 277 propagation.

278 **Table C-2. Sound pressure levels at 80 feet from source for four different chiller manufacturers**  
 279 **and models.**

	Sound Pressure Levels (dBA) Measured at 80 Feet from the Source								Overall A-Weighted (dBA)
	Octave Band Center Frequency (Hz)								
	63	125	250	500	1000	2000	4000	8000	
<b>1</b>	63	57	57	59	54	48	44	42	60
<b>2</b>	52	60	61	59	56	54	46	41	62
<b>3</b>	31	33	43	46	49	51	48	42	56
<b>4</b>	57	63	61	61	60	55	52	42	64

280 **Source:** BRD 2015.

281 **Key:** dBA = A-weighted decibel; Hz = hertz.

282

### 283 C.2.2 Acoustic Noise from Automotive Vehicles

284 It is generally recognized that the heavier traffic volumes, higher speeds, and greater numbers of  
 285 trucks increase the loudness of highway automotive vehicle traffic noise. The source of automotive  
 286 vehicle traffic noise comes primarily from vehicle exhausts, vehicle engines or powertrains, and tire  
 287 interactions with pavement, but defective mufflers or other malfunctioning equipment can increase  
 288 the loudness. Once highway speeds are achieved, the predominant noise from light trucks and cars is  
 289 from tire/pavement interaction, but for heavy trucks noise volume comes from all three sources. Any  
 290 condition that causes motor vehicle engines to labor more heavily, such as starting from a dead stop  
 291 or going up a steep incline, also increases traffic noise levels (FHWA 2014). The level of highway  
 292 traffic noise primarily depends upon three things: the volume of traffic, the speed of the traffic, and  
 293 the number of trucks in the flow of traffic (FHWA 2014).

294 For the purpose of highway traffic noise analyses, automotive vehicles fall into one of the five types  
 295 listed below:

- 296 1. **Automobiles:** all vehicles with two axles and four tires, designated primarily for  
 297 transportation of nine or fewer passengers (automobiles) or for transportation of cargo (light  
 298 trucks). Generally, the gross vehicle weight is less than 4,500 kilograms (kg) (9,900 pounds  
 299 [lb]).
- 300 2. **Medium trucks:** all cargo vehicles with two axles and six tires. Generally, the gross vehicle  
 301 weight is greater than 4,500 kg (9,900 lb) but less than 12,000 kg (26,400 lb).
- 302 3. **Heavy trucks:** all cargo vehicles with three or more axles. Generally, the gross vehicle  
 303 weight is greater than 12,000 kg (26,400 lb).
- 304 4. **Buses:** all vehicles having two or three axles and designated for transportation of nine or  
 305 more passengers.
- 306 5. **Motorcycles:** all vehicles with two or three tires with an open-air driver and/or passenger  
 307 compartment.

308 The *Noise Control Act of 1972* gave the U.S. Environmental Protection Agency (EPA) the authority  
 309 to establish noise regulations to control major sources of noise, including transportation vehicles and  
 310 construction equipment. Accordingly, **Table C-3** shows the Maximum Noise Emission Levels  
 311 established by EPA for medium and heavy trucks with a gross vehicle weight rating over 10,000 lb  
 312 engaged in interstate commerce (40 Code of Federal Regulations [CFR] Part 205). These standards do  
 313 not apply to highway, city, and school buses or to special purpose equipment, which include (but are

314 not limited to) construction equipment, snow plows, garbage compactors, and refrigeration equipment  
 315 (40 CFR 205.50). The standards are based upon actual driving on either concrete or sealed asphalt  
 316 (without gravel) and therefore represent noise from the vehicle including vehicle exhausts, vehicle  
 317 engines or powertrains, tire interactions with pavement, and defective mufflers or other  
 318 malfunctioning equipment. It can be assumed for this EA that the makeup of medium and heavy  
 319 trucks would almost entirely be post-1988 manufactured truck vehicles. Those used on roads within  
 320 the City of Richland would not be allowed to emit noise greater than 80 dBA at 50 feet from the  
 321 centerline of the roadway when idling or underway (Table C-3). Any pre-1988 vehicles would not  
 322 appreciably affect the site noise levels. However, this does not include any auxiliary equipment such  
 323 as tractor-trailer refrigeration units.

324 **Table C-3. Maximum noise emission levels allowed by EPA for in-use medium and heavy trucks**  
 325 **with gross vehicle weight rating over 10,000 pounds engaged in interstate commerce.**

	<b>Effective Date January 1, 1979 (Vehicles Manufactured After this Date)</b>	<b>Effective Date January 1, 1988 (Vehicles Manufactured After this Date)</b>
Truck Speed (miles per hour)	Maximum Noise Level at 50 feet from the Centerline of Travel (dBA)	Maximum Noise Level at 50 feet from the Centerline of Travel (dBA)
Less than 35	83	80
Greater than 35	87	80
Stationary	85	80

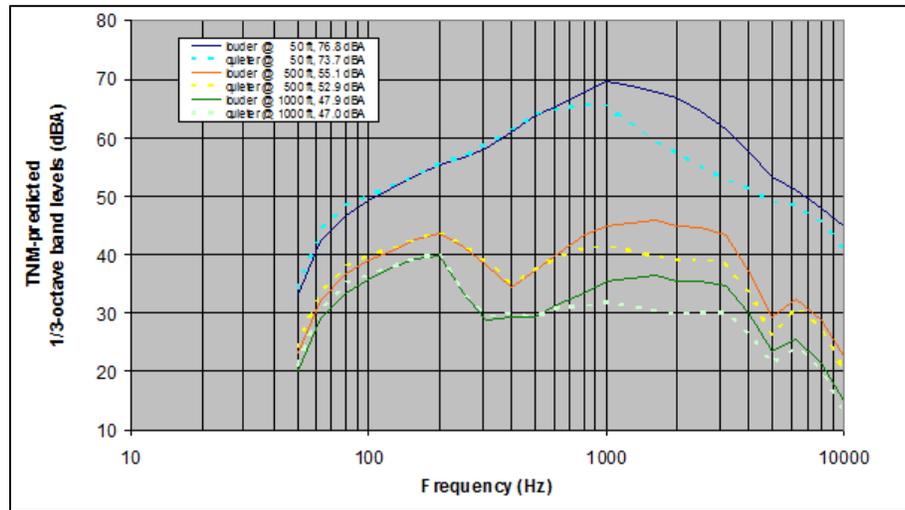
326 **Source:** FHWA 2012.

327 **Key:** dBA = A-weighted decibels.

328

329 The Federal Highway Administration’s (FHWA’s) Traffic Noise Model (TNM) is the recognized  
 330 standard for evaluating potential noise impacts from traffic. The data in **Figure C-6**, presented in  
 331 dBA, show the most significant SPL drop off of the mid- and upper-range frequencies with distance  
 332 from 50 to 500 to 1,000 feet, consistent with the “soft ground” surface characteristic. The shape of the  
 333 500- and 1,000-foot curves indicates the influence of the environmental factors in sound propagation.  
 334 The 50-foot curve reflects the source frequency and SPL make-up.

335 **Figure C-6. FHWA Traffic Noise Model output of predicted sound pressure spectral levels for a**  
 336 **flat site, with no noise barriers, and acoustically soft ground. Curves represent different**  
 337 **distances and louder and quieter pavement.**



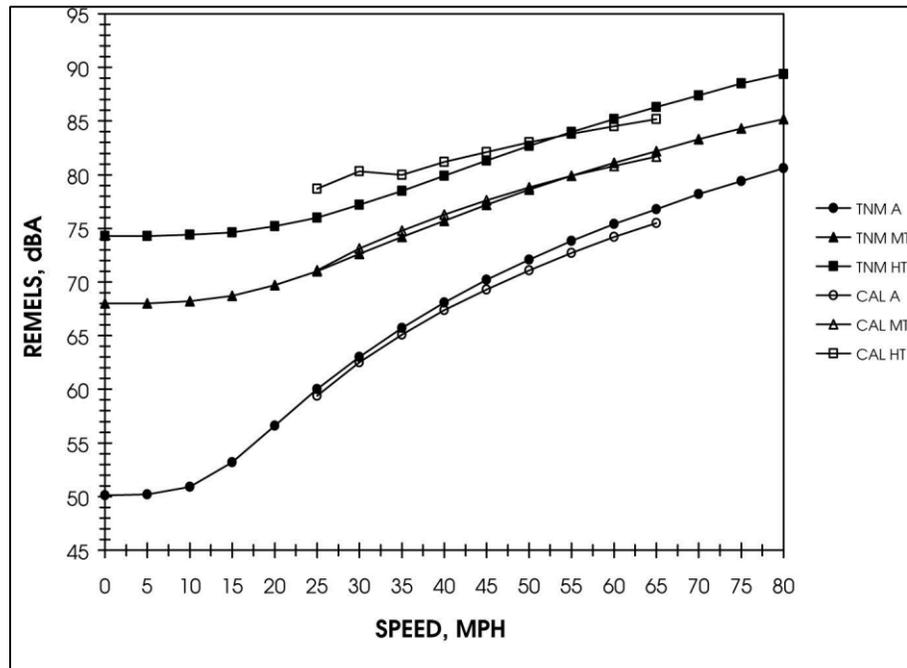
Source: FHWA 2012.

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**Figure C-7** shows that the noise emission levels of automobiles, medium trucks, and heavy trucks all increase in direct proportion to their speed. The open-circled symbol plots are measured values for a California Department of Transportation study. The filled-in symbol plots are modeled data using the FHWA TNM model. Overall, highway traffic noise SPLs increase with increasing speed limits. Note that the predicted TNM heavy truck values underestimated the actual values at slow speeds. At these speeds, as a truck changes gears it can “rev” more or less depending upon the driver’s skill or practice, with higher engine “revving” or revolutions per minute (rpm) resulting in increased noise. This circumstance is very important since it is experienced when, for example, a heavy truck starts up after a stop at a traffic light, at a railroad crossing, or exiting from a side road onto a major thoroughfare.

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**Figure C-7. A-Weighted noise emission levels for vehicles at different highway speeds.**



Source: CT 2013.

Legend: A= automobiles, MT = medium trucks, and HT = heavy trucks. REMELS = reference energy mean emission levels.

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**Table C-4** represents measured SPLs for continuous (dBA) or impulse noise (A-weighted impulse decibel [dBAI]) associated with certain on-site operations at a proposed truck warehouse distribution center. The moving tractor-trailer or shunter truck is also called a yard truck (Buckeye Western Star & Yard Trucks of Ohio 2015). Coupling refers to the act of connecting a semi-tractor cab to a semi-trailer. At a warehouse distribution center, semi-trailers are frequently coming and going and being backed up to loading and unloading docks on the sides of a building. Because of the high level of vehicle activity onsite, many facilities use the shunter yard trucks to move the trailers more economically and with greater precision to avoid accidents. These vehicles may have a top speed of only 25 mile per hour and are often not licensed for travel on highways.

**Table C-4. Overall A-weighted source power levels for a proposed truck warehouse distribution center.**

Source	Sound Power Level
Moving tractor-trailer or shunter truck	101 dBA
Forklift – impulsive	110 dBAI
Coupling – impulsive	116 dBAI
Container stacking – impulsive	111 dBAI

Source: HGC 2013.

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Although not specifically identified, the impulse noise in **Table C-4** is likely related to backup alarms. OSHA regulations (29 CFR 1926.601) require a reverse signal alarm, also known as a backup alarm, for any construction vehicle with an obstructed view to the rear when backing up. The regulation pertains specifically to construction but, as a safety precaution, equipment such as forklifts

374 and yard trucks have electric backup alarms as do delivery trucks and many other commercial  
 375 vehicles. A comparison of sound propagation and perception of three types of backup alarms with  
 376 regards to worker safety (Vaillancourt et al. 2013) describes the frequency spectra for three types of  
 377 backup alarms and their respective SPLs in unweighted dB. The broadband alarm, as its name  
 378 implies, covers a wide frequency spectrum with no identifiable peaks or center. The multi-tone has  
 379 three sharp SPL peaks around the most audible range of human hearing around 1,000 Hz. The tonal  
 380 alarm has one main singular peak. The multi-tone and tonal peaks reach over 100 dB. The intent is for  
 381 them to be heard easily over conversation and other yard noise. Any of these alarm types could be  
 382 present in facility operations' onsite vehicles.

383 **C.2.3 Acoustic Noise from Railway Trains**

384 Railroad noise emissions are regulated by EPA and the Federal Railroad Administration (FRA); see  
 385 **Table C-5**. Operations within a rail yard are addressed in 40 CFR Parts 201 and 210. Sound emitted  
 386 by locomotive horns and other audible warning devices are regulated in 49 CFR Part 229, the  
 387 Railroad Locomotive Safety Standards. Under these standards, the locomotive horn must be able to  
 388 produce an audible 96 dBA at 100 feet and the *Swift Rail Development Act* (Public Law 103-440)  
 389 requires that it be used at all highway-railroad grade crossings.

390 **Table C-5. Regulations governing railroad noise emissions.**

Agency	Code of Federal Regulations Section	Title
EPA	40 CFR Part 201	Noise Emission Standards for Transportation Equipment; Interstate Rail Carriers
FRA	49 CFR Part 210	Railroad Noise Emission Compliance Regulations
FRA	49 CFR Part 222	Use of Locomotive Horns at Public Highway-rail Grade Crossings
FRA	49 CFR Part 229	Railroad Locomotive Safety Standards (Locomotive Horns and Locomotive Cab Interior Noise)

391 **Source:** FRA 2009.

392  
 393 Noise compliance levels for line-haul (when the train is not in the yard) are shown in **Table C-6**.  
 394 These levels represent the maximum noise levels allowed while trains are moving to and from the  
 395 site. The EA assumes these will be the maximum levels permitted outside the yard.

396 **Table C-6. Summary of line-haul measurement regulatory requirements (FRA 2009).**

Noise Source	Governing Regulation	Compliance Level	Tolerance	Operating Condition	Duration	Measurement Location
Locomotives (including all switchers, regardless of build date)	40 CFR 201.12(a)	90 dBA	+ 2 dB	Moving	Duration of locomotive or rail car pass-by	Sideline: 30 meters (100 feet)
Locomotives built before 12/31/79 <sup>a</sup>	40 CFR 201.12(b)	96 dBA	+ 2 dB			Microphone height: 1.2 meters (4 feet)

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399  
400**Table C-6. Summary of line-haul measurement regulatory requirements (FRA 2009).  
(continued)**

Noise Source	Governing Regulation	Compliance Level	Tolerance	Operating Condition	Duration	Measurement Location
Rail cars speed $\leq$ 75 kilometers/hour (45 miles per hour)	40 CFR 201.13	88 dBA	+2 dB			
Rail cars speed $>$ 75 kilometers/hour (45 miles per hour)	40 CFR 201.13	93 dBA	+2 dB			

401 <sup>a</sup> If the build date of a locomotive cannot be established, then it should be evaluated as if it had a build date  
402 before December 31, 1979.

403 **Source:** FRA 2009.

404 **Key:** CFR = Code of Federal Regulations; dB = decibel; dBA = A-weighted decibel.

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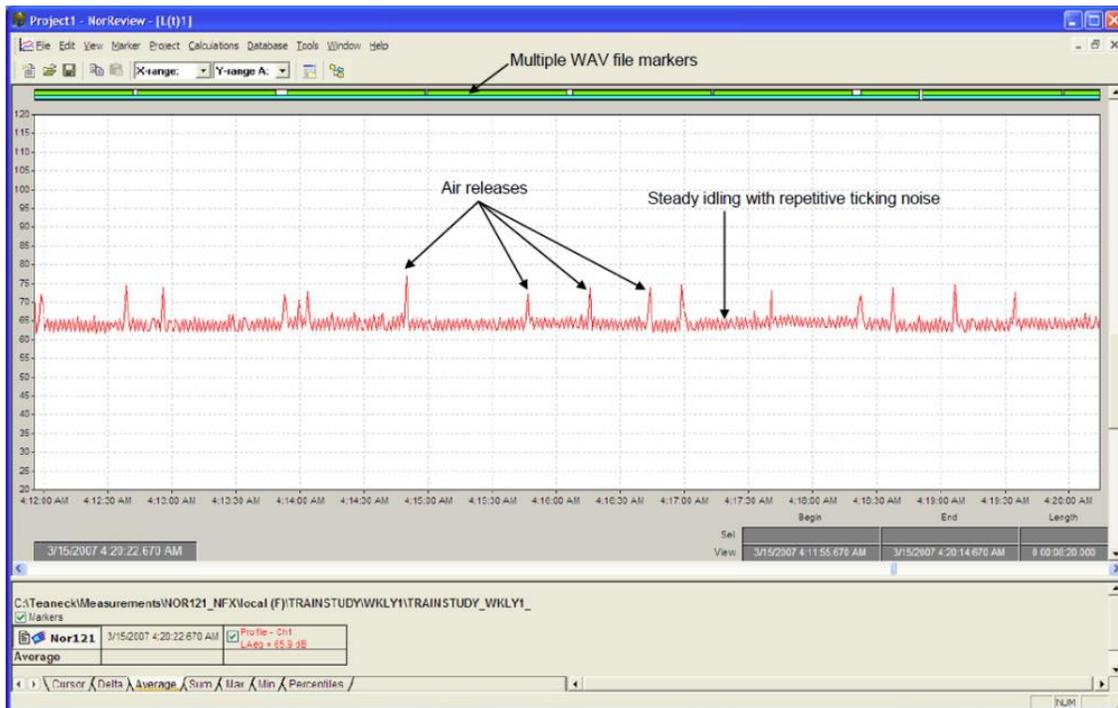
406 The Federal Transit Administration's *Transit Noise and Vibration Impact Assessment Manual*  
407 (FTA 2006) reports the following "approximate" maximum SPLs measured at 100 feet:

- 408 • Diesel locomotives – 85 dBA
- 409 • Electric locomotives – 83 dBA
- 410 • Rail cars – 77 dBA.

411 While the **Table C-6** levels provide the regulatory thresholds, a study conducted by a masters student  
412 at Rutgers University in 2009 provides information that is particularly relevant as it provides actual  
413 SPLs and frequency range noise measurements of trains (Anderson 2009). **Figure C-8** shows the  
414 SPLs in dBA for an idling train locomotive (about 65 dBA) with cycling of the engines and  
415 compressors from the railway air-braking system (that is, the air-releases and clicking sounds from  
416 the air dryer purging moisture). **Figure C-9** shows an idling train being passed by (a "passby")  
417 another train. The graph is dominated first by the passby train horn, followed by the sound of the  
418 locomotive, then the railcars, and finally the end of the passby and return to the idling train. As the  
419 train passes by, the horn is sounded with the SPL exceeding 100 dBA. These idling and passby SPLs  
420 are indicative of the levels that might occur at a Railex type facility if constructed on Hanford Site  
421 conveyed lands.

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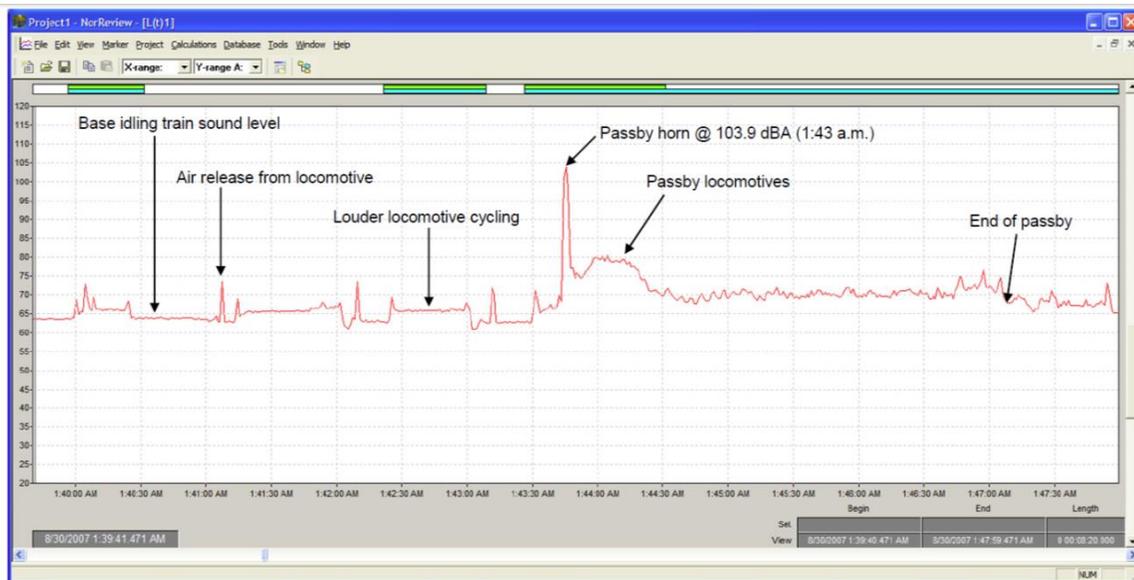
**Figure C-8. Sound pressure levels during railway train idling.**



Source: Anderson 2009.

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**Figure C-9. A passby railway train blowing its horn while passing an idling train.**



Source: Anderson 2009.

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430 **Table C-7** provides Z-scale and A-scale SPLs for the measured octave band center frequencies from  
 431 31.5 to 16, 000 Hz for an average passby train, a single idling locomotive, and an average horn from a  
 432 passby train (Anderson 2009). Z-scale is a zero scale or un-weighted SPL scale and does not take into  
 433 consideration the human ability to hear certain frequencies like the A-scale is meant to do.

434 **Table C-7. Z- and A-weighted sound pressure levels and octave band frequencies for average**  
 435 **passby and idling railway trains, and average horn from passby trains at a distance of 100 feet.**

Octave Band Center Frequency (Hz)	Average Passby Train		Single Idling Locomotive		Average Horn from Passby Train	
	Z-Scale (dB)	A-Scale (dBA)	Z-Scale (dB)	A-Scale (dBA)	Z-Scale (dB)	A-Scale (dBA)
31.5	83.3	43.9	76.5	37.1	88.6	49.2
63	88.9	62.7	80.7	54.5	98.5	72.3
125	83.2	67.1	68.0	51.9	93.0	76.9
250	75.7	67.1	60.8	52.2	96.6	88.0
500	73.4	70.2	61.1	57.9	103.8	100.6
1,000	71.8	71.8	56.5	56.5	100.3	100.3
2,000	69.2	70.4	55.2	56.4	93.9	95.1
4,000	68.6	69.6	55.8	56.8	86.5	87.5
8,000	69.1	68.0	56.1	55.0	79.9	78.8
16,000	68.1	61.1	46.7	39.7	71.9	64.9

436 **Source:** data from Anderson 2009.

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438 Measurement procedures for operations inside a rail yard differ from those used for moving railroad  
 439 equipment traveling along a rail corridor, since the yard operations are more event-driven. The  
 440 following rail yard operations are covered by specific regulatory noise limits shown in **Table C-8**  
 441 (FRA 2009):

- 442
- Stationary locomotives, including switcher locomotives, operating at maximum throttle settings connected to load test cells, and at idle (40 CFR 201.11)
  - 443
  - 444 • Switcher locomotives performing switching operations (40 CFR 201.12)
  - 445 • Car-coupling (car connection) impacts (40 CFR 201.15)
  - 446 • Retarders<sup>2</sup> (40 CFR 201.14)
  - 447 • Load cell test stands<sup>3</sup> (40 CFR 201.16 and 201.27).

<sup>2</sup> A major source of noise present in hump yards is railroad car retarders. These devices occasionally emit high frequency squeals due to a stick-slip process between the car wheel, the rail, and the retarder brake shoes. Retarders operate by having a movable brake shoe press each wheel against a stationary shoe. The resulting frictional forces serve to slow down the rolling car (FRA 2009).

<sup>3</sup> Load cell test stands are external, electrically resistive devices found primarily in rail yards and railroad testing facilities that simulate locomotive performance under heavy load during a stationary test.

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**Table C-8. Summary of rail yard operation regulatory requirements.**

Noise Source	Operating Conditions	Governing Regulation	Compliance Level (dBA)	Tolerance	Duration	Measurement Location
Locomotive	Stationary – idle	40 CFR 201.11(a)	L <sub>ASmx</sub> = 70	+2 dB	Minimum of 30 seconds	Sideline at 30 m (100 ft) Mic. ht. = 1.2 m (4 ft.)
Locomotive built before 12/31/79		40 CFR 201.11(b)	L <sub>ASmx</sub> = 73			
Locomotive attached to a load cell	Stationary – any throttle setting (except idle)	40 CFR 201.11(a)	L <sub>ASmx</sub> = 87	+ 2 dB	Minimum of 30 seconds	Sideline at 30 m (100 ft) Mic. ht. = 1.2 m (4 ft)
Locomotive built before 12/31/79, attached to a load cell		40 CFR 201.11(b)	L <sub>ASmx</sub> = 93			
Switcher locomotive	Stationary idle	40 CFR 201.11(c)	L <sub>ASmx</sub> = 70	+ 2 dB	Minimum of 30 seconds	Sideline at 30 m (100 ft) Mic. ht. = 1.2 m (4 ft)
Switcher locomotive	Stationary – any throttle setting (except idle)		L <sub>ASmx</sub> = 87			
Load cell test stand	With stationary locomotive at maximum throttle setting	40 CFR 201.16(a)	L <sub>ASmx</sub> = 78	+2 dB	Minimum of 30 seconds	Sideline at 30 m (100 ft) Mic. ht. = 1.2 m (4 ft)
Switcher locomotives (“trigger” for sideline measurements) <sup>a</sup>	Stationary, maximum throttle setting, without load cell	40 CFR 201.11(c) and 201.12(c)	L <sub>90(fast)</sub> = 65	+2 dB	Measure at least once every 10 seconds, for 100 measurements	Receiving property Mic. ht. = 1.2 m (4 ft)
Car-coupling impacts	All	40 CFR 201.15	L <sub>adjavemax(fast)</sub> = 92	+2 dBA [+4 for Type 2 meters]	Between 60 and 240 minutes	Receiving property Mic. ht. = 1.2 m (4 ft)
Retarders	All	40 CFR 201.14	L <sub>adjavemax(fast)</sub> = 83	+6 dB [+6 for Type 2 meters]	Between 60 and 240 minutes	Receiving property Mic. ht. = 1.2 m (4 ft)

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**Table C-8. Summary of rail yard operation regulatory requirements. (continued)**

Noise Source	Operating Conditions	Governing Regulation	Compliance Level (dBA)	Tolerance	Duration	Measurement Location
Load cell test stands (“trigger” for sideline measurements) <sup>a</sup>	All load cell stands in a rail yard, in conjunction with stationary locomotive at maximum throttle setting	40 CFR 201.16(b) and 201.27	L90(fast) = 65	+2 dB	Measure at least once every 10 seconds, for 100 measurements	Receiving property Mic. ht. = 1.2 m (4 ft)

451 <sup>a</sup>The 65 dBA receiving property criteria is the “trigger” for requiring the sideline test of switcher locomotives or  
 452 load cell test stands. If the receiving property measurements are not in compliance, then both moving and  
 453 stationary sideline measurements must be conducted.

454 **Source:** FRA 2009.

455 **Key:** CFR = Code of Federal Regulations; dB = decibel; dBA = A-weighted decibel; L<sub>adjavemax</sub> = adjusted  
 456 average maximum; L<sub>ASmx</sub> = maximum A-weighted sound level with slow time-weighting; L<sub>90</sub> = background  
 457 noise level; ft = feet; m = meters; mic. ht. = microphone height.

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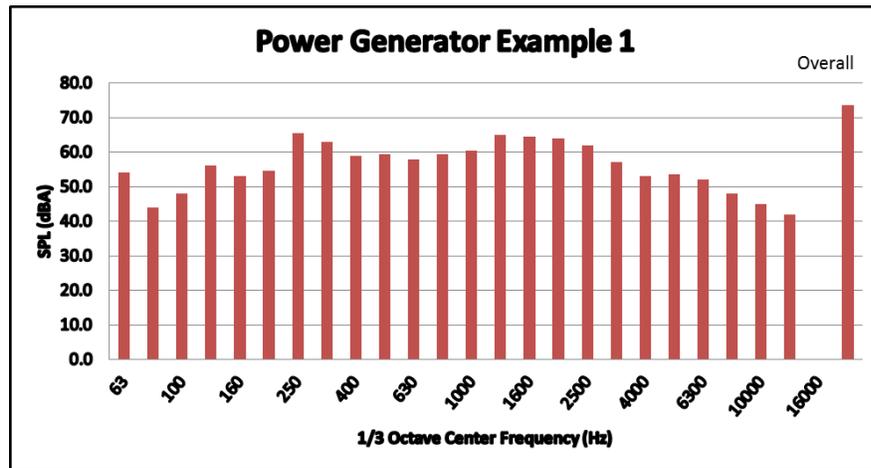
#### 459 C.2.4 Acoustic Noise from Emergency Generators

460 According to Gries (2004), the noise frequency spectrum for power generators varies widely, but the  
 461 noise sources are typically the same. These are engine noise and exhaust, cooling fan turbulent  
 462 airflow and blade passage, and alternator noise. The noise spectrum of each component depends on  
 463 respective device configuration or geometry, output power and load conditions.

464 **Figure C-10** provides the baseline SPLs for one-third octave frequencies for an example power  
 465 generator without acoustical insulation taken from Gries (2004). The spectrum represents an eight-  
 466 position average SPL (measured at eight near-proximity locations around the generator). The overall  
 467 SPL is 73.5 dBA. **Figure C-11** provides another baseline for a second generator example from Gries  
 468 (2004) but with an overall SPL of 78.1 dBA. These are indicative of the SPLs and one-third octave  
 469 band frequencies that could be seen if emergency generators are used on site lands.

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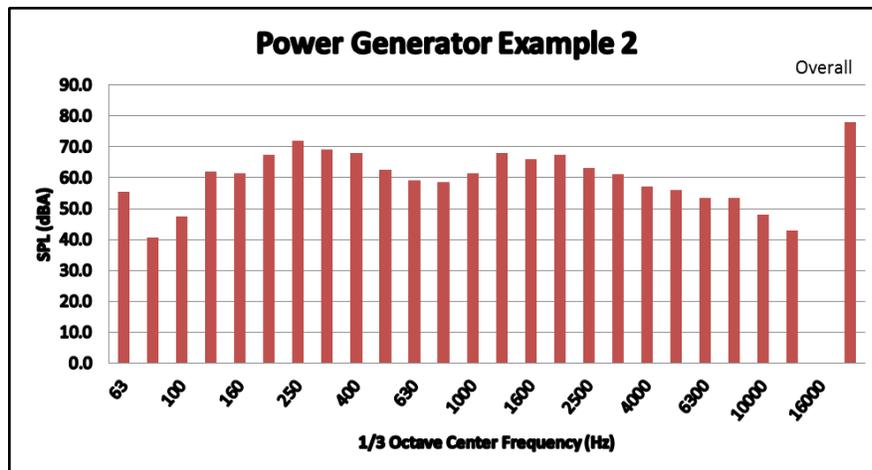
**Figure C-10. Baseline sound pressure levels for one-third octave frequencies for a power generator without acoustical insulation.**



Source: data from Gries 2004.

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**Figure C-11. Baseline sound pressure levels for one-third octave frequencies for a second power generator without acoustical insulation.**



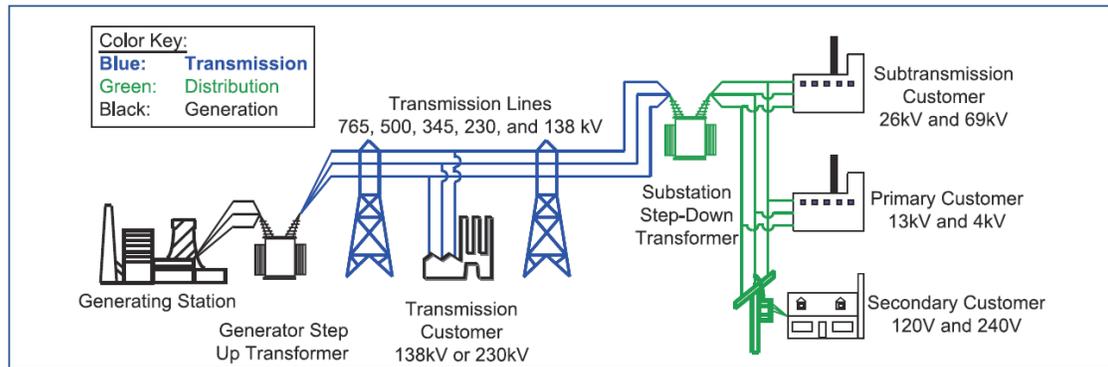
Source: Gries 2004.

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**C.2.5 Acoustic Noise from Electrical Energy Transmission**

481 The electrical energy transmission system used in the U.S. has many components (**Figure C-12**).  
 482 However there are only three that could be located on Hanford Site lands and are known to produce  
 483 acoustic noise. These are transmission power lines, electrical substations, and power transformers.  
 484 Transmission lines are high-voltage (110 or more kilovolt [kV]) and 60 cycle (60 Hz) alternating  
 485 current to reduce energy loss over distances. Electrical substations switch, change, or regulate  
 486 electrical voltage. Transformers operate on magnetic principles to increase (step up) or decrease (step  
 487 down) voltage.

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**Figure C-12. Basic structure of the electrical energy transmission system.**

Source: US-Canada 2004.

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### C.2.5.1 Acoustic Noise from Transmission Lines

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Transmission lines bring high-voltage electrical power from a source to a substation. According to Robert Dent, former president of the IEEE Power Engineering Society:

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The audible noise emitted from high-voltage lines is caused by the discharge of energy that occurs when the electrical field strength on the conductor surface is greater than the 'breakdown strength' (the field intensity necessary to start a flow of electric current) of the air surrounding the conductor. This discharge is also responsible for radio noise, a visible glow of light near the conductor, an energy loss known as corona loss and other phenomena associated with high-voltage lines.

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The degree or intensity of the corona discharge and the resulting audible noise are affected by the condition of the air--that is, by humidity, air density, wind and water in the form of rain, drizzle and fog. Water increases the conductivity of the air and so increases the intensity of the discharge. Also, irregularities on the conductor surface, such as nicks or sharp points and airborne contaminants, can increase the corona activity. Aging or weathering of the conductor surface generally reduces the significance of these factors. (Dent 1999)

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Corona activity normally produces a low frequency noise component, a 120-Hz "hum," and a high frequency component described by many as a sizzling, crackling, or snapping sound. This latter sound is due to corona discharge and sparking gaps that are most obvious during very humid or wet weather conditions. The 120-Hz hum is more of a continuous sound while the other sounds are very intermittent. Studies have shown that corona noise occurs only when the power line voltage is 220 kV or greater (Egger et al. 2009).

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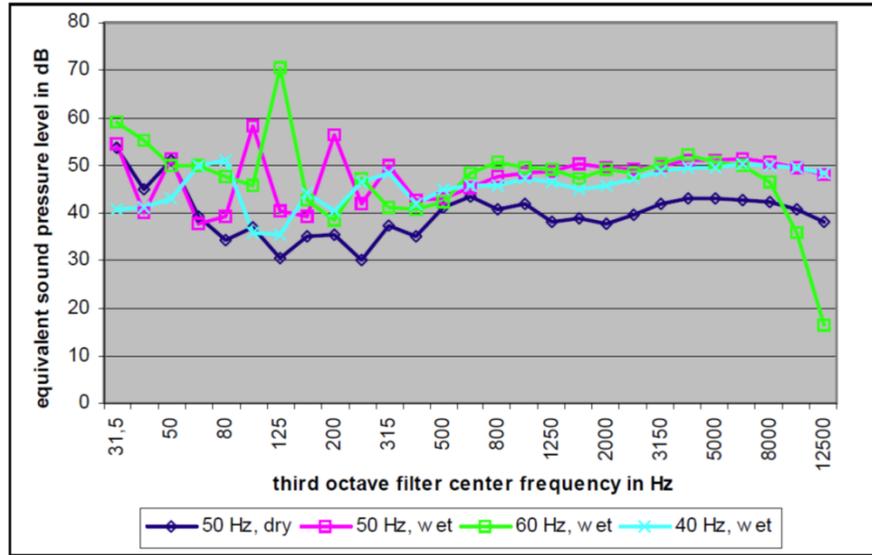
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**Figure C-13** shows typical SPLs (in unweighted dB) relative to the one-third octave band frequency spectra for electric transmission power lines for several operating frequencies (40-, 50-, and 60-Hz) (Muhr et al. 2014). Only the green, U.S. standard 60-Hz operating frequency line is applicable to this EA. The major peak at 120 Hz is a doubling of the 60-Hz operating frequency. This doubling frequency is the source of a noticeable "hum," the corona effect, while the remainder of the noise is less noticeable broadband noise related to wind and other noise related to the environment where the measurements were taken. Measurements were taken in close proximity to the source.

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**Figure C-13. Typical one-third octave frequency spectrum of transmission line noise showing the “corona” effect.**



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Source: Muhr et al. 2014.

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527 **Table C-9** shows measured SPL data from the *Falcon to Gonder 345 kV Transmission Project EIS*  
528 (BLM 2001) for existing power lines. These do not show the “corona” effect since the humidity is  
529 low. The overall SPLs are also lower, probably because these data come from a fairly remote area in  
530 north central Nevada (see Figure C-14). The C-scale data are more reflective of unweighted decibel  
531 readings.

532 **Table C-9. Example sound pressure level measurement data along an existing transmission line**  
533 **route in north central Nevada at the 80 foot right-of-way edge.**

Configuration - Time of Day - Weather Conditions	Overall A-Scale (dBA)	Overall C-Scale (dBC)	Octave Band Center Frequency (Hz) and SPL in dBA								
			31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Existing 66/25/120kV Power Lines - 10:15 am - 84°F - 10-12% humidity - 2-4 mph winds	23	54	50	31	32	16	15	10	10	11	13
Existing 230 kV Power Lines - 11:15 am - 89°F - 10-12% humidity - 2-7 mph winds	27	60	53	46	32	23	14	13	11	12	13

534  
535  
536

Source: BLM 2001, data from Table 3.11.

537 **Figure C-14. Photo of the existing transmission line where Table C-9 data were collected.**



Source: BLM 2001.

538  
539

540

541 **C.2.5.2 Acoustic Noise from Electrical Substations**

542 **Table C-10** shows measured SPL data from the *Falcon to Gonder 345-kV Transmission Project EIS*  
543 (BLM 2001) for an existing electrical substation. **Figure C-15** is a photo of the electrical substation  
544 where these data were collected. The C-scale data are more reflective of un-weighted decibel  
545 readings.

546 **Table C-10. Example sound pressure level measurement data along an existing substation**  
547 **property line at a north central Nevada site.**

Configuration - Time of Day - Weather Conditions	Overall A-Scale (dBA)	Overall C-Scale (dBC)	Octave Band Center Frequency (Hz) and SPL in dBA								
			31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Existing Property Line - 4:20 pm - 90°F - 10-12% humidity - 2-5 mph winds	49	66	55	61	67	50	41	35	25	20	21
Existing Property Line - 1:20 pm - 47°F - 10-12% humidity - 2-4 mph winds	42	56	46	54	57	47	37	28	21	17	18

548  
549

Source: BLM 2001, Table 3.11-5.

550

551 **Figure C-15. Photo of the substation in north central Nevada where Table C-10 SPL data were**  
 552 **collected.**

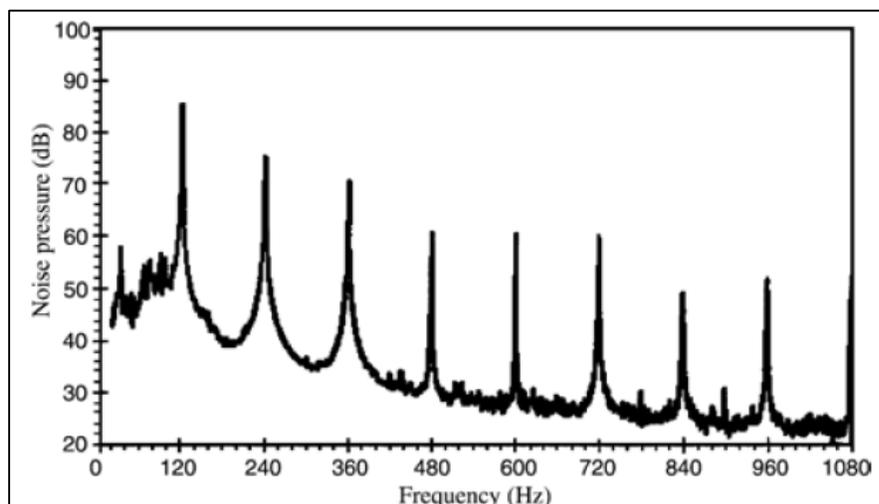


553  
 554 **Source:** BLM 2001.  
 555

### 556 C.2.5.3 Acoustic Noise from Transformers

557 Transformer noise comes from two sources, electrical and mechanical. Transformer noise has  
 558 characteristic constant low-frequency “hum” with a fundamental frequency of 120 Hz (double the 60-  
 559 Hz operating frequency) and even harmonics of line frequency of 60 Hz, such as 240 Hz, 360 Hz, and  
 560 up to 1,200 Hz or higher, primarily due to the vibration of its electrical core. Cooling fans and oil  
 561 pumps are also noise generators for large transformers producing broadband noise; however, this  
 562 noise is usually less noticeable than tonal noise (ANL 2013). **Figure C-16** shows a typical 60-Hz  
 563 transformer frequency spectrum and A-weighted SPLs. This graph shows the 2-, 4-, 6-, 8-, 10-, 12,  
 564 14, and 18 times 60-Hz harmonic peaks along with the broadband noise.

565 **Figure C-16. Typical frequency spectrum of acoustic noise produced by a 60-Hz transformer.**



566  
 567 **Source:** Chang et al. 2009.  
 568

569 The average SPL at a distance of about 500 feet from a transformer core would be about 51 dBA for  
 570 938 million volt-amperes. For divergent (that is, geometric) spreading only, the noise level at a  
 571 distance of about 1,800 feet would be about 40 dBA (ANL 2013). Ratings for self-cooled

572 transformers in average SPL dBs (unweighted) range from 50 dB for a 112-kilovolt-ampere (kVA)  
 573 transformer to 68 dBs for a 3,000 kVA transformer (Federal Pacific 2015). Similar ratings for forced-  
 574 air cooled transformers range from 67 dBs for a 300-kVA transformer to 71 dBs for a 3,000-kVA  
 575 transformer (Federal Pacific 2015).

576 **C.2.6 Acoustic Noise from Solar Energy Equipment**

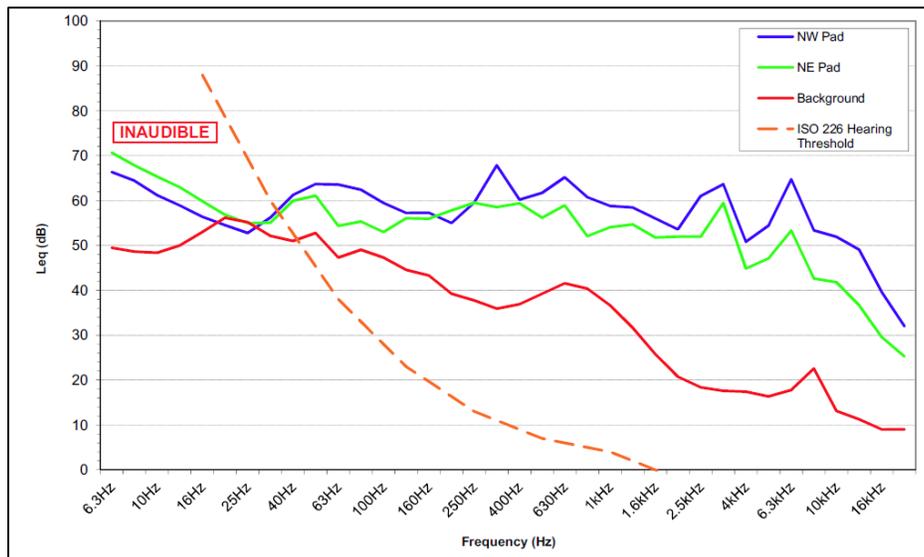
577 The solar technology relevant to this EA is single-axis tracking photovoltaic (PV) flat panel arrays.  
 578 The potential stationary noise sources for PV systems come from transformers, inverters, electrical  
 579 substations, transmission lines, and electric motors in the case of tracking systems (LDN 2011). For  
 580 operations that only provide energy from the sun’s energy like these, the predominant noise sources  
 581 are only operative during daylight hours.

582 **C.2.6.1 Acoustic Noise from Solar Panel Photovoltaic Arrays**

583 For solar panel PV array systems, the noise from substation transformers discussed in **Section C.2.5**  
 584 and inverters are the primary noise sources. Noise measured at an example PV array location five feet  
 585 from an inverter source was 65 dBA (LDN 2011). There are multiple transformer/inverter installations  
 586 at this site located about 280 feet from each other. The environmental review concluded for that solar  
 587 energy array, these noise sources do not cumulatively raise noise levels at the property line.

588 The frequency spectrum measured for two different inverter/transformer pads at a PV array in  
 589 Massachusetts is shown in **Figure C-17**. The blue and green lines indicate the combined noise effects  
 590 from both inverters and transformers. The red line represents background noise levels for that site, not  
 591 applicable to this EA. The International Standards Organization (ISO) Standard 226 Hearing  
 592 Threshold line indicates what is perceptible to the human ear.

593 **Figure C-17. Frequency spectrum and SPLs in un-weighted dBs for two PV array**  
 594 **inverter/transformer pads measured 10 feet from the source.**



595 **Source:** Tech Environmental 2012.

597 **C.3 VIBRATION FROM FACILITY OPERATIONS**

598 Like acoustic noise, vibration is a source-path-receiver problem. The most complex aspect is the path  
 599 because, unlike acoustic noise whose path is largely the air, vibration’s path is through the ground

600 which is a very complex medium. See Appendix B, Section B.5 for a brief explanation of vibration  
601 and its propagation.

602 Also, like acoustic noise, it is assumed that worker health and safety issues related to vibration would  
603 be addressed by the future landowner companies needing to comply with the rules and requirements  
604 of the Washington State Department of Labor and Industries (WDOLI 2015). Also the OSHA  
605 “general duty clause” requires employers to protect workers from known hazards. Vibration is  
606 recognized as a known hazard to workers that could cause work-related musculoskeletal disorders  
607 (ACGIH 2014). Therefore, vibration impacts related to worker health and safety are not considered  
608 further in this section because we are assuming that applicable laws and regulations would be  
609 followed.

610 Vibration effects on sensitive equipment at LIGO and the PNNL are mentioned in Appendix A and  
611 are the main focus of the remainder of this appendix on vibration. In particular, LIGO identified  
612 certain vibration sources as being of concern as these might affect their ability to perform their  
613 mission to conduct research. LIGO identified the following equipment as a concern (Raab 1996):

- 614 • Reciprocating power-plant machinery, rock crushers, and heavy machinery
- 615 • Railways that operate frequently
- 616 • Non-reciprocating power-plant machinery and balanced industrial machinery
- 617 • Vehicular traffic.

618 LIGO cited the *Manual of Seismological Observatory Practice* (WDC 1979) as the source for these  
619 requirements, and that document in turn cited an earlier document, *The Requirements of a High-*  
620 *Sensitivity Seismograph Station* (Carder 1963). Between then and now equipment technology has  
621 changed dramatically and so has the understanding of health and safety effects from vibration.  
622 Vehicular traffic is common to all representative facilities and is discussed separately in **Section**  
623 **C.3.1**. Railways are only planned for the Railex™ type warehousing and distribution facility but they  
624 wouldn’t operate frequently, only a few times per week (see Appendix E). Vibration from railways is  
625 discussed in **Section C.3.2**. Vibration from industrial machinery is discussed in **Section C.3.3**.

626 Two of the biggest vibration issues and LIGO-specific concerns are vehicular traffic (discussed in  
627 Section C.3.1) and railway operation (discussed in Section C.3.2). The others are concrete slab-  
628 mounted equipment such as pumps, compressors, generators, and specialized equipment used for the  
629 biofuels processing facility (discussed in Section C.3.3). For most of the representative facility types  
630 mentioned in Chapter 2 the equipment is related to the HVAC systems and the use of standby or  
631 emergency generators. The biofuels processing facility likely has the most non-vehicular activity  
632 outside of a building and has equipment that could produce vibratory impacts.

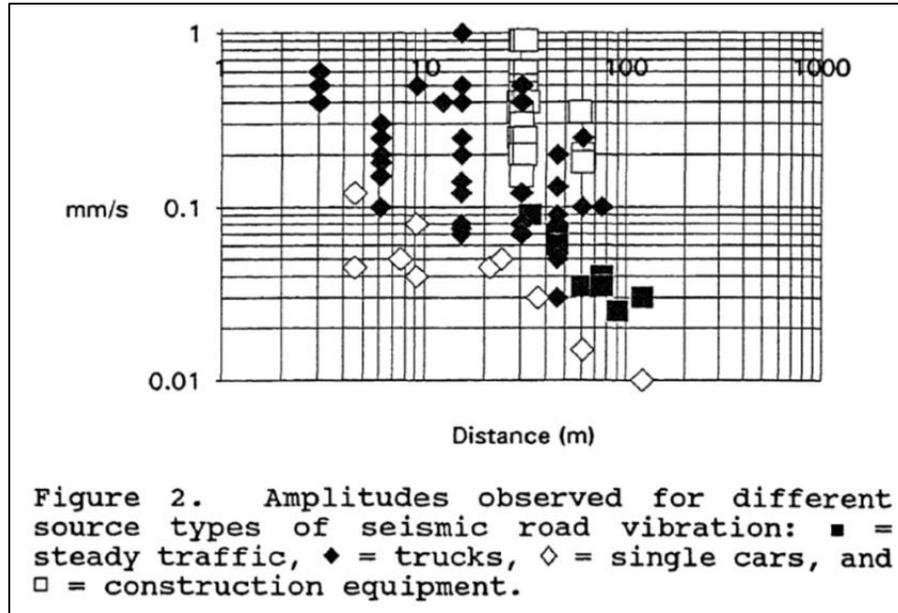
### 633 **C.3.1 Vibration from Automotive Vehicles**

634 While there has been a lot of interest and study in traffic vibration because of the potential to affect  
635 building structures, predicting ground-borne vibration impacts is, as the Federal Transit  
636 Administration put it, a “developing field” (FTA 2006). Vibration associated with traffic movement is  
637 a function of many things including the speed and number of vehicles, their size and weight, and the  
638 condition of the pavement.

639 Long (1993) made measurements of seismic road vibrations at two locations. He concluded, as would  
640 be expected, that heavy multi-axle vehicles have greater loading effect on roads than do passenger  
641 cars. He noted that vibration from trucks is on average four times larger than passenger cars and twice  
642 that of steady traffic (15 to 60 cars per minute with no large trucks). **Figure C-18** shows amplitudes

643 (vibrational velocity in millimeters per second versus distance) observed for steady traffic, trucks,  
 644 single cars, and construction equipment (Long 1993). However, the largest ground-borne vibrations  
 645 are produced when vehicles drive over road irregularities (Hunaidi 2000).

646 **Figure C-188. Amplitudes observed for different source types of seismic road vibration.**



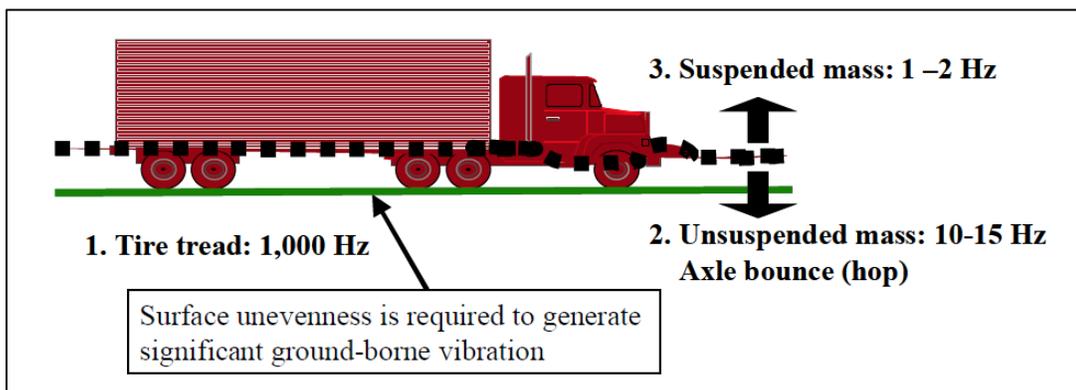
Source: Long 1993.

647  
 648  
 649

650 The main generators of unintentional highway traffic-induced vibration are related to trucks  
 651 impacting these surface irregularities (Hajek et al. 2006). There are three basic types of impact forces  
 652 acting on the pavement surface from vehicle movement (see **Figure C-19**):

- 653
1. those from the tire tread (in the range of 800 to 1,500 Hz)
  - 654 2. those from the unsuspended mass of the vehicle (tire bounce or axle hop at 10 to 15 times per  
 655 second)
  - 656 3. those related to the suspended mass or the vehicle's fundamental frequency (for a five-axle  
 657 semi-trailer, the suspension system heaves up and down at 1 to 2 Hz).

658 **Figure C-19. Sources of vibration caused by a truck going down the highway.**



659  
 660

Source: Hajek et al. 2006.

661  
 662 “Discrete pavement discontinuities, such as stepped transverse cracks exceeding about 4 mm  
 663 [millimeters], appear to be significant enough to overshadow the effect of random surface roughness  
 664 and result in specific sources of vibration. Potholes or bumps, typically more than 25 mm in depth or  
 665 height and about 150 mm long, are necessary to overshadow the effect of random pavement  
 666 roughness” (Hajek et al. 2006).

667 The vehicle weight, type of suspension system, and tire inflation can influence the amount of  
 668 vibration. Heavier vehicles produce higher ground-borne vibration because of the larger vehicle mass  
 669 acting on the pavement. Trucks equipped with steel leaf-spring suspension are likely to produce  
 670 higher vibrations compared to trucks equipped with air suspension systems. Also, over-inflated (stiff)  
 671 tires may bounce more readily over surface irregularities, resulting in higher vibration (Hajek et al.  
 672 2006).

673 An increase in the number of heavy trucks results in more vibration peaks, but not necessarily higher  
 674 vibration peaks. This is because of the rapid drop-off of vibration peaks with distance from the  
 675 source, and the short duration of the vibration peak. Higher vehicle speed increases ground-borne  
 676 vibration (Hajek et al. 2006).

677 Also very important to vibration are the man-made irregularities in the road surface, such as uneven  
 678 manhole covers and, very importantly, traffic-calming measures sometimes referred to as transverse  
 679 rumble or speed strips and speed bumps (Hunaidi 2000). Of particular concern are center-lane and  
 680 road shoulder rumble strips (WSDOT 2015), although data on ground-borne vibrations from these do  
 681 not appear to be available.

682 **Figure C-20** shows three types of traffic-calming features. **Table C-12** provides example vibration  
 683 data for a vehicle driven at 36 kilometers per hour for the three types shown in **Figure C-20** (Mhanna  
 684 et al. 2011). The vehicle used for the test was a Volvo FL6 commercial truck weighing between 12  
 685 and 15 tons.

686 **Figure C-190. Traffic-calming features introducing road surface unevenness.**



Source: Mhanna et al. 2011.

690 **Table C-11. Vibration at different distances for three traffic-calming features.**

Feature	Peak Particle Velocity (mm/second) at Various Distances					
	4 m	8 m	12 m	16 m	20 m	24 m
Speed cushion	1.45	0.57	0.42	0.36	0.29	0.19
Short hump	6.48	2.46	2.08	1.97	1.52	0.93

<b>Trapezoidal</b>	1.02	0.43	0.28	0.18	0.15	0.13
--------------------	------	------	------	------	------	------

691 **Source:** Mhanna et al. 2011.

692

693 **C.3.2 Vibration from Railway Trains**

694 Ground-borne vibration generated by railway trains is a result of several factors (Suhairy 2000):

- 695 • Operational and vehicle factors such as the train speed, condition and type of suspension, and  
696 condition of the wheels
- 697 • Guideway factors such as the type and condition of rails, type of guideway and rail support  
698 system, and mass and stiffness of the structure
- 699 • Geological factors such as stiffness and internal damping of the soil, depth to bedrock,  
700 layering of soil, and the depth to water table

701 Note that no two locations or situations will exhibit the same set of factors. Therefore, any measured  
702 data from actual locations are only indicative of the type and levels of vibrations that could occur and  
703 cannot accurately represent the vibration levels that might actually be experienced at the Hanford  
704 Site. **Table C-13** provides some explanation of the factors important to the vibration source and path  
705 (FTA 2006).

706 **Table C-12. Factors that influence levels of ground-borne vibration and noise.**

<b>Factors</b>	<b>Influence</b>
<b><i>Factors Related to Vibration Source</i></b>	
Vehicle suspension	If the suspension is stiff in the vertical direction, the effective vibration forces will be higher. On transit cars, only the primary suspension affects the vibration levels; the secondary suspension that supports the car body has no apparent effect.
Wheel type and condition	Use of pneumatic tires is one of the best methods of controlling ground-borne vibration. Normal resilient wheels on rail transit systems are usually too stiff to provide significant vibration reduction. Wheel flats and general wheel roughness are the major cause of vibration from steel wheel/steel rail systems.
Track / roadway	Rough track or rough roads are often the cause of vibration problems. Maintaining a smooth surface will reduce vibration levels.
Track support system	On rail systems, the track support system is one of the major components in determining the levels of ground-borne vibration. The highest vibration levels are created by track that is rigidly attached to a concrete trackbed (for example, track on wood half-ties embedded in the concrete). The vibration levels are much lower when special vibration control track systems such as resilient fasteners, ballast mats, and floating slabs are used.

707

708

**Table C-13. Factors that influence levels of ground-borne vibration and noise. (continued)**

<b>Factors</b>	<b>Influence</b>
<b><i>Factors Related to Vibration Source</i></b>	
Speed	As intuitively expected, higher speeds result in higher vibration levels. Doubling speed usually results in a vibration level increase of 4 to 6 decibels.
Transit structure	The general rule-of-thumb is that the heavier the transit structure, the lower the vibration levels. The vibration levels from a lightweight bored tunnel will usually be higher than from a poured concrete box subway.
Depth of vibration Source	There are significant differences in the vibration characteristics when the source is underground compared to surface level.
<b><i>Factors Related to Vibration Path</i></b>	
<b>Factor</b>	<b>Influence</b>
Soil type	Vibration levels are generally higher in stiff clay-type soils than in loose sandy soils.
Rock layers	Vibration levels are usually high near at-grade track when the depth to bedrock is 30 feet or less. Subways founded in rock will result in lower vibration amplitudes close to the subway. Because of efficient propagation, the vibration level does not attenuate as rapidly in rock as it does in soil.
Soil layering	Soil layering will have a substantial, but unpredictable, effect on the vibration levels since each stratum can have significantly different dynamic characteristics.
Depth to water table	The presence of the water table may have a significant effect on ground-borne vibration, but a definite relationship has not been established.

709

**Source:** FTA 2006.

710

711

Both PNNL and LIGO are concerned about vibration generated within certain frequency bands.

712

**Figures C-21** and **C-22** show are some examples of ground-borne vibration data from freight trains measured at distances of 20 meters and 10 meters, respectively, from railway tracks (Suhairy 2000).

713

714

These measurements take into consideration the vibration components in the X, Y, and Z directions.

715

The particle velocities are given in millimeters per second and not as peak particle velocity.

716

“As a rule of thumb the heavier the train the more vibration will be generated. A heavy freight train

717

with average speed generates significant magnitude of vibration at low frequencies range, which

718

could travel further away in the ground comparing with the high frequencies that suffer a lot of

719

damping in the ground... From the results for more than 120 trains, one can say in general that the

720

dominating frequency was one peak or two around 5 to 12.5 Hz and a second peak which has less

721

amplitude around 80 to 100 Hz.” Suhairy (2000) concludes that the dominating frequency direction at

722

distances longer than about 20 meters is the Z direction; however, it should be noted that this

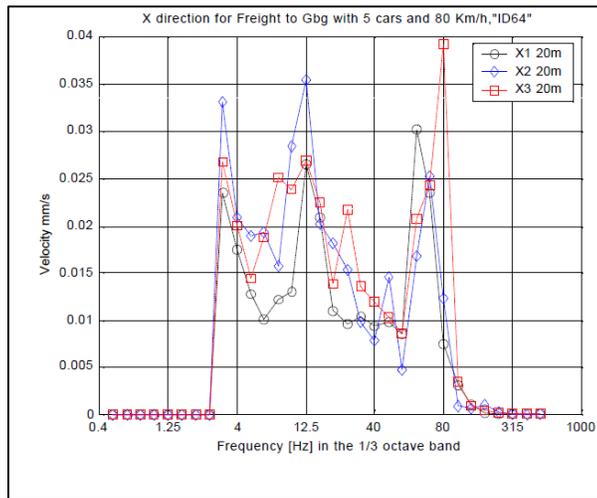
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conclusion could be highly impacted by site conditions.

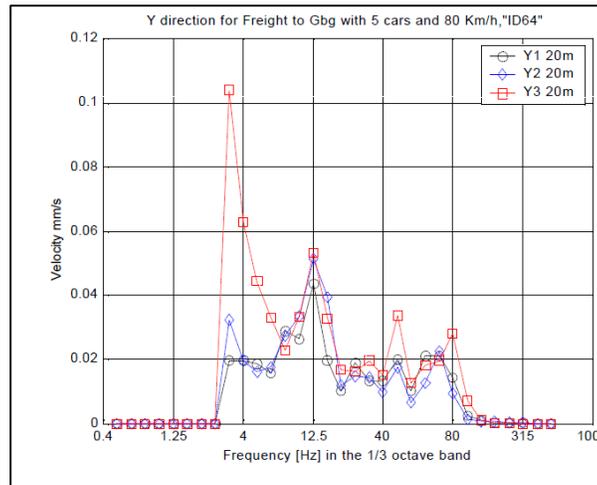
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**Figure C-201. Vibration measurements for a freight train with 5 railcars traveling at 80 km/hour measured 20 meters from the center of the railway tracks in the X, Y, and Z direction.**

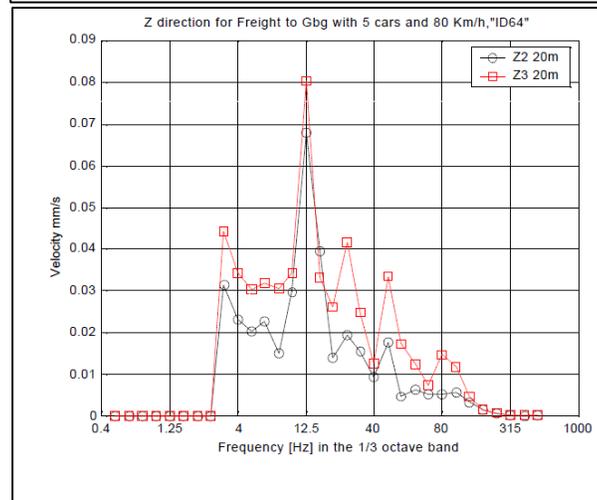
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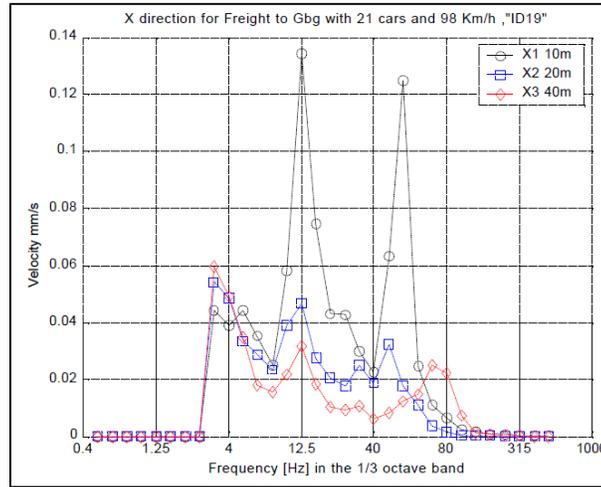


Source: Suhairy 2000.

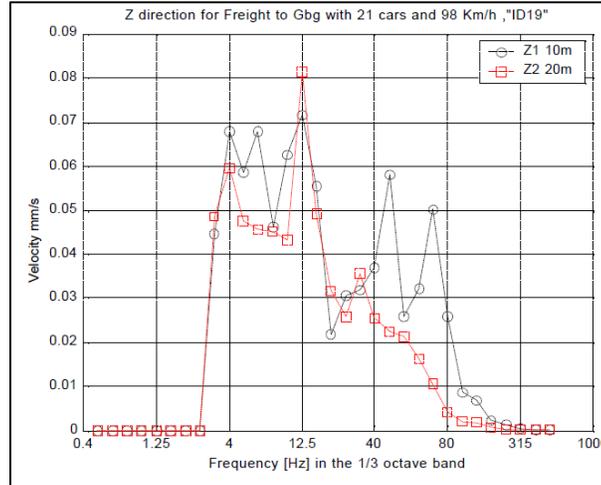
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**Figure C-212. Vibration measurements for a freight train with 21 railcars traveling at 98 km/hour measured at 10 meters from the center of the railway tracks in the X, Y, and Z direction.**

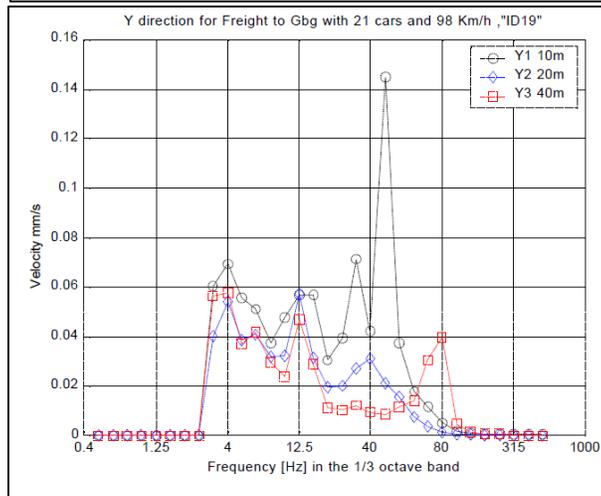
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734



735  
736



Source: Suhairy 2000.

### 737 C.3.3 Vibration from Operating Facility Equipment

738 It is unknown exactly what specific equipment would be used for any of the TRIDEC TMI  
739 representative facility types simply because it is unknown what actual facilities would be constructed  
740 on the Hanford Site lands. Nevertheless, it is reasonable to make several assumptions concerning the  
741 equipment as it pertains to vibration:

- 742 • **Worker safety concerns will minimize vibrations.** Whatever equipment is installed would  
743 be configured so as to protect workers from known vibration health impacts such as, hand-  
744 arm vibration syndrome, vibration white finger disease, and whole-body vibration exposure  
745 (NIOSH 1983; ACGIH 2014). Equipment installed within buildings that requires worker  
746 protection would have vibration isolation or dampening because there is little that can be  
747 done in the way of personal protective equipment to significantly reduce impacts to workers.  
748 There is no OSHA or *Washington Industrial Safety Health Act* regulation for vibration. Under  
749 the General Duty Clause, Section 5(a)(1) of the *Occupational Safety and Health Act*,  
750 employers are required to provide their employees with a place of employment that "is free  
751 from recognizable hazards that are causing or likely to cause death or serious harm to  
752 employees." The courts have interpreted the Act's general duty clause to mean that an  
753 employer has a legal obligation to provide a workplace free of conditions or activities that  
754 either the employer or industry recognizes as hazardous and that cause, or are likely to cause,  
755 death or serious physical harm to employees when there is a feasible method to abate the  
756 hazard. The frequencies of greatest interest to protect workers from whole body vibration are  
757 4 to 8Hz in the vertical direction, and 1 to 2 Hz in the horizontal direction (Branch 2009).
- 758 • **Economic considerations will minimize vibrations.** There are economic considerations that  
759 would strongly encourage companies to reduce vibration wherever possible:
  - 760 – Companies would install low-vibration equipment and, if not possible, install vibration  
761 isolation and damping devices to minimize possible damage to the building structure(s)  
762 and other sensitive equipment (Schaffer 2007).
  - 763 – Equipment manufacturers and installers would comply with industry "best practices" to  
764 dissipate or remove vibration and conform to industry standards (such as those  
765 established by American Society of Heating, Refrigerating and Air-Conditioning  
766 Engineers) (BRD 2015).
- 767 • **Regulatory compliance will minimize vibrations.** Employers would comply with federal,  
768 state, and local regulations for environmental protection as well as respond to pressure from  
769 the respective worker health insurance carrier. While there are no current standards, the State  
770 of Washington has adopted standards for certain projects from, for example, the ISO, the  
771 American National Standards Institute (ANSI), and the Swiss Standard 640312 (WSDOT  
772 2011). The following three tables address potential compliance standards.

773 **Table C-14** provides ISO and ANSI maximum vibration velocity standards for annoyance due to  
774 ground-borne vibration. **Table C-15** identifies the Swiss Standard (SARTE 1992) structural  
775 categories important to their vibration standard, SN 640312. **Table C-16** shows the vibration-level  
776 acceptance criteria from the Swiss Standard SN 640312 relative to the structure categories shown in  
777 **Table C-15**. WSDOT (2011) used some of these as criteria for a project in Seattle, WA to establish  
778 acceptable vibration levels for an environmental impact statement.

779  
780**Table C-13. Criteria for annoyance caused by ground-borne vibration from Part 2 of ISO Standard 2631 (1974) and ANSI Standard S3.29-2001.**

<b>Building Use Category</b>	<b>Maximum Vibration Velocity (inches/second)</b>	<b>Comments</b>
Hospital and critical areas	0.005	
Residential (nighttime)	0.007	
Residential (daytime)	0.01	Criterion also applies to churches, schools, hotels, and theaters
Office	0.02	Criterion applies to commercial establishments
Factory	0.03	Criterion applies to industrial establishments

781  
782  
783**Source:** WSDOT 2011.**Table C-14. Structural categories according to the Swiss Standard SN 640312.**

<b>Structural Category</b>	<b>Definition</b>
I	Reinforced-concrete and steel structures (without plaster), such as industrial buildings, bridges, masts, retaining walls, unburied pipelines; underground structures such as caverns, tunnels, galleries, lined and unlined
II	Buildings with concrete floors and basement walls, above-grade walls of concrete, brick or ashlar masonry; ashlar retaining walls, buried pipelines; underground structures such as caverns, tunnels, galleries, with masonry lining
III	Buildings with concrete basement floors and walls, above-grade masonry walls, and timber joist floors
IV	Buildings that are particularly vulnerable or worth preserving

784  
785**Source:** SARTE 1992; WSDOT 2011.

786  
787**Table C-15. Acceptance criteria from the Swiss Standard SN 640312 to protect structures based on their structural category.**

Structural Category	Continuous or Steady-State Vibration Sources <sup>a</sup>		Transient or Impact Vibration Sources <sup>b</sup>	
	Frequency (Hz)	Max Velocity (in/s)	Frequency (Hz)	Max Velocity (in/s)
I	10–30	0.5	10–60	1.2
	30–60	0.5–0.7	60–90	1.2–1.6
II	10–30	0.3	10–60	0.7
	30–60	0.3–0.5	60–90	0.7–1.0
III	10–30	0.2	10–60	0.5
	30–60	0.2–0.3	60–90	0.5–0.7
IV	10–30	0.12	10–60	0.3
	30–60	0.12–0.2	60–90	0.3–0.5

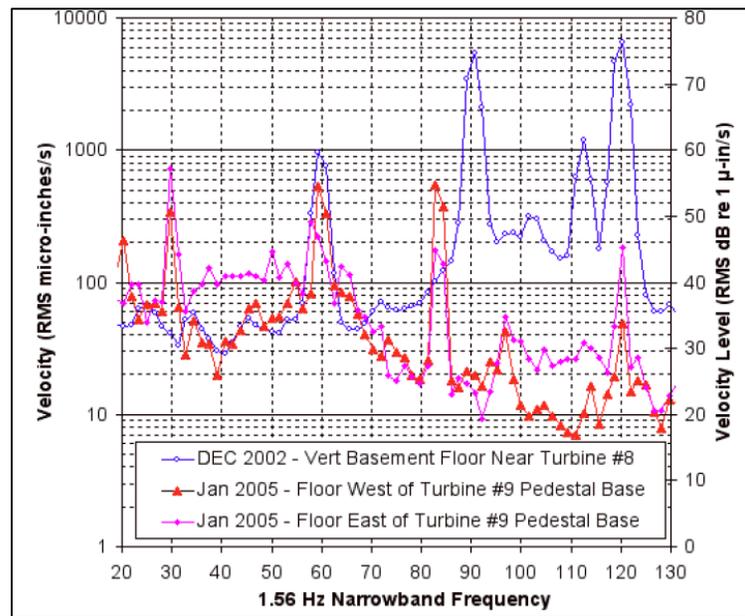
788 **Key:** Hz = hertz; in/sec = inches per second789 <sup>a</sup> Continuous or steady-state vibration consists of equipment such as vibratory pile drivers, hydromills, large  
790 pumps and compressors, bull dozers, trucks, cranes, scrapers and other large machinery, jackhammers and  
791 reciprocating pavement breakers, and compactors.792 <sup>b</sup> Transient or impact vibration consists of activities such as blasting with explosives, drop chisels for rock  
793 breaking, buckets, impact pile drivers, wrecking balls and building demolition, gravity drop ground compactors,  
794 and pavement breakers.795 **Source:** SARTE 1992; WSDOT 2011.

796

797 For this EA, the biofuels processing facility is likely to have the widest variety of equipment. Certain  
798 of these equipment have been identified including gas and combustion air compressors, pumps and  
799 electric motors, hoppers, cyclones, vibrating conveyors, rotary dischargers, oscillating and vibrating  
800 screens and shakers, flare stacks, and grinders (shredders and hammer mills) (NREL 2012).801 DOI (2015b) identified two pieces of biofuel processing equipment that are known to produce  
802 significant vibration: wood chippers and steam turbine generators. One industrial sized wood  
803 chipper/defibration machine (essentially a wood shredder) was found to have a vibration level of from  
804 1.0 to 1.6 mm/sec (Moretzsohn 2010). Steam turbine generators can come in many sizes and were  
805 evaluated for vibration in one study (Evans 2005). In that study there were five existing generators,  
806 three steam (6 megawatt [MW], 6 MW, and 25 MW) and two gas (13 MW and 36 MW). The three  
807 steam generators operate at 3,600 rpm and have disturbing frequencies of 60 Hz (the lowest  
808 frequency of vibration generated by the equipment). The two gas generators operate at 4,862 and  
809 5,400 rpm and have disturbing frequencies of 81 and 90 Hz, respectively. The vibration peaks shown  
810 in **Figure C-23** below are the disturbing frequencies and their harmonics. Those at 30-, 60-, 90- and  
811 120-Hz are important to this EA.

812

**Figure C-223. Comparison of generator source vibration spectra for five generators.**



Source: Evans 2005.

813

814

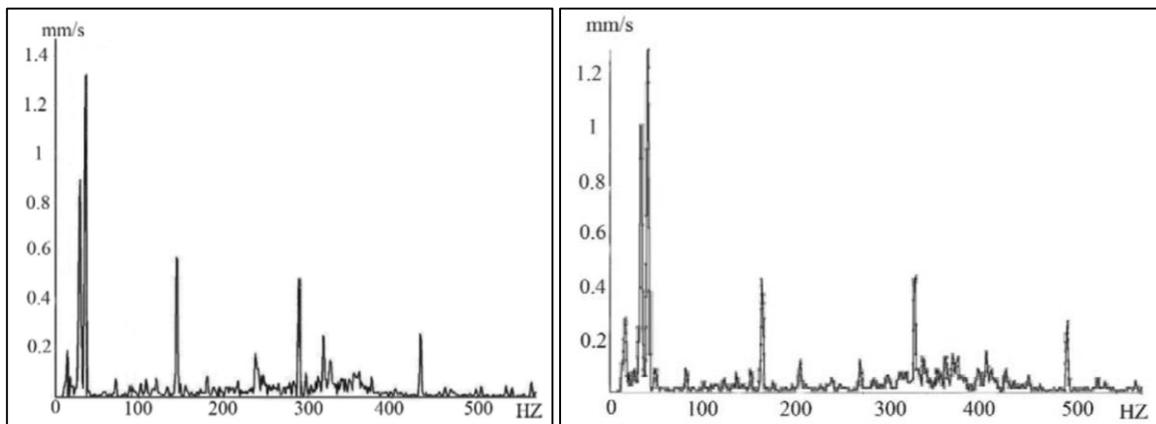
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816 The other major piece of equipment important to biofuels processing is the use of large industrial  
 817 compressors. Rotary screw compressors are widely used for refrigeration and compression of  
 818 ammonia and other refrigerating gases. They may be simply classified as dynamic or displacement  
 819 compressors. Displacement compressors confine successive volumes of gas within a closed space and  
 820 increase the pressure by reducing the volume of the space. There are two types: rotary and  
 821 reciprocating compressor. As a major type of rotary and positive displacement compressor, the rotary  
 822 screw compressor is becoming the most common. From a vibration study of rotary screw compressor  
 823 vibration (Zargar 2013), the motor, gear box, and compressor each displayed a maximum vibration  
 824 velocity of 2.3, 3, and 2.8 mm/sec before repair, and 2, 1.6, and 1.6 mm/sec after repair (see **Figure**  
 825 **C-24**).

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**Figure C-234. The velocity amplitudes of a rotary screw compressor before (a) and after (b) repair.**

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Key: mm/s = millimeters per second.

Source: Zargar 2013.

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1 **APPENDIX D – ELECTROMAGNETIC FIELDS FROM**  
2 **CONSTRUCTION AND FACILITY OPERATION**

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**Table of Contents**

6	D. APPENDIX D – Electromagnetic Fields from Construction and Facility Operation .....	D-1
7	D.1 Introduction .....	D-1
8	D.1.1 Electric Fields .....	D-2
9	D.1.2 Magnetic Fields .....	D-2
10	D.2 Electric and Magnetic Field Health and Safety Levels of Concern.....	D-4
11	D.3 Electric and Magnetic Fields Associated with Construction.....	D-6
12	D.4 Electric and Magnetic Fields Associated with Electrical Energy Transmission .....	D-6
13	D.5 Electric and Magnetic Fields Associated with Solar Power Energy Production.....	D-12
14	D.6 Electric and Magnetic Fields Associated with Facility Operations.....	D-14
15	D.7 References .....	D-17

16

**List of Figures**

18	Figure D-1. Types of radiation in the electromagnetic spectrum. ....	D-1
19	Figure D-2. Magnetic field levels for common household electrical devices. ....	D-3
20	Figure D-3. Basic structure of the electrical energy transmission system.....	D-7
21	Figure D-4. Example of an electrical substation hourly loading variation.....	D-8
22	Figure D-5. Example of an electrical substation weekly loading variation.....	D-8
23	Figure D-6. Magnetic field reduction by increasing pole height in 5-foot increments. ....	D-9
24	Figure D-7. Percentage of magnetic field reduction with increased transmission pole height. ....	D-9
25	Figure D-8. Magnetic field strength reduction with distance for a double-circuit 220-kV line	
26	with a 30-foot ground clearance and a load of 500 amps. ....	D-10
27	Figure D-9. Magnetic fields related to different pole-head and underground configurations for	
28	66-kV subtransmission lines. ....	D-11
29	Figure D-10. Typical electric and magnetic field levels for power transmission lines. ....	D-12

30

**List of Tables**

32	Table D-1. The electromagnetic radiation spectrum and related TLV <sup>®</sup> frequency categories.....	D-5
33	Table D-2. TLVs <sup>®</sup> and exposure limits for static magnetic fields.....	D-5
34	Table D-3. Electric and magnetic field exposure guidelines for alternating fields. ....	D-6
35	Table D-4. Typical magnetic field levels associated with overhead power transmission lines.....	D-10
36	Table D-5. Magnetic field levels measured at 1.6 feet from electrical substation point source	
37	equipment.....	D-12
38	Table D-6. Potential magnetic field strength from various components of West Linn Solar Array. ....	D-13
39	Table D-7. EMF background levels at three PV array inverter locations. ....	D-13
40	Table D-8. Measured EMF levels for the same three PV array inverter sites in Table D-6 at	
41	different directions and distances from the inverter pads. ....	D-14
42	Table D-9. EMF measurements during a workday.....	D-15

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43	Table D-10. EMF spot measurements in the workplace. ....	D-16
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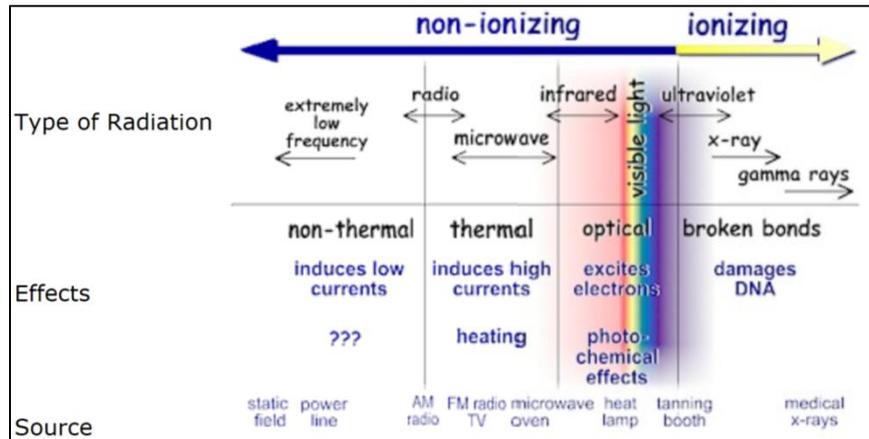
**D. APPENDIX D – ELECTROMAGNETIC FIELDS FROM CONSTRUCTION AND FACILITY OPERATION**

**D.1 INTRODUCTION**

Electric and magnetic fields (EMF) are created as a result of radiation in the electromagnetic spectrum (Figure D-1). EMF is produced through the generation, transmission, and use of electric power in some fashion, which in the United States has a fundamental frequency of 60 hertz (Hz) (one Hz is one cycle per second). In *National Environmental Policy Act* analyses, we are concerned about health and safety from both electric and magnetic fields. In this environmental assessment (EA), we are also concerned about EMF effects on existing operations (see Appendix A).

The Occupational Safety and Health Administration’s non-ionizing<sup>1</sup> radiation regulations do not address extremely low frequency (ELF) radiation<sup>2</sup>. The alternative is to address health impacts based upon recognized national consensus<sup>3</sup> health standards that are important in the ELF range. There are two recognized consensus health standards organizations with relevance to EMF. The first is the International Commission on Non-Ionizing Radiation Protection (ICNIRP) that internationally provides scientific advice and guidance on the health and environmental effects of non-ionizing radiation. The second is a U.S. organization, the American Conference of Governmental Industrial Hygienists (ACGIH) who provides *Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices* (ACGIH 2014). These are discussed in **Section D.2**.

**Figure D-1. Types of radiation in the electromagnetic spectrum.**



Source: EPA 2013.

Basic information about EMF provided in the section below comes from the Electric and Magnetic Fields Research and Public Information Dissemination program, an extensive study led by the National Institutes of Environmental Health Sciences of the National Institutes of Health and the Department of Energy. This program was a six-year project focused on the issue of potential risk to human health from electric power exposure (NIEHS 2002).

<sup>1</sup> Non-ionizing radiation is radiation that has enough energy to move atoms and molecules around or cause them to vibrate but not enough to remove electrons. Examples are sound waves, visible light, and microwaves.

<sup>2</sup> Extremely low frequency or ELF is the range from 1- to 300-cycles per second.

<sup>3</sup> National consensus standards are those for which affected persons have previously reached substantial agreement.

---

**72 D.1.1 Electric Fields**

73 Electric power in the U.S. is alternating current (AC) with a frequency of 60 Hz with a peak-to-peak  
74 wavelength of 3,100 miles. AC electric fields and magnetic fields are characterized by their  
75 wavelength (the distance from the peak of one wave to the top of the next), frequency (the number of  
76 wavelength cycles in a given time), and amplitude (the height or strength of the wave). The amplitude  
77 of the electrical current is measured in volts and referred to as voltage and varies considerably  
78 between the point of generation and use. Electrical current that does not vary is called direct current  
79 (DC) and therefore has no frequency.

80 Electric fields produced by the electrical power voltage are measured in units of volts (V) or  
81 thousands of volts (kilovolts [kV]) per meter (m): V/m or kV/m. Magnetic fields are generated when  
82 electrical current flows through conductors (wires or electrical devices) and, for AC current, increase  
83 or decrease in response to the flow of electrical current. For DC current, these fields are “static” or  
84 stay the same as long as the current level does not change.

**85 D.1.2 Magnetic Fields**

86 Magnetic fields are measured in units of gauss<sup>4</sup> (G) or tesla<sup>5</sup> (T), where 1 T = 10,000 G. Units  
87 commonly referred to for magnetic fields are the microtesla ( $\mu$ T) and the milligauss (mG). A  
88 milligauss is 1/1,000 of a G or  $10^{-3}$  G. A  $\mu$ T is 1/1,000,000 of a T, or  $10^{-6}$  T. To convert  $\mu$ T to mG,  
89 multiply by 10. To convert mG to  $\mu$ T, divide by 10. The magnetic field levels of concern to Pacific  
90 Northwest National Laboratory are in units of nanoteslas (nT) (an nT is 1/1,000,000,000 of a T, or  $10^{-9}$   
91 T). For reference, 1,000 nT equals 1  $\mu$ T or 10 mG. The earth’s static magnetic field is about 500  
92 mG. For comparison, magnetic fields related to common household devices are shown in **Figure D-2**.

---

<sup>4</sup> A gauss (G) is a unit of magnetic induction wherein 1 G corresponds to the magnetic flux density that will induce an electromotive force of one abvolt ( $10^{-8}$  volts) in a linear centimeter of wire moving laterally at one centimeter per second.

<sup>5</sup> A tesla is also a unit of magnetic flux density and is equal to  $10^4$  G.

**Figure D-2. Magnetic field levels for common household electrical devices.**

		Distance from source		
		0.03 m	0.3 m	1 m
Clothes washer		0.8–40 μT	0.2–3μT	0.01–0.2 μT
Television		2.5–50	0.04–2	0.01–0.2
Electric range		6–200	0.4–4	0.01–0.1
Microwave oven		75–200	4–8	0.3–0.8
Fluorescent lamp		40–400	0.5–2	0.01–0.3
Electric razor		15–15,000	0.1–9	0.04–0.3
Hair dryer		6–2,000	0.1–7	0.01–0.3
Conventional electric blanket		10 μT	1.5 μT	< 0.1 μT
New "low magnetic field" electric blanket		1	0.15	< 0.01 *

Source: EHIR 2009.

94

95

96

The value of a magnetic field at some distance from its source can be calculated from knowing the magnetic field strength at the source, the distance, and the configuration of the source (that is, a point source or line source). To accurately calculate these fields at a distance from the source is very complex and is customarily performed by a computer program such as that from the Bonneville Power Administration's (BPA) *Corona and Field Effects Program*. However, even though the calculations are complex, the basis for them can be generally expressed as four general arithmetic formulas for reduction of the magnetic flux density with distance (Feero 1991):

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104

1. If the electrical circuit is a very long single circuit relative to the distance from the observer, then the magnetic flux density is given by:

105

106

$B=6.56 I/r$ , where "B" is the magnetic flux density in mG, "I" is the electrical current in amperes flowing through the wire, and "r" is the distance from the wire to the observer.

107

108

2. More commonly it is a more complex case, with more than one current flowing and the circuit is either not long or not a straight wire. A different equation is then necessary (from classical physics the Biot-Savart Law, one of the Maxwell Equations for electromagnetic systems). For this, the magnetic flux density is given by:

109

110

111

$\Delta B = k (I\Delta \times r)/r^3$ , where "k" is a constant, "I" is the current in one of the wire sections ( $\Delta$ ), and "r" is the distance from the wire to the observation point.

112

113

114

3. For a point distance from two long parallel wires carrying equal currents, with current flowing in opposite directions, the magnetic flux density is:

115

116

$B = 6.56 Id/r^2$ , where "d" is the distance separating the two wires and is much smaller than "r", the distance to the observer.

117

118

4. And lastly, for a continuous wire loop the magnetic flux density is:

119  $B = (10.31 I \times a^2)/r^3$ , where “a” is the radius of the loop.

120 From these equations, it can be seen that the reduction in magnetic density flux with distance is  
121 essentially a function of one of the following:

- 122 • inverse of the distance (if “r” is in the denominator, “1/r” said to be the inverse of “r”)
- 123 • inverse of the square of the distance (if “r<sup>2</sup>” is in the denominator)
- 124 • inverse of the cube of the distance (if “r<sup>3</sup>” is in the denominator).

125 There are a couple of important characteristics for electric and magnetic fields. Electric fields can be  
126 shielded or weakened by electrical conducting materials even though they may be poor conductors.  
127 These include trees, buildings, and even human skin. Magnetic fields pass through most materials and  
128 are more difficult to shield or mitigate. The additional complicating factor for magnetic fields is that  
129 they can be of different strengths in the horizontal and vertical directions. This last characteristic is  
130 important to the Pacific Northwest National Laboratory PSF.

## 131 **D.2 ELECTRIC AND MAGNETIC FIELD HEALTH AND SAFETY LEVELS OF** 132 **CONCERN**

133 As mentioned above, the ACGIH provides the only consensus standard for protection from EMF. The  
134 ACGIH annually publishes the *Threshold Limit Values for Chemical Substances and Physical Agents*  
135 *& Biological Exposure Indices* (ACGIH 2014). The ACGIH considers magnetic fields as non-  
136 ionizing radiation “physical agents” and breaks them down into static magnetic fields, sub-  
137 radiofrequency (30 kilohertz [kHz] and below) magnetic fields, radiofrequency, and microwave  
138 radiation. **Table D-1** shows the non-ionizing radiation spectrum, the region, the waveband and  
139 wavelength for the region, the frequency limits, and the applicable threshold limit value (TLV<sup>®</sup>). Note  
140 that static magnetic fields are not shown in the table. This is because the frequency of a static field is  
141 effectively zero. This EA is concerned with static magnetic fields and the sub-radiofrequency (ELF)  
142 categories. **Table D-2** provides the TLVs<sup>®</sup> for the static magnetic field (DC) consensus standards  
143 developed by the ACGIH (2014) and the ICNIRP (2002). **Table D-3** provides worker and public  
144 electric and magnetic field exposure guidelines for alternating fields (ACGIH 2014; ICNIRP 2010;  
145 ICES 2002).

146 **Table D-1. The electromagnetic radiation spectrum and related TLV<sup>®</sup> frequency categories.**

Region	Non-Ionizing Radiation			
	Sub-Radiofrequency		Radiofrequency	Microwave
Wavelength	~300,000 km to 1000 km	1000 km to 10 km	10 km to 1 m	1 m to 1 mm
Frequency	1 to 300 Hz	300 Hz to 30 kHz	30 kHz to 30 MHz	30 MHz to 300 GHz
Applicable ACGIH TLV <sup>®</sup>	Sub-radiofrequency		Radiofrequency and microwave	

147 **Key:** km = kilometer; m = meter; mm = millimeter; Hz = hertz; kHz = kilohertz; MHz = megahertz; GHz =  
 148 gigahertz.

149 **Source:** ACGIH 2014.

150

151 According to the ACGIH (2014), for a non-ionizing radiation magnetic field due to sub-  
 152 radiofrequencies of 1 to 300 Hz, the “ceiling value” (the value that should not be exceeded during the  
 153 workday under any circumstances) for whole-body exposure is calculated as:

154 
$$B_{TLV} = 60/f$$

155 where “f” is the frequency in Hz, and  $B_{TLV}$  is the magnetic flux density in milliTesla (mT).

156 From 300 Hz to 30 kHz, the whole-body ceiling value is 0.2 mT (ACGIH 2014).

157 Occupational exposures should also not exceed an electric field strength of 25 kV/m from 0 (DC) to  
 158 220 Hz. For frequencies in the range of 220 Hz to 3 kHz, the ceiling value is given by (ACGIH  
 159 2014):

160 
$$E_{TLV} = 5.525 \times 10^6/f$$

161 where “f” is the frequency in Hz, and  $E_{TLV}$  is the root mean square (RMS) electric field strength in  
 162 V/m.

163 A value of 1,842 V/m RMS is the whole-body ceiling value for frequencies from 3 to 30 kHz. It is  
 164 recommended by ACGIH that those wearing a pacemaker or similar medical devices not be exposed  
 165 above 1 kV/m (ACGIH 2014).

166 **Table D-2. TLVs<sup>®</sup> and exposure limits for static magnetic fields.**

Exposure	Ceiling Value
<b>Occupational</b> <sup>a</sup>	
Whole body (general workplace)	2 T
Whole body (special worker training and controlled workplace environment)	8 T
Limbs	20 T
Medical device wearers	0.5 mT
<b>Public</b> <sup>b</sup> : Exposure to any part of the body	400 mT

167 **Sources:** <sup>a</sup>ACGIH 2014; <sup>b</sup>ICNIRP 2009.

168

169

**Table D-3. Electric and magnetic field exposure guidelines for alternating fields.**

<b>Organization</b>	<b>Type of Exposure</b>	<b>Electric Field (kV/m)</b>	<b>Magnetic Field (mG)</b>
ACGIH	Occupational	25 <sup>1a</sup>	10,000
ICNIRP	Occupational	8.3 <sup>b</sup>	4,200
	General public	4.2	2,000
IEEE	Occupational	20	27,100
	General public	5 <sup>c</sup>	9,040

170

<sup>a</sup> Grounding is recommended above 5 to 7 kV/m and conductive clothing is recommended above 15 kV/m.

171

<sup>b</sup> Increased to 16.7 kV/m if nuisance shocks are eliminated.

172

<sup>c</sup> Within power line rights-of-way, the guideline is 10 kV/m.

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174

**Source:** ACGIH 2014; ICNIRP 2010; ICES 2002.

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### **D.3 ELECTRIC AND MAGNETIC FIELDS ASSOCIATED WITH CONSTRUCTION**

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While there are many potential sources of EMF from reciprocating engines, compressors, electric pumps, and generators that might be present during construction activities, there is almost nothing in the literature to address magnetic fields related to those activities. In fact, for an environmental impact statement for the construction of a high-speed train, federal and state regulators go so far as to say that “There would be negligible EMF or EMI [electromagnetic interference] impacts...during construction of the HST [high-speed train] alternatives because construction equipment generates low levels of EMFs and EMI. The only EMI that might be generated during construction would be occasional licensed radio transmissions between construction vehicles” (CHRA and FRA 2012).

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### **D.4 ELECTRIC AND MAGNETIC FIELDS ASSOCIATED WITH ELECTRICAL ENERGY TRANSMISSION**

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High-voltage power is carried from the generating station, using high-capacity transmission lines supported by above-ground metal structures (see Figure D-3). At transmission substations, the voltage is reduced and routed in multiple directions by subtransmission lines. Subtransmission lines are constructed on wood poles or steel poles, and sometimes placed in underground structures. Subtransmission lines end at the facilities of large power users or at distribution substations. At distribution substations, the voltage is further reduced and delivered to homes and offices on wires supported by wooden poles or in underground structures. All components of the transmission, subtransmission, distribution, and substation systems that are “energized” (carrying electricity) create EMFs (SCE 2004).

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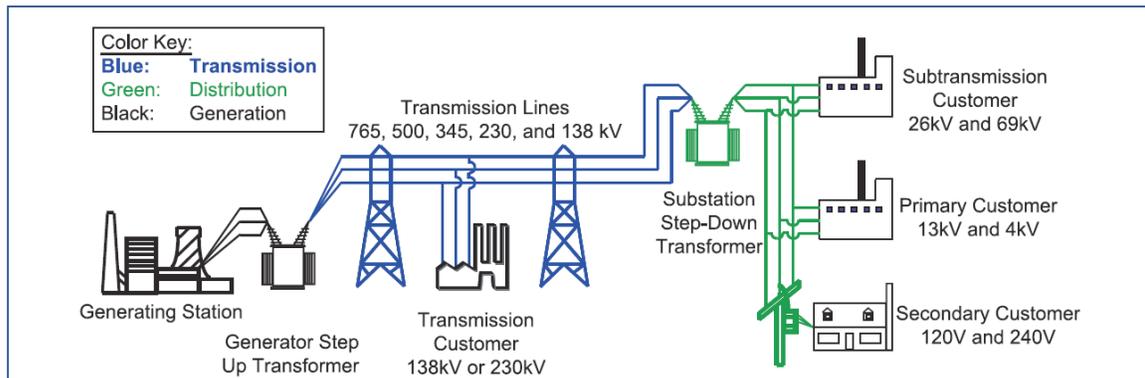
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**Figure D-3. Basic structure of the electrical energy transmission system.**

Source: US-Canada 2004.

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200

201 The minimum width of an overhead transmission/distribution line right-of-way (ROW) is determined  
202 by a number of factors such as “swing” characteristics of the line and the minimum clearances  
203 required by federal and state regulations. The minimum centerline-to-edge of right-of-way width of  
204 100 feet was established for overhead 500-kV lines through radio interference studies conducted in  
205 the early 1960s. This 100-foot distance is about 20 feet greater than would be needed for swing  
206 considerations. Smaller than 100-foot ROW widths for 500-kV lines are found on lands under the  
207 U.S. Forest Service and Bureau of Land Management jurisdictions, due to the lack of development  
208 adjacent to the ROW (SCE 2004).

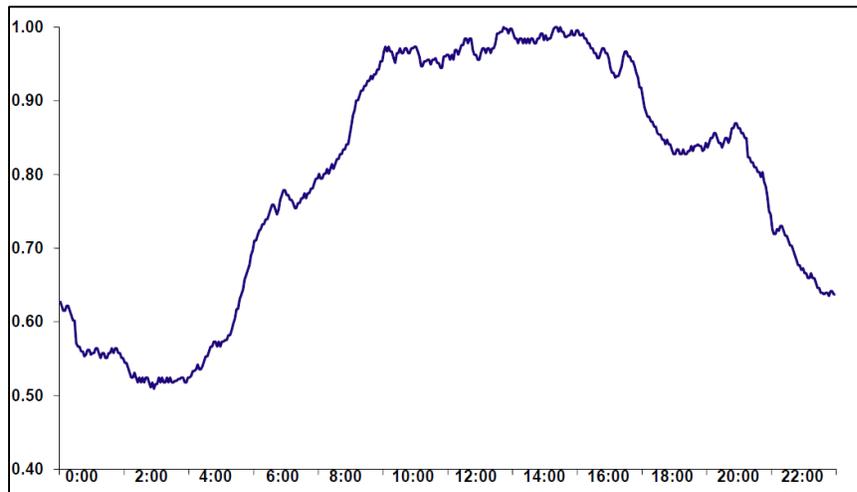
209 BPA has the following maximum electric field strength requirements for roads and parking lots  
210 adjacent to BPA ROWs. These limits are: in the ROW, 9 kV/m; at the edge of the ROW, 5 kV/m; at  
211 road crossings, 5 kV/m; at shopping center parking lots, 3.5 kV/m; and at commercial/industrial  
212 parking lots, 2.5 kV/m (BPA 2011).

213 Substations receive power from generating stations or other substations of the same type and can have  
214 both transmission and distribution components. They increase the voltage for long distance  
215 transmission or decrease it for distribution to an end user. They provide switchgear to direct the  
216 electricity to individual lines and to circuit breakers to clear lines in the event of an electric system  
217 failure.

218 Distribution substations receive power from transmission substations through radial or looped  
219 subtransmission lines and transform it to a lower voltage. These deliver the power to the individual  
220 customers after further transformation at locations throughout the distribution network. Distribution  
221 substations must be located close to, and generally central to, the load served due to high losses and  
222 voltage drops present in distribution lines.

223 The “load” or electrical current demand is directly related to the EMF generated. Electrical system  
224 loads vary or cycle on an hourly, daily, monthly, and annual basis. **Figure D-4** shows how the load  
225 changes throughout a 24-hour period, and **Figure D-5** shows the weekly loading variation (SCE  
226 2004).

227

**Figure D-4. Example of an electrical substation hourly loading variation.**

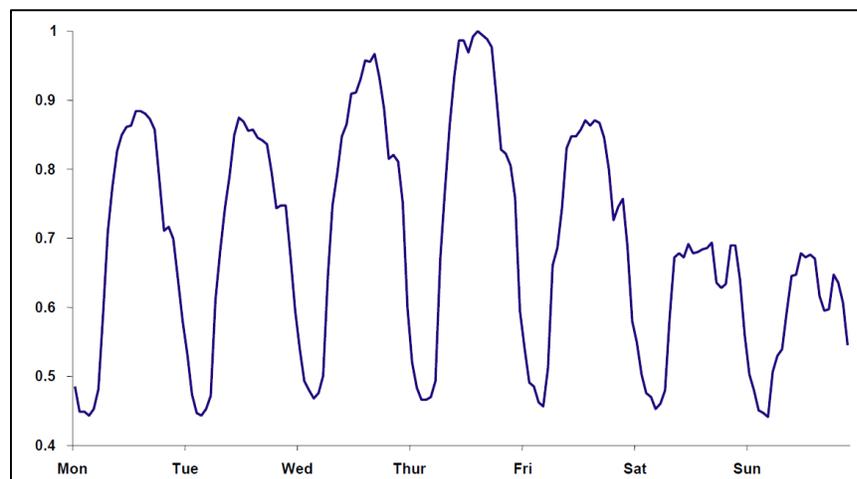
Source: SCE 2004.

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**Figure D-5. Example of an electrical substation weekly loading variation.**

Source: SCE 2004.

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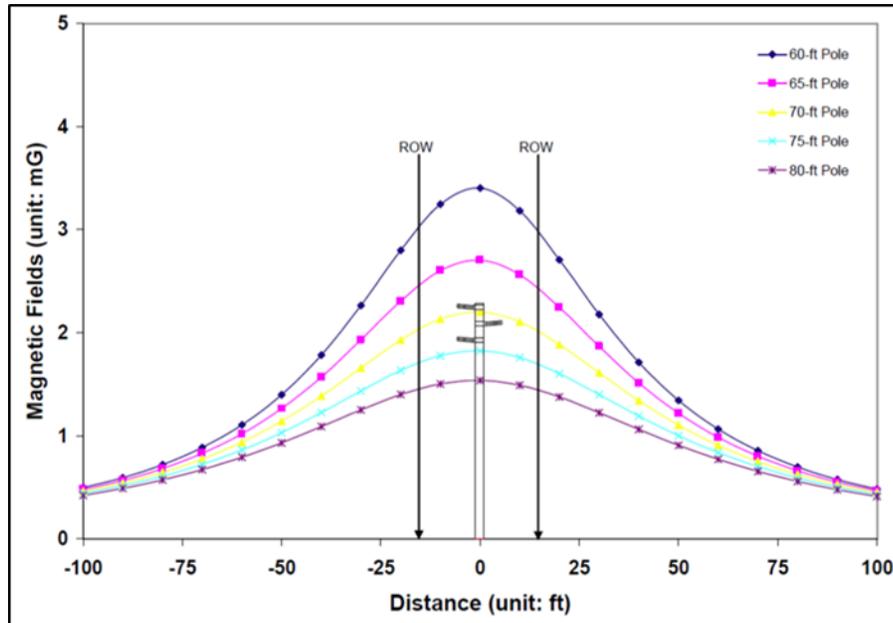
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235 These loading variations cause changes in the amount of EMF produced. Studies have been done to  
 236 evaluate changes in configuration on the amount of EMF produced. **Figures D-6, D-7, and D-8** each  
 237 show in a different way the relationship between pole height and the reduction in magnetic field  
 238 strength. **Figure D-6** shows how the magnetic field is reduced from within the ROW out to 100 feet.  
 239 The highest curve represents, understandably, the lowest line height. The lower the line is physically,  
 240 the higher the magnetic field is at that point. It is important to note that, as each of the lines reach 100  
 241 feet from the centerline, they appear to be coming asymptotic or merge. This is because as you are  
 242 farther from the source, the height of the source becomes a small component of the distance and  
 243 eventually the height becomes unimportant – at a distance. The reason why pole height is important is  
 244 because of those who are either within the ROW or very nearby. **Figure D-7** provides a percentage  
 245 reduction for each 5 foot increment of height. **Figure D-8** shows an example situation showing  
 246 magnetic field strength reduction with ROW distance for a double-circuit 220-kV line with a 30-foot  
 247 ground clearance and a load of 500 amps (SCE 2004).

248 What is not clear from these figures is that the line height varies with distance due to sagging caused  
 249 by heat expansion or the weight of water or frost on the line. The effective height is therefore what is  
 250 important and not just the height at the pole.

251 **Table D-4** shows some typical measured magnetic field levels associated with overhead power  
 252 transmission lines (PSCW 2013; SCE 2004). These are synoptic or spot values and would be affected  
 253 by the change in loads shown in **Figures D-4** and **D-5**.

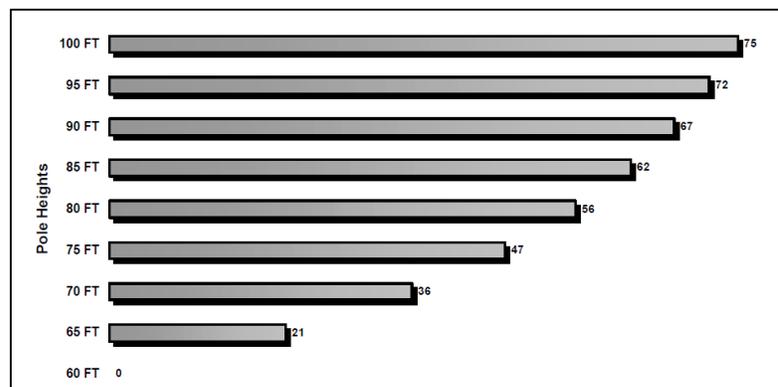
254 **Figure D-6. Magnetic field reduction by increasing pole height in 5-foot increments.**



Source: EHIB 2009.

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**Figure D-7. Percentage of magnetic field reduction with increased transmission pole height.**

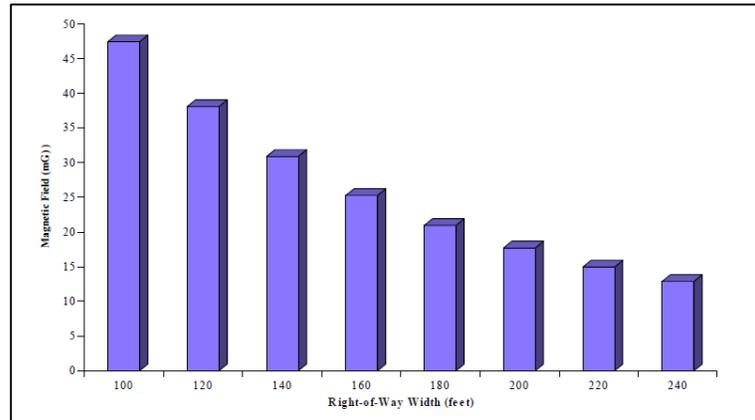


Source: SCE 2004.

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**Figure D-8. Magnetic field strength reduction with distance for a double-circuit 220-kV line with a 30-foot ground clearance and a load of 500 amps.**



Source: SCE 2004.

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**Table D-4. Typical magnetic field levels associated with overhead power transmission lines.**

Overhead Transmission/Distribution Line Voltages (kV)	Usage	Typical Magnetic Field Measurements (mG)				
		Maximum in ROW	Approximate Distance from Centerline			
			50 feet	100 feet	200 feet	300 feet
12 and below	General range	0.4 - 20		0.1 - 1	0.0	
69 and 138	General range	3 - 80	0.5 - 2.5	0.1 - 10	0.1 - 3	
115	Average	30	7	2	0.4	0.2
	Peak	63	14	4	0.9	0.4
230	Average	58	20	7	1.8	0.8
	Peak	118	40	15	3.6	1.6
500	Average	87	29	13	3.2	1.4
	Peak	183	62	27	6.7	3.0

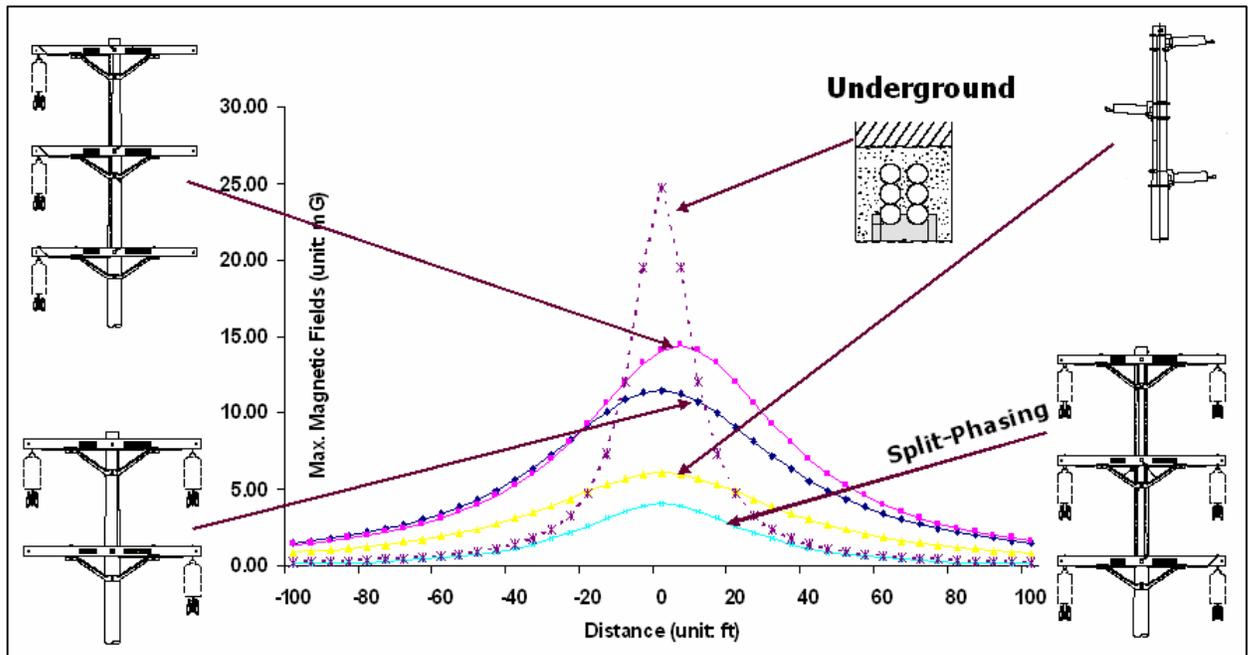
Source: PSCW 2013; SCE 2004; PPL 2004.

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**Figure D-9** brings many of these issues together by showing the magnetic fields related to different pole-head and underground configurations for 66-kV subtransmission lines (SCE 2004). Power lines transmit three phases of power. Each of the three conductors (or lines) carries electricity at 60 Hz and the same voltage but each is out of phase with the others by one-third of a wavelength. So when one line is at its peak, the next line is one-third delayed and the other two-thirds delayed. Power poles sometimes have six lines or two three-phase systems. How these are configured allows for some of the EMF generated to cancel some of the other EMF. **Figure D-9** shows how the configuration of the three-phase lines can reduce the magnetic flux field. It also shows the much higher magnetic flux for an underground line.

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**Figure D-9. Magnetic fields related to different pole-head and underground configurations for 66-kV subtransmission lines.**



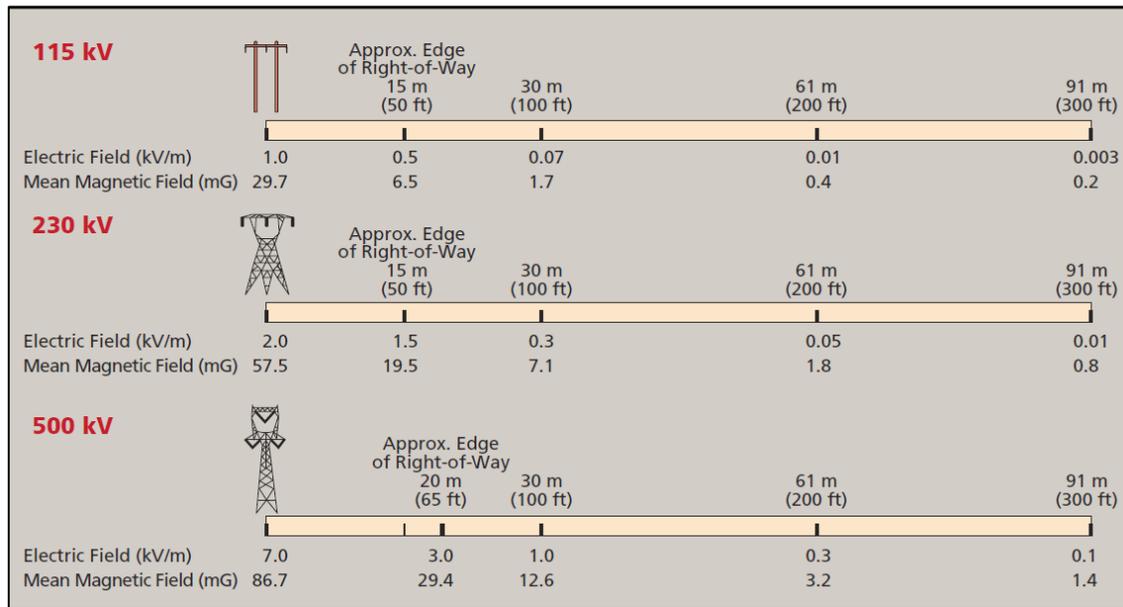
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Source: SCE 2004.

**Figure D-10** shows some typical electric and magnetic field levels for 115-, 230-, and 500-kV power transmission lines measured at one meter above ground from power lines in the Pacific Northwest (NIEHS 2002). The figure shows that the electric and magnetic field strength drops off significantly within 300 feet of the centerline.

288

**Figure D-10. Typical electric and magnetic field levels for power transmission lines.**



Source: NIEHS 2002.

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**Table D-5** provides information about the magnetic field strength levels produced by electrical substation equipment along with water treatment plant equipment (motors and inductor) (NYC 2004).

294

295

**Table D-5. Magnetic field levels measured at 1.6 feet from electrical substation point source equipment.**

Equipment	Potential Maximum Magnetic Field Strength (mG)
Motor – 2,000 horsepower	98.5
Motor -- 1,500 horsepower	71.2
4.16-kV switchgear	13.3
13.2-kV switchgear	15.6
7,500-kVA transformer	72.5
11,250-kVA transformer	108.75
Inductor	117

Source: NYC 2004.

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**D.5 ELECTRIC AND MAGNETIC FIELDS ASSOCIATED WITH SOLAR POWER ENERGY PRODUCTION**

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Solar energy production uses power lines, electrical substations, photovoltaic (PV) inverters (DC conversion to AC), power transformers, alternators (dish thermal), and grid connections. EMF associated with power lines, electrical substations, and transformers was already addressed in **Section D.4**.

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Solar PV energy produced by solar panels generates DC current and must be converted for the power grid to AC using an inverter. Solar panel array systems therefore generate both a static DC-related magnetic field and an AC-generated magnetic field but at different locations on a site (DC on the array panels and AC at the inverters). Concentrating solar power dish thermal technology using Stirling turbine engines is 60 Hz AC due to the engine’s alternator and does not require an inverter.

309 These dish systems do not generate static magnetic fields. These AC magnetic fields are generated at  
310 each solar dish installation.

311 According to the *Mid-Columbia Clean Energy Feasibility Assessment* (DOE 2011), “PV generation  
312 projects sometimes require upgrades to transmission lines due to access required at remote site  
313 locations (that is, away from the load); however, there are adequate substations for grid  
314 interconnections in the region to make interconnection a low-priority issue. Transmission line  
315 capacity should not be an issue, as loads at decommissioned sites no longer exist, and there is  
316 adequate room for these lines to transmit PV power on the BPA grid; however, interconnection  
317 location and line capacity must be coordinated with the existing utility system.”

318 **Table D-6. Potential magnetic field strength from various components of West Linn Solar**  
319 **Array.**

Source	Field Type	Magnetic Field Strength (mG)	
		3 feet	10 feet
Parallel string of PV modules	Static	1,697	509
DC to AC inverter	Power frequency	344	3
Network grid interconnection	Power frequency	14	n/a

320 **Source:** GC 2015.

321  
322 According to Chang and Jennings (1994), power inverters are the most common source of power  
323 frequency (60 Hz) magnetic fields in photovoltaic systems. The field strength of the alternating  
324 magnetic fields from a power inverter is directly related to the AC current that the inverter generates.  
325 Every solar array system will vary, but a common configuration for a large grid-connected system is  
326 to utilize one inverter for each parallel string. The design of an existing PV project (data in **Table D-**  
327 **5**) has twelve 260-kilowatt inverters, each with a rated maximum alternating output capacity of 301  
328 amperes. This could theoretically produce a time-varying magnetic field of approximately 344  
329 milligauss at three feet from the inverters. The published report calculates that at a distance of 10 feet,  
330 the magnetic field strength would be about 3 mG (GC 2015).

331 **Table D-7. EMF background levels at three PV array inverter locations.**

Pad	Magnetic Field (mG)			Electric Field (V/m)		
	Site 1	Site 2	Site 3	Site 1	Site 2	Site 3
NW boundary	<0.2	0.2	<0.2	<5	<5	<5
SW boundary	1.8	0.2	<0.2	<5	<5	<5
S center boundary	3.0			<5		
SE boundary	0.7	0.4	0.2	<5	<5	<5
NE boundary	<0.2	<0.2	<0.2	<5	<5	<5
NC boundary	0.3			<5		
Background mean	<0.2	<0.2	<0.2	<5	<5	<5

332 **Source:** Tech Environmental 2012.

333

334  
335**Table D-8. Measured EMF levels for the same three PV array inverter sites in Table D-6 at different directions and distances from the inverter pads.**

Site Number	Pad	Direction to Inverter Face	Distance (ft)	Magnetic Field (mG)	Electric Field (Vm)
1	Setback		50	0.2	<5
1	Setback		100	0.4	5.0
1	Setback		150	<0.2	<5
1	NW	Parallel	.25	500	<5
1	NW	Parallel	10.25	10.5	<5
1	NW	Parallel	15.75	2.75	<5
1	NW	Parallel	150	0.2	<5
1	NW	Perpendicular	4	500	<5
1	NW	Perpendicular	8	200	<5
1	NW	Perpendicular	12	6.5	<5
1	NW	Perpendicular	150	0.5	<5
1	NE	Parallel	3.83	500	<5
1	NE	Parallel	7.67	30	<5
1	NE	Parallel	11.83	4.5	<5
1	NE	Parallel	150	0.2	10.0
1	NE	Perpendicular	7.5	500	<5
1	NE	Perpendicular	15	10	<5
1	NE	Perpendicular	22.5	2.1	<5
1	NE	Perpendicular	150	0.1	<5
2	-	Parallel	4	200	<5
2	-	Parallel	8	10	<5
2	-	Parallel	12	0.8	<5
2	-	Parallel	95	<0.2	<5
2	-	Perpendicular	4	500	<5
2	-	Perpendicular	8	25	<5
2	-	Perpendicular	12	4.5	<5
2	-	Perpendicular	150	<0.2	<5
3	-	Parallel	3	150	<5
3	-	Parallel	6	10	<5
3	-	Parallel	9	5.0	<5
3	-	Parallel	150	<0.2	<5
3	-	Perpendicular	3	500	<5
3	-	Perpendicular	6	200	<5
3	-	Perpendicular	9	80	<5
3	-	Perpendicular	150	0.4	<5

336 **Source:** Tech Environmental 2012.

337

338 **Tables D-7 and D-8** provide background EMF readings for a PV array system with measurements  
339 taken around the sites and three inverter pads (Tech Environmental 2012).340 **D.6 ELECTRIC AND MAGNETIC FIELDS ASSOCIATED WITH FACILITY**  
341 **OPERATIONS**342 Everything that runs on electricity or generates an electric spark has the potential to create EMFs.  
343 Depending upon the size and type of operating facility, they may have many of the power sources  
344 previously described in this appendix. They may have power lines, electrical substations, and  
345 transformers. EMF associated with these power lines, electrical substations, and transformers was

346 already addressed in **Section D.4**. This section focuses on magnetic fields associated with equipment  
 347 and operations not described earlier.

348 The following two tables from the NIEHS represent magnetic field exposures to workers in a wide  
 349 variety of occupations. The data reflect exposure to equipment similar to those that might be found in  
 350 the representative facilities described in this EA. **Table D-9** shows some EMF exposure data for  
 351 common work environments (NIEHS 2002). **Table D-10** provides data from the same reference but  
 352 different sources that show EMF spot measurements for similar work environments (NIEHS 2002). In  
 353 lieu of having measurements from specific pieces of equipment, these measurements reflect the  
 354 magnetic fields encountered by the workers using this equipment in their facilities in close proximity  
 355 to the magnetic flux density sources. Many of the industries and worker occupations shown in this  
 356 table are relevant to facilities and operations described in this EA.

357 **Table D-9. EMF measurements during a workday.**

Industry and occupation of workers	ELF magnetic fields (mG)	
	Median for occupation	Range for 90% of workers
<b>ELECTRICAL WORKERS IN VARIOUS INDUSTRIES</b>		
Electrical engineers	1.7	0.5 – 12.0
Construction electricians	3.1	1.6 – 12.1
TV repairers	4.3	0.6 – 8.6
Welders	9.5	1.4 – 66.1
<b>ELECTRIC UTILITIES</b>		
Clerical workers without computers	0.5	0.2 – 2.0
Clerical workers with computers	1.2	0.5 – 4.5
Line workers	2.5	0.5 – 34.8
Electricians	5.4	0.8 – 34.0
Distribution substation operators	7.2	1.1 – 36.2
Workers off the job (home, travel, other)	0.9	0.3 – 3.7
<b>TELECOMMUNICATIONS</b>		
Install, maintenance, and repair technicians	1.5	0.7 – 3.2
Central office technicians	2.1	0.5 – 8.2
Cable splicers	3.2	0.7 – 15.0
<b>AUTO TRANSMISSION MANUFACTURE</b>		
Assemblers	0.7	0.2 – 4.9
Machinists	1.9	0.6 – 27.6
<b>HOSPITALS</b>		
Nurses	1.1	0.5 – 2.1
X-ray technicians	1.5	1.0 – 2.2

358

359

**Table D-9. EMF measurements during a workday. (continued)**

Industry and occupation of workers	ELF magnetic fields (mG)	
<b>SELECTED OCCUPATIONS FROM ALL ECONOMIC SECTORS</b>		
Construction machine operators	0.5	0.1 – 1.2
Motor vehicle drivers	1.1	0.4 – 2.7
School teachers	1.3	0.6 – 3.2
Auto mechanics	2.3	0.6 – 8.7
Retail sales	2.3	1.0 – 5.5
Sheet metal workers	3.9	0.3 – 48.4
Sewing machine operators	6.8	0.9 – 32.0
Forestry and logging jobs	7.6	0.6 – 95.5 c

ELF = extremely low frequency – frequencies 3 to 3,000 Hz.

\* The median is the middle measurement in a sample arranged by size. These personal exposure measurements reflect the median magnitude of the magnetic field produced by the various EMF sources and the amount of time the worker spent in the fields.

\*\* This range is between the 5th and 95th percentiles of the workday averages for an occupation.

\*\*\* Chain saw engines produce strong magnetic fields that are not pure 60-Hz fields.

Source: NIEHS 2002.

360

361

**Table D-10. EMF spot measurements in the workplace.**

Industry and Sources	ELF magnetic fields (mG)	Comments	Other Frequencies
<b>Mechanical equipment used in manufacturing</b>			
Electric resistance heater	6,000 - 14,000	Tool exposures measured at operator's chest	VLF
Induction heater	10 - 460		High VLF
Hand-held grinder	3,000		
Grinder	110		
Lathe, drill press	1 - 4		
<b>Electro-galvanizing</b>			
Rectification room	2000 - 4,600	Rectified DC current (with an ELF ripple) galvanizes metal parts	High static fields
Outdoor electric line and substation	100 - 1,700		
<b>Aluminum Refining</b>			
Aluminum pot rooms	3.4 - 30	Highly rectified DC current (with an ELF ripple) refines aluminum	Very high static field
Rectification room	300 - 3,300		High static field
<b>Steel Foundry</b>			
Ladle refinery furnace active	170 - 1300	Highest ELF field was at the chair of control room operator	High ULF from the ladle's big magnetic stirrer
Ladle refinery furnace inactive	0.6 - 3.7		
Electro-galvanizing unit	2 - 1,100		High VLF
<b>Television Broadcasting</b>			
Video cameras (studio and minicam)	7.2 - 24	Measured 1 ft. away	VLF
Video tape degaussers	160 - 3,300		
Light control centers	10 - 300	Walk-through survey	
Studio and newsrooms	2 - 5		

362

363

**Table D-10. EMF spot measurements in the workplace. (continued)**

Industry and Sources	ELF magnetic fields (mG)	Comments	Other Frequencies
<b>Telecommunications</b>			
Relay switching racks	1.5 - 32	Measured 2 - 3 in. from relays	Static fields and ULF-ELF transients
Switching rooms (relay & electronic switches)	0.1 - 1,300	Walk-through survey	Static fields and ULF-ELF transients
Underground phone vault	3 - 5	Walk-through survey	
<b>Hospitals</b>			
Intensive care unit	0.1 - 220	Measured at nurse's chest	VLF
Post-anesthesia care unit	0.1 - 24		VLF
Magnetic resonance imaging (MRI)	0.5 - 280	Measured at technician's work locations	Very high static field, VLF and RF
<b>Government Offices</b>			
Desk work locations	0.1 - 7	Peaks due to laser printers	
Desks near power center	18 - 50		
Power cables in floor	15 - 170		
Computer center	0.4 - 6.6		
Can opener	3,000	Appliance fields measured 6 in. away	
Desktop cooling fan	1,000		
Other office appliances	10 - 200		
Building power supplies	25 - 1,800		
<b>Transportation</b>			
Cars, minivans, and trucks	0.1 - 125	Steel-belted tires principal ELF source	Frequencies less than 60 Hz
Bus (diesel powered)	0.5-146		Frequencies less than 60 Hz
Electric cars	0.1-181		Elevated static fields
Chargers for electric cars	4-63	Measured at 2 feet	
Electric buses	0.1-88	Measured at waist, at ankles 2-5 times higher	
Electric train passenger cars	0.1-330	Measured at waist, at ankles 2-5 times higher	25 and 60 Hz
Airliner	0.8-24.2	Measured at waist	400 Hz

364 **Key:** DC = direct current; ELF = extremely low frequency – 3 to 30 Hz; Hz = hertz; mG = milligauss; ULF =  
365 ultra low frequency - between 300 and 3,000 Hz; VLF = very low frequency – 3,000 – 30,000 Hz.

366 **Source:** NIEHS 2002.

367

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1 **APPENDIX E – REPRESENTATIVE FACILITIES**

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**Table of Contents**

4

5

6 E. APPENDIX E – REPRESENTATIVE FACILITIES ..... E-1

7 E.1 Introduction ..... E-1

8 E.2 Warehousing and Distribution..... E-7

9 E.2.1 Example A, Subarea - Manufactured Parts and Materials Distribution; Material

10 Handling; Packaging and Crating; and Logistics..... E-9

11 E.2.2 Example B, Subarea – Food and Agriculture; Refrigerated Warehousing and

12 Storage; Material Handling and Logistics ..... E-9

13 E.3 Research and Development ..... E-11

14 E.3.1 Example A, Subarea – Scientific Research; Computation; Biotechnology ..... E-12

15 E.3.2 Example B, Subarea – Scientific Research; Software; Computation; Energy ..... E-13

16 E.4 Technology and Manufacturing ..... E-14

17 E.4.1 Example A, Subarea – Defense Manufacturing; Sensor; Medical Device

18 Manufacturing..... E-14

19 E.4.2 Example B, Subarea – Advanced Materials Manufacturing ..... E-15

20 E.5 Food and Agriculture..... E-15

21 E.5.1 Example A, Subarea – Food Processing; Agricultural Products ..... E-15

22 E.5.2 Example B, Subarea – Wine Processing; Agricultural Products ..... E-15

23 E.6 Back Office..... E-16

24 E.6.1 Example A, Subarea – Call Center; Data Processing; Training ..... E-17

25 E.6.2 Example B, Subarea – Administrative Processing; Data Processing; Information

26 Technology; Professional Services; Training ..... E-17

27 E.7 Energy – General..... E-17

28 E.7.1 Energy - Subarea – Biofuels Manufacturing ..... E-17

29 E.8 Energy – Solar Farm..... E-18

30 E.8.1 Example A – Photovoltaic Energy Production..... E-22

31 E.8.2 Example B - Thermal Electric Dish Energy Production ..... E-23

32 E.9 Multi-Phased Development Site – Commerce Center, Phased Development Light

33 Multi-Use Industrial Business Park ..... E-24

34 E.10 References ..... E-26

35

36 **List of Figures**

37 Figure E-1. The Wallula Railex® facility in Burbank, WA showing larger 500,000 ft2 wine

38 services distribution center, the 220,000 ft2 food distribution warehouse, and the

39 2.5 mile loop railroad track..... E-10

40 Figure E-2. Railex® refrigerated rail cars inside the food distribution warehouse. .... E-10

41 Figure E-3. Railex® food distribution warehouse with train starting to enter warehouse with  
 42 truck loading docks. .... E-11

43 Figure E-4. The Railex® Wallula facility showing proposed rail infrastructure and future  
 44 expansions. .... E-11

45 Figure E-5. NASA Langley Research Center, Hampton, VA is an example of an R&D facility. ... E-12

46 Figure E-6a and 6b. The U.S. Department of the Interior’s Brackish Groundwater National  
 47 Desalination Research Facility is another example of an R&D facility. The adjacent  
 48 ponds and tanks that are part of this facility are not visible in this photo. .... E-12

49 Figure E-7. Artist’s rendering of the Jackson Laboratory, Farmington, CT. .... E-13

50 Figure E-8. NREL RSF under construction showing the “lazy H” configuration. .... E-13

51 Figure E-9. National Renewable Energy Laboratory – Research Support Facility. .... E-14

52 Figure E-10. Open office area in the main wing of NREL’s RSF. .... E-14

53 Figure E-11. Example of a biofuels production facility. .... E-18

54 Figure E-12. Example integrated biofuels technology production facility. .... E-18

55 Figure E-13. Example of a single-axis PV array with two drive units (NREL 2008). .... E-22

56 Figure E-14. Example string inverter to convert DC into AC electricity. .... E-22

57 Figure E-15. SunCatcher® solar dish systems installed at Peoria, AZ for the 1.5-MW Maricopa  
 58 Solar Project with administrative and maintenance buildings in the background. .... E-23

59 Figure E-16. Maricopa Project showing the 60 SunCatcher® solar dishes with maintenance and  
 60 operations on the upper right, and the electrical substation out of the photo to the left. E-  
 61 24

62 Figure E-17. Artist’s rendition of the proposed Napa Commerce Center. .... E-24

63 Figure E-18. Napa Commerce Center Master Plan site layout. .... E-25

64 Figure E-19. Napa Commerce Center diagram from the use permit showing the projected tentative  
 65 phases of development. .... E-25

66

67 **List of Tables**

68 Table E-1. The representative target marketing industry examples and general use descriptions. .... E-2

69 Table E-2. General characteristics of the “Multi-Phased” and “Single-Phase Development”  
 70 representative facilities listed in Table E-1. .... E-6

71 Table E-3. General characteristics of the Solar Farm example facilities listed in Table E-1. .... E-19

72

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74

## E. APPENDIX E – REPRESENTATIVE FACILITIES

75

### E.1 INTRODUCTION

76

At this time, no specific end users or development proposals have been identified or proposed. To perform a meaningful analysis of environmental consequences, this environmental assessment (EA)

77

uses representative example industry facilities for each of the “target marketing industry” (TMI) categories (TRIDEC 2011a,

78

2011b). According to the Tri-City Development Council’s (TRIDEC’s) land request, these would be built and operated on

79

what would be single-industry “super sites” that in this EA are referred to as Single-Phase Developments. This EA also uses

80

one additional representative Multi-Phased Development example indicative of what might be built and operated on

81

TRIDEC’s “mega site.” Existing environmental analyses were used to obtain information about facility characteristics that are

82

necessary for environmental consequence analysis (e.g., footprint, infrastructure, utilities, emissions, construction of

83

buildings, projected workforce and traffic, water usage, and similar requirements). These were available for most of the

84

representative types. Some of these facilities are constructed and operated by commercial private-sector enterprises and details of

85

their construction or operation are not readily publicly available.

86

The facilities identified and used in this EA are not the only facilities that could be selected and are not inclusive of all

87

possible example types that could have been selected. They represent the types and intensities of impacts that might result

88

from full development of the facilities. Characteristics considered include total land area, building footprint, building

89

height, construction duration, number of construction and operations workers, and hours of operation.

90

The TMIs are presented in Chapter 2 (Figure 2-3) and basic information about the representative facilities is introduced in

91

**Table 2-1**, “Representative Target Marketing Industry and Solar Technology Example Facilities” and shown below in **Table E-1**.

92

The table shows the TMI category, the subarea or subareas for which the representative facilities are examples, the general type

93

of operation, the representative facility name, and a brief general use description of the facility.

94

This appendix presents more detailed information about these facilities and linkages to web-based information about them necessary for the resource-by-resource area analysis of environmental

95

consequences. **Table E-2** provides general site characteristics for the facilities described in this appendix.

96

#### Disclaimer:

By selecting these facilities as representative for this EA, DOE in no way recommends or endorses these companies or their products. DOE also is not implying these companies or their operations are being considered for or are interested in building on the Hanford Site conveyance lands.

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114 **Table E-1. The representative target marketing industry examples and general use descriptions.**

Target Marketing Industry Category	Subarea(s)	Type of Operation / Facility	Representative or Example Facility	General Use Description
Multi-Phased Development				
Warehousing and Distribution; Food and Agriculture; Back Office	Food and Agriculture; Refrigerated Warehousing and Storage; Packaging and Crating; Wine Processing; Food Processing; Administrative Processing; Information Technology	Commerce Center - Phased Development Light Multi-Use Industrial Business Park	NAPA Commerce Center, CA.	This business park includes professional and business offices, manufacturing and assembly, warehousing and limited retail developed in phases. This facility will be developed in phases over a 20-year timeframe: Phase I - 650,000 ft <sup>2</sup> ; Phase IIA - 160,000 ft <sup>2</sup> ; Phase IIB - 460,000 ft <sup>2</sup> ; Phase IIC - 575,000 ft <sup>2</sup> ; Phase IID - 500,000 ft <sup>2</sup> ; and Phase IIE - 350,000 ft <sup>2</sup> . Phase I of this multi-phase development would be developed with all the single-phase developments.
Single-Phase Developments				
Warehousing and Distribution - A	Manufactured Parts and Materials Distribution; Material Handling; Packaging and Crating; and Logistics	Manufactured Parts Distribution Center	NAPA Auto Parts Distribution Center, Ontario, CA	This facility supplies replacement parts, specialty parts and equipment for the automotive repair, collision, heavy-duty truck, and industrial markets.

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116 **Table E-1. The representative target marketing industry examples and general use descriptions.**  
 117 **(continued)**

Target Marketing Industry Category	Subarea(s)	Type of Operation / Facility	Representative or Example Facility	General Use Description
Warehousing and Distribution - B	Food and Agriculture; Refrigerated Warehousing and Storage; Material Handling; and Logistics	Storage and Rail Distribution Center	Raillex Distribution Center, Port Wallula, WA	This facility provides for storage and rail distribution across the USA of fruits, vegetables, and other temperature sensitive cargo to CA, NY, IL, and FL. This facility currently has a 500,000 ft <sup>2</sup> wine distribution warehouse and 210,000 ft <sup>2</sup> food distribution warehouse. There is a planned Phase 2 addition of over 1M ft <sup>2</sup> and additional track. This facility currently receives 2-55 railcar units per week with each shipping about 8 million lbs of produce shipped to east coast.
Research and Development - A	Scientific Research; Computation; Biotechnology	Biological R&D Center	Jackson Laboratory for Genomic Medicine, U Connecticut	The facility has flexible laboratory spaces, computational biology areas, scientific support services, data processing center, private offices, auditorium, conference rooms, media training areas and administrative offices.
Research and Development - B	Scientific Research; Software; Computation; Energy	Energy R&D Center	NREL Research Support Facility, Golden, CO	This facility is a LEED Platinum living laboratory for conducting research in energy efficiency and renewable energy. The building is a Net-Zero facility with a roof-mounted Photovoltaic array providing electricity to the facility.
Technology and Manufacturing - A	Defense manufacturing; Sensor; Medical Device Manufacturing	Electronics Equipment Manufacturing	John Deere Electronic Solutions, Fargo, ND	This facility manufactures navigational, measuring, electromedical, and control instruments. The company focuses on developing highly reliable, ruggedized electronic products to withstand harsh physical and electrical environments.
Technology and Manufacturing - B	Advanced Materials Manufacturing	Light Industrial	Rainesville Technology, Rainesville, AL	This facility does injection molding, painting, and assembly of automotive parts. Manufactures injection molded rubber and plastic products, glass injection moldings, and natural gas production services.
Food and Agriculture - A	Food Processing; Agricultural Products	Vegetable Food Processing	Keystone Potato Products, Frailey Township, PA	This facility takes locally grown fresh potatoes, washes them, and then cuts and cooks them. Burners are fired with methane from garbage decomposition or propane as necessary. Co-generation plant excess steam is used to run driers, peelers and blanchers. The products are mainly dehydrated potato flakes and flour that are shipped and distributed to retailers.

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119 **Table E-1. The representative target marketing industry examples and general use descriptions.**  
 120 **(continued)**

Target Marketing Industry Category	Subarea(s)	Type of Operation / Facility	Representative or Example Facility	General Use Description
Food and Agriculture - B	Wine Processing; Agricultural Products	Wine/Spirits Processing	Beringer Wine Estates, NAPA, CA	This facility has wine storage and warehousing, wine production, grape crushing, blending, bottling and shipment. The Beringer EIR evaluated...the 218-acre site with 1,167,590 ft <sup>2</sup> of floor space for wine storage and warehousing, 60,000 ft <sup>2</sup> of office space and 196,000 ft <sup>2</sup> for wine production, such as grape crushing, blending, bottling and associated areas. The approved development plan also included parking for 350 vehicles, site grading, and installation of wastewater treatment ponds and planting of vineyards on the western portion of the site.
Back Office - A	Call Center; Data Processing; Training	National Call Center	Sykes Enterprises Call Center, Fayetteville, NC	This facility uses telephone communications and data processing computers to provide service to customers.
Back Office - B	Administrative Processing; Data Processing; Information Technology; Professional Services; Training	Automatic Data Processing Center	ADP Inc., Dearborn, MI	This facility provides human capital management solutions including payroll services, human resource management, benefits administration, talent management, time and attendance, retirement services, and insurance services for small, mid-sized and large businesses. This facility has a 7,500 ft <sup>2</sup> computer room, employee cafeteria, self-contained back-up generator and support areas.
Energy	Biofuels Manufacturing	Biorefinery and Feedstock Processing Facility	Energem Corporation, Pontotoc, MS	This facility is a Heterogeneous Feed Biorefinery (HFB) and Materials Recovery Facility (MRF) in Pontotoc, Mississippi, that uses the biomass fraction of municipal solid waste and cellulosic material as feedstock to produce commercial ethanol. The buildings and equipment include a Gasification island, Methanol production island, Ethanol production island, Methanol compressor shed, Chiller shed, Waste water building, Feedstock storage building, Cooling tower, Motor Control Center, Heat Exchanger shed, Production Storage Tanks, Office Building, Oxygen Storage Area, and Nitrogen Storage Area

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122 **Table E-1. The representative target marketing industry examples and general use descriptions.**  
 123 **(continued)**

Target Marketing Industry Category	Subarea(s)	Type of Operation / Facility	Representative or Example Facility	General Use Description
Solar Farm				
Solar Technology A	Photovoltaic Energy Production	Electrical Production Facility	Blythe Mesa Solar Project, Riverside County, CA	This electric production facility uses single-axis PV panels that would be connected to the electrical grid. The PV cells convert sunlight into electricity by the sun's light exciting electrons in the panel's material producing an electrical current. Many panels are connected together into arrays. The single-axis rotation follows the sun's path from morning to evening.
Solar Technology B	Thermal Electric Dish Energy Production	Electrical Production Facility	Calico Solar Project, San Bernardino, CA	This facility uses thermal electric parabolic-mirror dishes each with a turbine engine to generate electrical energy. Each dish focuses the sun's energy on the turbine engine causing gas/liquid to expand and drive the turbine. The turbines motion generates electricity that is collected at substations on site and then connected to the electrical power grid. This is also referred to as concentrated solar power (CSP). CSP technology is no longer under consideration but was part of the original analysis for the Draft EA.

124 **Key:** ft = feet; HFB = Heterogeneous Feed Biorefinery; LEED = Leadership in Energy and Environmental  
 125 Design; MRF = Materials Recovery Facility; PV = photovoltaic; R&D = research and development.  
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**Table E-2. General characteristics of the “Multi-Phased” and “Single-Phase Development” representative facilities listed in Table E-1.**

	Phased Development	Warehousing and Distribution		Research & Development		Technology & Manufacturing		Food & Agriculture		Back Office		Energy
	Multi-Use Industrial Business Park	A	B	A	B	A	B	A	B	A	B	Biorefinery & Feedstock Processing Facility
	Napa Commerce Center, Napa, CA	NAPA Auto Parts Distribution Center, Ontario, CA	Raillex Distribution Center, Wallula, WA	Jackson Laboratory for Genomic Medicine, Farmington, CT	NREL Research Support Facility, Golden, CO	John Deere Electronic Solutions, Fargo, ND	Rainesville Technology, Rainesville, AL	Keystone Potato Products, Frailey Township, PA	Berenger Wine Estates, Napa, CA	Sykes Enterprises Call Center, Fayetteville, NC	ADP Inc., Dearborn, MI	Energem Corporation, Pontotoc, MS
Total Land Area (acres)	180	10	30	17	29	30	50	83	218	5	6	31
Buildings	16	1	2	1	1	1	1	1	Many	1	1	14
Building Stories	1 & 2	1 & 2	1 & 2	4	3	2	1 & 2	1	1 & 2	2	2	Multi-Story
Approximate Height of Buildings (ft)	40	40	40	80	60	40	40	20	40	40	40	10 to 115
Gross Area of Buildings (gross ft <sup>2</sup> )	2,650,000	200,000	710,000	190,000	222,000	95,000	200,000	51,000	1,500,000	50,000	85,000	61,000
Total Building Footprint (acres)	38	5	16	4	2	2	5	1	34	1	1	1
Construction Duration (months)	20-yr.	18	12	18	18	18	18	18	18	12	12	24
Paved Area (acres)	88	6	18	10	18	18	31	51	133	3	4	19

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**Table E-2. General characteristics of the “Multi-Phased” and “Single-Phase Development” representative facilities listed in Table E-1. (continued)**

	Phased Development	Warehousing and Distribution		Research & Development		Technology & Manufacturing		Food & Agriculture		Back Office		Energy
		A	B	A	B	A	B	A	B	A	B	
	Multi-Use Industrial Business Park											Biorefinery & Feedstock Processing Facility
	Napa Commerce Center, Napa, CA	NAPA Auto Parts Distribution Center, Ontario, CA	Railx Distribution Center, Wallula, WA	Jackson Laboratory for Genomic Medicine, Farmington, CT	NREL Research Support Facility, Golden, CO	John Deere Electronic Solutions, Fargo, ND	Rainesville Technology, Rainesville, AL	Keystone Potato Products, Frailey Township, PA	Berenger Wine Estates, Napa, CA	Sykes Enterprises Call Center, Fayetteville, NC	ADP Inc., Dearborn, MI	Enerkem Corporation, Pontotoc, MS
Impervious Land Area (acres)	117	8	24	14	24	24	41	67	177	4	5	16
No. of Employees (full time equivalents)	2,530	400	100	1,500	825	60	340	50	610	500	389	61
Hours of Operation (hours/days per week)	24/7	24/7	24/7	8/5	10/5	24/7	24/7	24/7	24/7	24/7	24/7	24/7

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**Key:** ft = feet.

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**Sources:** These data are largely from the respective facility information sources in the following sections with the following exceptions: Impervious land area is calculated in accordance with the procedure in the *User’s Guide for the California Impervious Surface Coefficients* (Washburn et al. 2010). Paved area acreage was calculated using the average of 60% of the total land as determined by *Impervious Surface Reduction Study* (City of Olympia 1995). Building stories are assumed to be approximately 20 feet each. Construction durations are either as given by the source or assumed based upon the general characteristics. The hours of operation are either as given or assumed based upon the general characteristics. Building footprint is based upon the gross square footage if a one-story building, one-half the gross square footage if a two-story building, or 26% of the total land area for a mixed one- and two-story facility (City of Olympia 1995). Many values are rounded since the number of significant digits is not important for this analysis.

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**E.2 WAREHOUSING AND DISTRIBUTION**

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Warehousing is the storage of goods. Traditional or “public warehousing” is generally understood to be storing a customer’s goods for a temporary period of time. However, in the context of this EA, it is not a “static” storage but rather a multi-client high-velocity warehousing operation where customers have short-term or fluctuating space requirements to maintain inventory.

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(1) “Warehouse” means an enclosed building or structure in which finished goods are stored. A warehouse building or structure may have more than one storage room and more than one floor. Office space, lunchrooms, restrooms, and other space within the warehouse and necessary for the operation of the warehouse are considered part of the warehouse as are loading docks and other such space attached to the building and used for handling of finished goods. Landscaping and parking lots are not considered part of the warehouse. A storage yard is not a warehouse, nor is a building in which manufacturing takes place... (Revised Code of Washington [RCW] 82.08.820)

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157 Distribution is the receiving, storage, processing, and shipment of goods. Physically, warehousing  
158 and distribution centers are very similar in that they have walls, a roof, dock space, and truck doors. A  
159 distribution center also provides such services as transportation, cross-docking, order-fulfillment,  
160 labeling, and packaging along with whatever services are necessary to complete the order cycle,  
161 including order processing, order preparation, shipping, receiving, transportation, returned goods  
162 processing, and performance measurement.

163 (d) “Distribution center” means a warehouse that is used exclusively by a retailer  
164 solely for the storage and distribution of finished goods to retail outlets of the retailer.  
165 “Distribution center” does not include a warehouse at which retail sales occur...  
166 (RCW 82.08.820).

167 The different types of warehouses include:

- 168 • *Heated and unheated general warehouses*—provide space for bulk, rack, and bin storage,  
169 aisle space, receiving and shipping space, packing and crating space, and office and toilet  
170 space.
- 171 • *Refrigerated warehouses*—preserve the quality of perishable goods and general supply  
172 materials that require refrigeration. Includes freeze and chill space, processing facilities, and  
173 mechanical areas,
- 174 • *Controlled humidity warehouses*—similar to general warehouses except that they are  
175 constructed with vapor barriers and contain humidity control equipment to maintain humidity  
176 at desired levels.

177 The TRIDEC TMI warehousing and distribution category subareas (all of which are included in the  
178 selected representative facilities) are listed below (TRIDEC 2011a, 2011b):

- 179 • Manufactured parts and materials distribution
- 180 • Food and agricultural
- 181 • Refrigerated warehousing and storage
- 182 • Material handling
- 183 • Packaging and crating
- 184 • Logistics.

185 An example of a distribution warehouse facility and the site layout can be found at  
186 <http://www.phoenixrealty.net/northport/> (Newmark Grubb 2015). In the online photos, there are 37  
187 docking bays where semi-trailers back up for loading and unloading. The site layout is indicative of  
188 the parking and road areas needed for warehousing and distribution facilities.

189 All distribution centers have three main areas and may have additional specialized areas. The three  
190 main areas are the receiving dock, the storage area, and the shipping dock. In small organizations, it is  
191 possible for the receiving and shipping functions to occur side by side, but in large centers, separating  
192 these areas simplifies the process. Many distribution centers have dedicated dock doors for each store  
193 in their shipping area. The receiving area can also be specialized based on the handling characteristics  
194 of freight being received, on whether the product is going into storage or directly to a store, or by the  
195 type of vehicle delivering the product.

196 **E.2.1 Example A, Subarea - Manufactured Parts and Materials Distribution; Material**  
197 **Handling; Packaging and Crating; and Logistics**

198 This facility is the National Auto Parts Association (NAPA™) Auto and Truck Parts in Ontario, CA.  
199 NAPA™ is an automotive and truck replacement parts and accessories retailer that operates over 60  
200 distribution centers across the U.S. The description is for the renovation of an existing NAPA  
201 warehouse facility. The warehouse retrofit required removing existing floor sealer, prepping the slab,  
202 installing new densifying product, and polishing the floor. The contractor cut-in and installed five  
203 hydraulic dock levelers, and a back-up generator, as well as patched and painted the building's  
204 exterior surfaces and roof. The project required the build-out of a new retail store, hazardous rooms  
205 (International Building Code H3/H4), and an aerosol room. The 197,000 ft<sup>2</sup> facility has 25 loading  
206 docks and employs about 60 workers with an inventory of about \$11 million (DeLoach 2013).

207 The existing office area was demolished for the construction of new interior offices. The new office  
208 area included cubicle farms, executive offices, a training room with accordion partitions, a  
209 kitchenette, restrooms, lockers, and indoor/outdoor break rooms. The site work involved the  
210 installation of a new driveway as well as additional parking spaces and landscaping. More  
211 information and photos of this facility can be found in the appendix references (DeLoach 2013;  
212 Oltmans 2014; PMA 2015).

213 **E.2.2 Example B, Subarea – Food and Agriculture; Refrigerated Warehousing and Storage;**  
214 **Material Handling and Logistics**

215 This facility is the Wallula Railex® facility in Burbank, WA, built in 2013 on 182 acres of heavy-  
216 industrial zoned land located adjacent to the Union Pacific Railroad mainline. **Figure E-1** below  
217 shows the Railex® Wine Services warehouse facility in the middle of the photo and the Railex® food  
218 distribution facility below (Gerola 2014).

219 The following description comes largely from Tri-City Herald articles (Pihl 2013, 2014; Hulse 2014).  
220 The Railex Wine Services facility is 500,000 ft<sup>2</sup> of temperature- and humidity-controlled warehouse  
221 and distribution with the capacity to hold on the order of five to six million cases of wine. The wine  
222 facility is the equivalent of 11 football fields under one roof.

223 Four trains a week currently transport produce (apples, onions, and frozen vegetables) from the  
224 Wallula food distribution facility to New York. One train carries about eight million pounds of  
225 produce in refrigerated, temperature-controlled freight cars (see Figure E-2).

226 The Railex® train drives through the Wallula food distribution facility which has (Railex 2010):

- 227 • 225,000 ft<sup>2</sup> of refrigerated space
- 228 • 17,500 racked pallet positions
- 229 • 6 separate computer controlled temperature zones
- 230 • 19 enclosed refrigerated rail docks
- 231 • 38 refrigerated truck doors (see Figure E-2)
- 232 • Fully integrated radiofrequency enabled Warehouse Management System
- 233 • Products loaded and unloaded from freight cars inside the warehouse
- 234 • 2 1/2 mile rail loop track on property (see aerial photo, Figure E-1).

235 Each Railex® train uses 55-car refrigerated unit freight cars that are the equivalent of 200 trucks per  
236 week (Kuntz 2006) (see Figures E-2 and E-3). Four trains per week are the equivalent of over 800  
237 trucks per week. More information and photos of this facility can be found in the appendix references

238 (Gerola 2014; Hulse 2014; Kuntz 2006; Nall 2013; Pihl 2013, 2014; Port of Walla Walla 2006, 2014;  
239 Railex 2010).

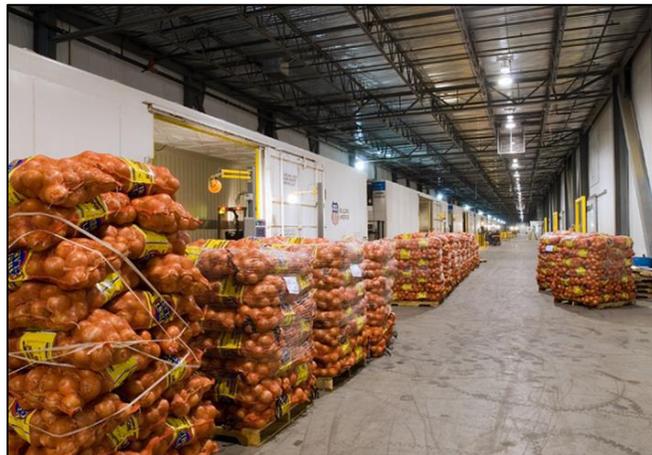
240 **Figure E-1. The Wallula Railex® facility in Burbank, WA showing larger 500,000 ft<sup>2</sup> wine**  
241 **services distribution center, the 220,000 ft<sup>2</sup> food distribution warehouse, and the 2.5 mile loop**  
242 **railroad track.**



Source: Gerola 2014.

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**Figure E-2. Railex® refrigerated rail cars inside the food distribution warehouse.**



Source: Gerola 2014.

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**Figure E-3. Railex<sup>®</sup> food distribution warehouse with train starting to enter warehouse with truck loading docks.**



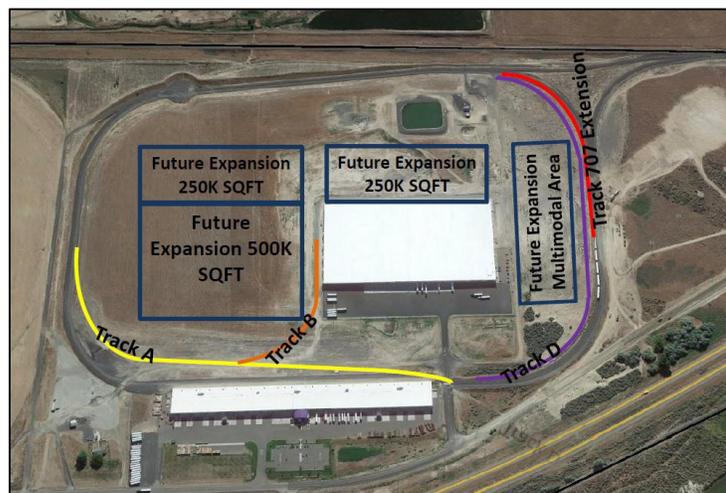
Source: Kuntz 2006.

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The Port of Walla Walla plans to add an additional 8,300 linear feet of new rail, rail switching equipment, and gravel service roads to accommodate the additional produce shipments for future expansion. **Figure E-4** shows the possible expansion areas for the Railex<sup>®</sup> facilities accounting for over a million ft<sup>2</sup> of additional buildings, parking areas, and multi-modal storage along with the potential location of additional track.

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**Figure E-4. The Railex<sup>®</sup> Wallula facility showing proposed rail infrastructure and future expansions.**



Source: Gerola 2014.

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### E.3 RESEARCH AND DEVELOPMENT

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Product research and development (R&D) is an activity performed by a team of professionals working to transform a product idea into a technically sound and promotable product. Corporate R&D departments are generally responsible for product development and testing, researching brand names, and creating an effective packaging concept. There is no unique description or characteristic of an R&D facility since R&D can apply to almost any business endeavor. TRIDEC’s vision of the types of

271 R&D facilities that would be built on conveyed lands would be in the following category subareas  
 272 (the two selected representative facilities include those subareas in bold) (TRIDEC 2011a, 2011b):

- 273 • **Scientific research**
- 274 • **Software**
- 275 • Data security
- 276 • **Computation**
- 277 • **Energy**
- 278 • Environmental
- 279 • **Biotechnology.**

280 The first category subarea (scientific research) is very generic in that it could include almost any area  
 281 of research. The next three category subareas would take place largely in structures that appear more  
 282 like college buildings or office-type buildings that would house electronics/computer laboratories and  
 283 might have sophisticated computer systems beyond the standard desktop personal computers. The last  
 284 three category subareas might have building structures that would include both office-type and light-  
 285 industrial facility buildings including biological or chemical laboratories. **Figures E-5** and **E-6** are  
 286 general examples of what these types of facilities might look like.

287 **Figure E-5. NASA Langley Research Center, Hampton, VA is an example of an R&D facility.**



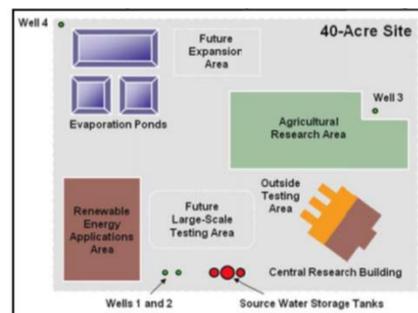
Source: GSA 2014.

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**Figure E-6a and 6b. The U.S. Department of the Interior’s Brackish Groundwater National Desalination Research Facility is another example of an R&D facility. The adjacent ponds and tanks that are part of this facility are not visible in this photo.**



Source: DOI 2013.



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**E.3.1 Example A, Subarea – Scientific Research; Computation; Biotechnology**

298 This facility is the Jackson Laboratory for Genomic Research, a Leadership in Energy and  
 299 Environmental Design (LEED®) Gold multi-story 183,500 ft<sup>2</sup> facility in Farmington, CT. It opened in

300 October 2014 on a 17-acre site on the south lower level of the University of Connecticut Health  
301 Center Campus. Initially this site hired 115 researchers, and about 40 of them were already CT  
302 residents. It is expected that the facility will create 300 jobs in the new facility and an additional 331  
303 research-related jobs on the Health Center Campus. About 842 construction jobs were created during  
304 construction with an estimated 6,200 spinoff and indirect jobs (Kable 2013). The budget for research  
305 and facilities over a 20-year period is expected to be about \$1.1 billion (Kable 2013). **Figure E-7**  
306 shows and artist's rendering of the Jackson Laboratory after construction. More information and  
307 photos of this facility can be found in the appendix references (Benson 2013; CBIA 2012;  
308 DeFrancesco 2014; Harris 2014; Jackson Laboratory 2014, 2015; Kable 2013; Malloy 2011; Pilon  
309 2014; Schreier 2013; UConn Health 2015).

310 **Figure E-7. Artist's rendering of the Jackson Laboratory, Farmington, CT.**



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312 **Source:** Malloy 2011.

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### E.3.2 Example B, Subarea – Scientific Research; Software; Computation; Energy

315 This facility is the National Renewable Energy Laboratory's (NREL) Research Support Facility  
316 (RSF) in Golden, CO (see **Figures E-8** and **E-9**). The facility is a 360,000 ft<sup>2</sup> LEED® Platinum office  
317 building and is a showcase for energy efficiency and renewable energy technologies. It will house  
318 about 800 staff at NREL, but will be used by about 1,300. It cost about \$57.4 million to construct for  
319 a total of \$64 million with furnishings (NREL 2010) (see **Figure E-10**). More information and photos  
320 of this facility can be found in the appendix references (DOE 2012c; NREL 2009, 2010, 2014a,  
321 2014b).

322 **Figure E-8. NREL RSF under construction showing the “lazy H” configuration.**



323  
324 **Source:** NREL 2009.

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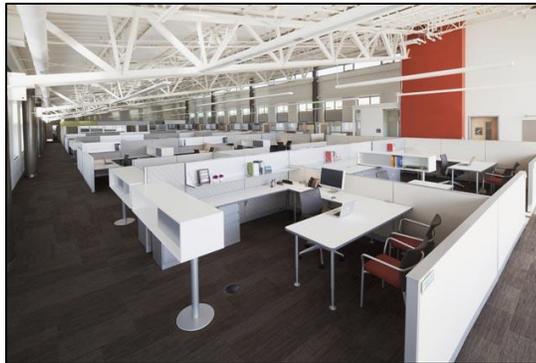
**Figure E-9. National Renewable Energy Laboratory – Research Support Facility.**



Source: NREL 2014b.

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**Figure E-10. Open office area in the main wing of NREL’s RSF.**



Source: NREL 2010.

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## **E.4 TECHNOLOGY AND MANUFACTURING**

335 This TMI category is focused mostly on the design and fabrication of mechanical/electronic devices.  
336 This technology could require, for example, printing of circuit boards, chemical etching/milling,  
337 metal finishing, anodizing, chromating, electro-polishing, and industrial wastewater treatment for  
338 hazardous materials. The TRIDEC TMI category subareas (the two selected representative facilities  
339 include those subareas in bold) are as follows (TRIDEC 2011a, 2011b):

- 340
- 341 • **Defense manufacturing**
  - 342 • **Sensor manufacturing**
  - 343 • **Medical device manufacturing**
  - 344 • Food processing machinery manufacturing
  - 345 • **Advanced materials manufacturing**
  - Carbon fiber manufacturing.

346 The Co-Operative Industries Aerospace & Defense Facility in Fort Worth, TX, and Bridger Photonics  
347 Inc. in Bozeman, MT, are examples of defense manufacturing facilities. Photos of these can be seen  
348 at their company websites (CIA&D 2011; BP 2015).

### **E.4.1 Example A, Subarea – Defense Manufacturing; Sensor; Medical Device Manufacturing**

350 This facility is John Deere Electronics Solutions Inc. (JDES) that was formerly their subsidiary  
351 known as Phoenix International. JDES specializes in design and manufacture of ruggedized  
352 electronics for John Deere and other original equipment manufacturers in industries that need their  
353 equipment to function under harsh electrical and physical environmental conditions.

354 JDES's state-of-the-art design and manufacturing technologies provides a wide range of robust  
355 products: electro-hydraulic controls; telematics communication and processing modules; color,  
356 graphical, and touchscreen displays; gauge/switch panels; and custom sensors designed to withstand  
357 severe temperatures, humidity, vibration and other harsh conditions. JDES also specializes in  
358 ruggedized power electronics that include electric drive controls from low-voltage, low-power ranges  
359 (1 to 10 kilowatts [kW]) up to heavy vehicle traction drives in high-voltage, high-power ranges (20  
360 kW to hundreds of kW).

361 JDES spent \$22 million on their 90,000 ft<sup>2</sup> building in Fargo, ND. More information and photos of  
362 this facility can be found in the appendix references (John Deere 2015a, 2015b; Reuer 2012; Vaughan  
363 2014).

#### 364 **E.4.2 Example B, Subarea – Advanced Materials Manufacturing**

365 This is the Rainsville Technology Inc. (RTI) facility in Rainsville, AL. A \$3.3 million expansion at  
366 their car parts facility added 30 jobs for DeKalb County and surrounding areas. RTI expanded the  
367 facility to 282,000 ft<sup>2</sup> to build more parts for an automobile plant in a nearby AL town. RTI makes  
368 plastic injection-molded parts, painting, and assembly of automotive parts. RTI manufactures  
369 injection-molded rubber and plastic products, and glass injection moldings; and has natural gas  
370 production services. More information and photos of this facility can be found in the appendix  
371 references (Benton 2012; Doster 2015; Guinn 2014; Moriroku Technology 2012).

### 372 **E.5 FOOD AND AGRICULTURE**

373 This TMI category is focused on agricultural processing operations. These operations commonly have  
374 separate areas for handling the raw food product, processing the food into a product, and, depending  
375 upon the food, aging, storage, and shipment/distribution. These generally require several buildings  
376 requiring the use of "chillers" to keep food spoilage to a minimum, water for cleaning and processing,  
377 heating/cooling for food processing and facility climate control, generate large quantities of by-  
378 product waste, and have correspondingly significant electrical usage. The TRIDEC TMI category  
379 subareas (the two selected representative facilities include those subareas in bold) are (TRIDEC  
380 2011a, 2011b):

- 381 • **Wine processing**
- 382 • **Food processing**
- 383 • **Agricultural products**
- 384 • Craft beer production.

#### 385 **E.5.1 Example A, Subarea – Food Processing; Agricultural Products**

386 This is the Keystone Potato Products facility in Frailey Township, PA. This facility takes locally  
387 grown fresh potatoes, washes them, and then cuts and cooks them. Burners are fired with methane  
388 from garbage decomposition or propane as necessary. Co-generation plant excess steam is used to run  
389 driers, peelers, and blanchers. The products are mainly dehydrated potato flakes and flour that are  
390 shipped and distributed to retailers. More information and photos of this facility can be found in the  
391 appendix references (Keystone Potato 2010; PR Newswire 2007; Sophy 2005).

#### 392 **E.5.2 Example B, Subarea – Wine Processing; Agricultural Products**

393 This facility is the Beringer Wine Estates Devlin Road Facility (City of American Canyon 2012).  
394 Napa County approved the construction of a 1,424,400 ft<sup>2</sup> multi-building facility on the eastern  
395 portion of the 218-acre site Napa Commerce Center (see **Section E.9**), parallel to existing Union

396 Pacific railroad tracks. The western portion of the site would be used for vineyards, wastewater  
397 treatment ponds to accommodate effluent generated by on-site wine production operations, and  
398 wetland preservation areas. Approved land uses and activities included 1,167,590 ft<sup>2</sup> of floor space  
399 for wine storage and warehousing, 60,000 ft<sup>2</sup> of office space and 196,810 ft<sup>2</sup> for wine production,  
400 such as grape crushing, blending, bottling, and associated areas. A total of 350 onsite surface parking  
401 spaces and truck and rail loading docks were included in the project. Maximum building height was  
402 approved at 43 feet. The facility would be served by the western and northern extension of Devlin  
403 Road from its present terminus at South Kelly Road (City of American Canyon 2012). More  
404 information and photos of this facility can be found in the appendix references (City of American  
405 Canyon 2012; Eichleay 2015; Valley Architects 2009).

## 406 **E.6 BACK OFFICE**

407 The back office TMI category refers to those personnel involved in administration, order processing,  
408 or customer service that are not generally seen by customers. These facilities are commercial office-  
409 type buildings that are heavily dependent upon communications (voice and internet), and computer  
410 equipment including desktop personal computers and servers connected both as local area networks  
411 and wide area networks connecting this back office facility to other facilities or operations that could  
412 be local or states or continents away. There would likely be a main building and, because of the need  
413 for communications/computers, a generator backup. Electrical, heating/cooling, water, waste  
414 generation, and other characteristics would be consistent with normal office buildings. The TRIDEC  
415 TMI category subareas (the two selected representative facilities include those subareas in bold) are  
416 (TRIDEC 2011a, 2011b):

- 417 • **Call centers**
- 418 • **Administrative processing**
- 419 • **Data processing**
- 420 • **Information technology**
- 421 • Remote sensing
- 422 • **Professional services**
- 423 • **Training.**

#### 424 **E.6.1 Example A, Subarea – Call Center; Data Processing; Training**

425 This facility is the Sykes Enterprises Call Center in Fayetteville, NC. Sykes offers customer contact  
426 management solutions and services in the business process arena. They provide these services  
427 primarily in the communications, financial services, healthcare, technology, travel, and retail  
428 industries. They provide multilingual order and payment processing, inventory control, product  
429 delivery, and returns handling (Sykes 2015). More information and photos of this facility can be  
430 found in the appendix references (City of Fayetteville 2012; Hoyle 2013; Sykes 2015).

#### 431 **E.6.2 Example B, Subarea – Administrative Processing; Data Processing; Information** 432 **Technology; Professional Services; Training**

433 This is the Automatic Data Processing Center in Dearborn, MI (**Figure E-32**). This facility provides  
434 human capital management solutions including payroll services, human resource management,  
435 benefits administration, talent management, time and attendance, retirement services, and insurance  
436 services for small, mid-sized, and large businesses. This facility has a 7,500 ft<sup>2</sup> computer room,  
437 employee cafeteria, self-contained back-up generator, and support areas. More information and  
438 photos of this facility can be found in the appendix references (ADP 2015; Baverman 2008; Olson  
439 2014; URS 2012; Warikoo 2014).

### 440 **E.7 ENERGY – GENERAL**

441 In the energy category, TRIDEC included four subareas (the selected representative facility includes  
442 the subarea in bold) that are very different (TRIDEC 2011a, 2011b). These are:

- 443 • Small modular reactors
- 444 • **Biofuels manufacturing**
- 445 • Solar testing facilities
- 446 • Smart grid.

447 While the small modular reactor subarea was identified on TRIDEC's 10 CFR Part 770 request,  
448 TRIDEC subsequently determined that this technology is not reasonably foreseeable at this time  
449 (Cary 2013). Solar technology is addressed in **Section E.8** of this appendix.

#### 450 **E.7.1 Energy - Subarea – Biofuels Manufacturing**

451 This facility is the Enerkem Heterogeneous Feed Biorefinery (HFB) and Materials Recovery Facility  
452 (MRF) in Pontotoc, MS. The HFB/MRF facility uses the biomass fraction of municipal solid waste  
453 and cellulosic material as feedstock to produce commercial ethanol. The facility converts mixed  
454 domestic waste and cellulosic residues into a pure synthesis gas (or syngas) that is suitable for the  
455 production of biofuels and chemicals using proven, well-established, and commercially available  
456 catalysts. With its proprietary technology platform, the company is able to chemically recycle the  
457 carbon molecules from non-recyclable waste to create a number of products including ethanol. The  
458 process reduces the volume of waste ultimately going into a landfill by more than 90% and, at the  
459 same time, extracts useful energy from the waste used as feedstock (DOE 2012d). More information  
460 and photos of this facility can be found in the appendix references (DOE 2010a, 2012d; Lane 2014;  
461 Nesseth 2014). Photos of an example biofuels facility are shown in **Figures E-11 and E-12**.

462 The buildings and equipment include a gasification island, methanol production island, ethanol  
463 production island, methanol compressor shed, chiller shed, waste water building, feedstock storage  
464 building, cooling tower, motor control center, heat exchanger shed, production storage tanks, office  
465 building, oxygen storage area, and nitrogen storage area.

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**Figure E-11. Example of a biofuels production facility.**

Source: EPA 2009.

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**Figure E-12. Example integrated biofuels technology production facility.**

Source: DOE 2015.

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474**E.8 ENERGY – SOLAR FARM**

475 The solar farm is not presented specifically to address the TMI categories but does fall within one of  
 476 the subareas. The TRIDEC TMI energy subareas (the subarea in bold is addressed by the solar farm  
 477 analysis) are (TRIDEC 2011a, 2011b):

- 478       • Small modular reactors  
 479       • Biofuels manufacturing  
 480       • **Solar testing facilities**  
 481       • Smart grid.

482 TRIDEC's proposal for a 300-acre solar farm addressed an interest in three specific solar technology  
 483 applications (see Chapter 2, **Section 2.2.2**) (the two in bold below are those represented by the solar  
 484 farm analysis):

- 485       • Photovoltaic fixed tilt  
 486       • **Photovoltaic single-axis tracking**

- 487 • Photovoltaic two-axis tracking or **thermal electric (“dish” style)**.

488 Basic information about the representative facilities is shown at the beginning of this appendix in  
 489 **Table E-1**. The table shows the TMI category, the subarea or subareas for which the representative  
 490 facilities are examples, the general type of operation, the representative facility name, and a brief  
 491 general use description of the facility. The solar farm representative facilities are shown as the last  
 492 two entries on **Table E-1**. General characteristics of the solar farm representative facilities are shown  
 493 on **Table E-3**.

494 **Table E-3. General characteristics of the Solar Farm example facilities listed in Table E-1.**

	Single-Axis Photovoltaic Solar		Thermal Electric "Dish" Solar	
Specifications	Example Facility - Blythe Mesa Solar Project, Riverside County, CA	FSA - 300-acre parcel projection	Example Facility - Calico Solar Project, San Bernardino, CA	FSA - 300-acre parcel projection
Total Land Area (acres)	3,360	300	6,215	300
Direct Land Usage (acres)	2,207	197	5,698	275
Construction Duration (months)	36	12	52	12
Impervious Land Area (acres)	12	4	517	25
Panels or Units	1,425,600 high efficiency silicon solar panels configured into blocks 660 ft wide and 470 ft long with each block comprising six trackers with 18 north-south oriented rows of PV panels (295 ft long and 140 ft wide). 310 - 1.5 MW solar arrays that are 7.12 acres each. There are 3 substations on 2.07 acres each. There are 3 O&M buildings on a total of 4.3 acres. There is one guard structure on 1.4 acres.	127,286 high efficiency silicon solar panels configured into blocks 660 ft wide and 470 ft long with each block comprising six trackers with 18 north-south oriented rows of PV panels (295 ft long and 140 ft wide), 28 - 1.5 MW solar arrays that are 7.12 acres each. There will be 1 substation on 2.07 acres. There are 2 O&M buildings on a total of 2.15 acres. There is one guard structure on 0.13 acres. Total building footprint about 2.28 acres or about 100,000 ft <sup>2</sup> .	34,000 SunCatcher® power generating systems organized into 1.5-MW solar groups of 60 SunCatchers® per group. Groups would be connected in series to create 3-, 6-, and 9-MW solar groups connected to overhead collection lines rated at 48 MW or 51 MW. Each SunCatcher is a 25-kW solar dish comprised of an array of curved glass mirror facets. There are about 5 SunCatchers® per acre.	The same as the Calico Solar Project except that there will be 1,640 SunCatcher® power generating systems. Total building footprint 214,000 ft <sup>2</sup> .

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**Table E-3. General characteristics of the Solar Farm example facilities listed in Table E-1. (continued)**

	Single-Axis Photovoltaic Solar		Thermal Electric "Dish" Solar	
Specifications	Example Facility - Blythe Mesa Solar Project, Riverside County, CA	FSA - 300-acre parcel projection	Example Facility - Calico Solar Project, San Bernardino, CA	FSA - 300-acre parcel projection
Structural layout	<p>The panels would be configured into trackers, and the trackers configured into blocks approximately 660 ft wide and 470 ft long. Each block comprises six trackers with 18 north-south oriented rows of PV panels (295 ft long and 140 ft wide) that rotate up to 45 degrees from east to west to track the sun (total number of rows is 35,640), with the center of rotation being approximately 4 to 8 ft above grade. Solar panels at an upright position would have a minimum clearance of 2 ft above the highest adjacent ground. Within each tracker, the rows of PV panels would be linked by a steel drive strut (295 ft long), which would be oriented perpendicular to the axis of rotation. A small 0.5 horsepower electric drive motor would move the strut back and forth. Torque tubes act as the horizontal support to the PV panels and are in turn supported by micro piles (15 to 20 ft long and having a 4.5 inch outer diameter), which are driven directly into the ground.</p>	<p>Same as the Blythe Mesa Solar Project.</p>	<p>Each SunCatcher<sup>®</sup> is 38 ft long x 38 ft wide and 40 ft high. There is one main services complex administration building (130 ft long x 70 ft wide x 14 ft high), one main services complex maintenance building (70 ft long x 70 ft wide x 14 ft high), two SunCatcher<sup>®</sup> assembly buildings (1,000 ft long x 100 ft wide x 78 ft high), 1 well-water and fire-water 220,000 gal storage tank 36 ft in diameter x 20 ft high), two demineralized 11,000 gal water tanks (10 ft in diameter and 10 ft high), one potable 5,000 gal water tank (40 ft in diameter and 20 ft high). All roads sealed with Soiltac<sup>®</sup> (polymeric sealant) for dust control.</p>	<p>The same as the Calico Solar Project.</p>

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**Table E-3. General characteristics of the Solar Farm example facilities listed in Table E-1. (continued)**

	Single-Axis Photovoltaic Solar		Thermal Electric "Dish" Solar	
Specifications	Example Facility - Blythe Mesa Solar Project, Riverside County, CA	FSA - 300-acre parcel projection	Example Facility - Calico Solar Project, San Bernardino, CA	FSA - 300-acre parcel projection
Other facility Information	Drive piers are driven 8 ft to 12 ft into the ground. Drive piers are about 19 ft apart. Multiple PV modules are connected to a combiner box. Multiple combiner boxes are connected to an inverter, and multiple inverters are connected to a medium-voltage transformer that is connected to a 34.5kV power line that connects to the electrical substation. Inverters and transformers are placed on a concrete equipment pad that is 12 ft wide and 30 ft long. The medium-voltage overhead poles are 54.5 ft tall. The three project substations (each approximately 300 ft long by 300 ft) would collect all the medium-voltage circuits and step up the voltage to 230 kV.	Same except for: The one project substations (approximately 300 ft long by 300 ft wide) would collect all the medium-voltage circuits and step up the voltage to 230 kV.		
Number of Employees (full time equivalents)	500 construction, 12 operation (1 plant manager, 5 engineering/technicians, 6 security)	166 construction (proportioned on construction time); 6 operation (1 plant manager, 2 engineering / technicians, 3 security) (based on minimum probable)	101 to 731 per month construction; 136 full-time for operation.	25 to 134 per month construction (proportioned on construction time); 7 full-time for operation (proportioned on acreage)
Paved Area (acres)	12	4	511	25
Hours of Operation (hours per day / days per week)	10/7	10/7	10/7	10/7
Electrical Generation (MW)	485	42	850	41

501 **Key:** FSA = Focused Study Area; ft = feet; gal = gallon; kV = kilovolt; kW = kilowatt; O&M = operations and  
502 maintenance; PV = photovoltaic; MW= megawatt.

503  
504 The solar farm characteristic projections are for the most part extrapolations based upon the ratio of  
505 the representative facility acreage to the solar farm’s 300-acre size. Construction duration is not a  
506 direct ratio calculation since some parts (like maintenance and operating facilities) would take the  
507 same amount of time regardless of overall acreage.

**508 E.8.1 Example A – Photovoltaic Energy Production**

509 This facility is the Blythe Mesa Solar Project, Riverside, CA. This electric production facility uses  
510 single-axis PV panels that would be connected to the electrical grid. The PV cells convert sunlight  
511 into electricity by the sun's light exciting electrons in the panel's material producing an electrical  
512 current. Many panels are connected together into arrays. The single-axis rotation follows the sun's  
513 path from morning to evening. **Figure E-13** shows an example single-axis tracking system. **Figure E-**  
514 **14** shows an inverter used to convert direct current (DC) to alternating current (AC) energy. More  
515 information and photos of this facility can be found in the appendix references (BLM 2014; Jacoby  
516 2014; Roth 2014).

517 **Figure E-13. Example of a single-axis PV array with two drive units (NREL 2008).**



518  
519 Source: NREL 2008.

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**Figure E-14. Example string inverter to convert DC into AC electricity.**



522  
523 Source: NREL 2013.

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525 **E.8.2 Example B - Thermal Electric Dish Energy Production (CSP technology is no longer under**  
526 **consideration but was part of the original analysis for the Draft EA.)**

527 This facility is the Calico Solar Project in San Bernardino, CA. This facility uses thermal electric  
528 parabolic-mirror dishes, each with a turbine engine to generate electrical energy. Each dish focuses  
529 the sun's energy on the turbine engine causing gas/liquid to expand and drive the turbine. The  
530 turbine's motion generates electricity that is collected at substations onsite and then connected to the  
531 electrical power grid. **Figures E-15** and **E-16** are photos from the already constructed Calico Solar  
532 Project in Peoria, AZ, but are the same type of solar dish and installation. More information and  
533 photos of this facility can be found in the appendix references (BLM 2010; CSP World 2012; DOE  
534 2010b).

535 **Figure E-15. SunCatcher® solar dish systems installed at Peoria, AZ for the 1.5-MW Maricopa**  
536 **Solar Project with administrative and maintenance buildings in the background.**

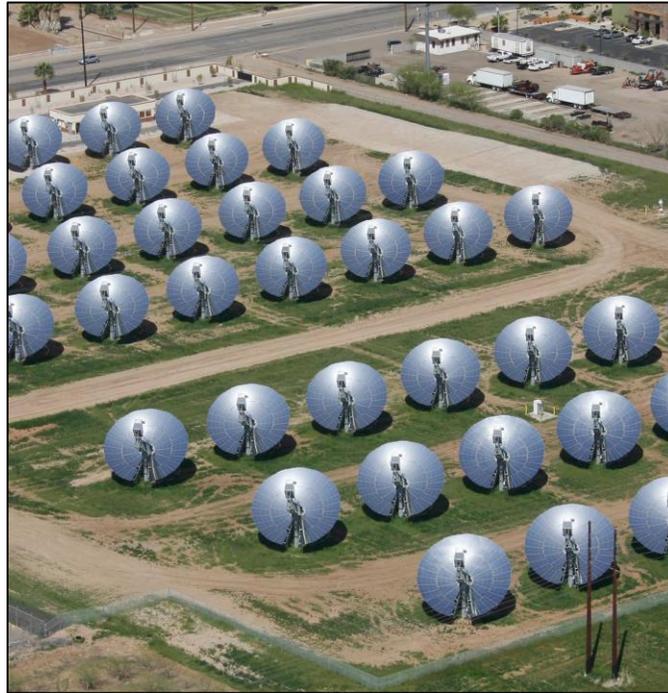


Source: DOE 2010b.

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**Figure E-16. Maricopa Project showing the 60 SunCatcher® solar dishes with maintenance and operations on the upper right, and the electrical substation out of the photo to the left.**



Source: NREL 2011.

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**E.9 MULTI-PHASED DEVELOPMENT SITE – COMMERCE CENTER, PHASED DEVELOPMENT LIGHT MULTI-USE INDUSTRIAL BUSINESS PARK**

547 This “Multi-Phased Development” is the Napa Commerce Center (**Figures E-17 and E-18**) that  
548 includes professional and business offices, manufacturing and assembly, warehousing and limited  
549 retail developed in phases. This facility will be developed in phases over a 20-year timeframe (see  
550 **Figure E-19**): Phase I - 650,000 ft<sup>2</sup>; Phase IIA - 160,000 ft<sup>2</sup>; Phase IIB - 460,000 ft<sup>2</sup>; Phase IIC -  
551 575,000 ft<sup>2</sup>; Phase IID - 500,000 ft<sup>2</sup>; and Phase IIE - 350,000 ft<sup>2</sup>. Phase I of this Multi-Phased  
552 Development would be developed with all the Single-Phase Developments. Most of the relevant  
553 information about this facility can be found in the Environmental Impact Report (City of American  
554 Canyon 2012).

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**Figure E-17. Artist’s rendition of the proposed Napa Commerce Center.**

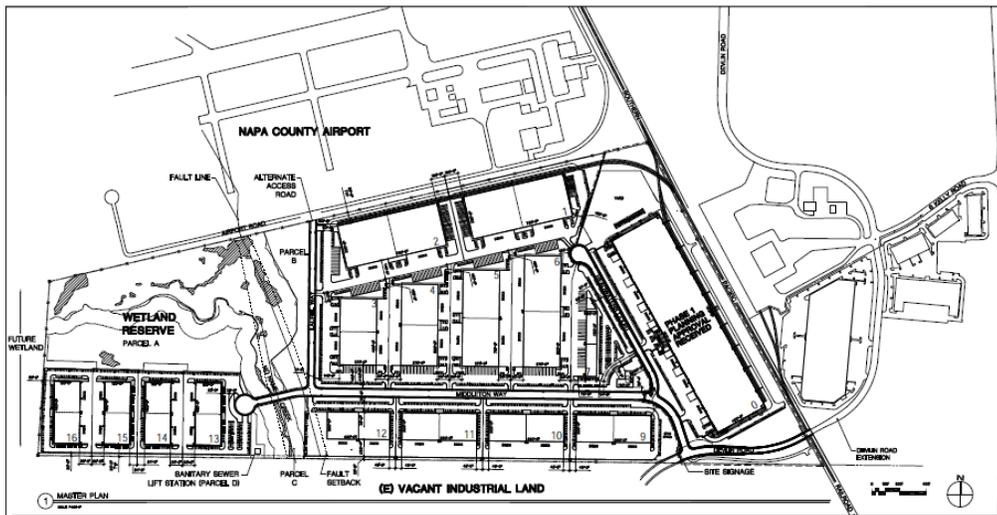


Source: City of American Canyon 2012.

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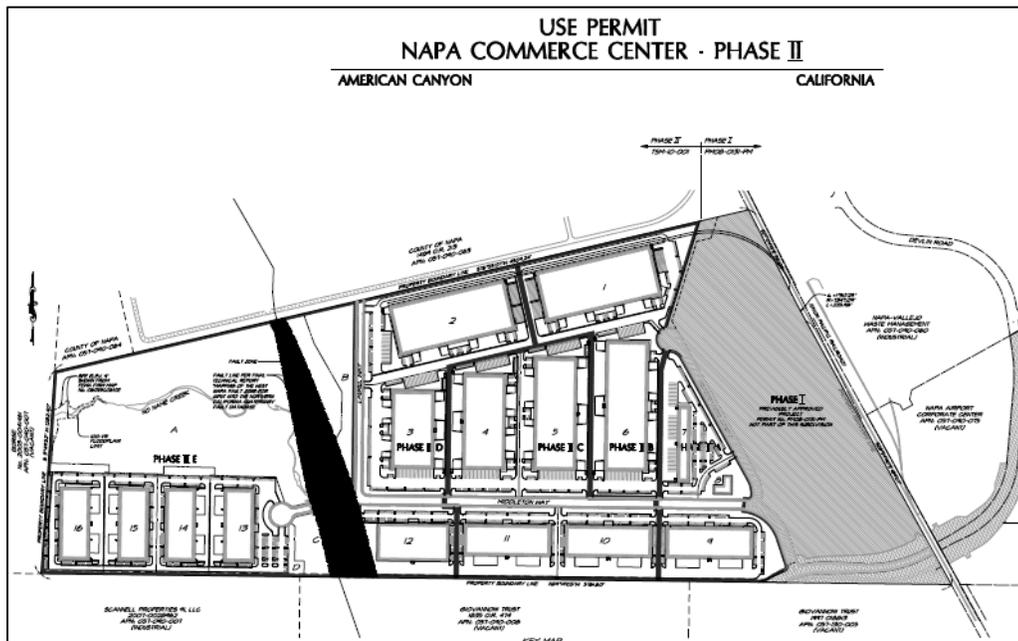
Figure E-18. Napa Commerce Center Master Plan site layout.



Source: City of American Canyon 2012.

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Figure E-19. Napa Commerce Center diagram from the use permit showing the projected tentative phases of development.



Source: City of American Canyon 2012.

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568 **E.10 REFERENCES**

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1 **APPENDIX F – RADIOLOGICAL ACCIDENTS**

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4 **Table of Contents**

5 F.1 General Background and Methodology..... F-1  
6 F.2 Analytical Assumptions..... F-3  
7 F.3 Comparative Radiological Risk..... F-5  
8 F.4 Results ..... F-5  
9 F.5 Emergency Response..... F-7  
10 F.6 References ..... F-9

11

12 **List of Tables**

13 Table F-1. Isotopics and Quantities for Hot Cell Spill Event in Building 324..... F-4  
14 Table F-2. Isotopics for postulated seismic event in Building 325. .... F-5  
15 Table F-3. Nominal Public Cancer Fatality Probability (LCFs) - Building 324 & 325 Events ..... F-5  
16 Table F-4. Estimated radiological accident consequences for Buildings 324 and 325. .... F-5  
17 Table F-5. Estimated accident event annual frequencies for Buildings 324 and 325..... F-6  
18 Table F-6. Estimated annual radiological risk ranges for Building 324 and 325 accidents. .... F-6

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## F. APPENDIX F – RADIOLOGICAL ACCIDENTS

23

### F.1 GENERAL BACKGROUND AND METHODOLOGY

24

25 For the purpose of this EA, an evaluation to fully characterize the postulated bounding radiological  
26 accident impacts that could exist in or near the FSA from nearby facility accidents was conducted.  
27 The purpose of this analysis is to address the postulated bounding radiological dose from  
28 events/accidents that could occur at the 324/325 buildings to a member of the public. A series of  
29 postulated bounding accident events were screened and ultimately evaluated for the 300 Area in  
30 support of the Proposed Action. Buildings 324 and 325 in the 300 Area were the focal points for the  
31 analysis given their co-location to the FSA, as well as the potential extent/quantity of their materials-  
32 at-risk (the gross inventory of radiological material that is susceptible to release from an accident  
33 event). The analysis was based on accident scenarios and source terms reported in previous Hanford  
34 Site safety documentation for these facilities, including the *Building 325 Radiochemical Processing  
35 Laboratory Documented Safety Analysis* (PNNL 2014) and *Dose Consequences from 324 Building  
Accidents to Support Land Transfer* (WCH 2014).

36

37 Nuclear safety documentation has a unique purpose as compared with environmental documentation.  
38 Nuclear safety documentation is developed to document postulated bounding scenarios for the  
39 purposes of designing safety systems and processes for activities at nuclear facilities. These  
40 documents are utilized to ensure conservative planning and operation of a facility, resulting in  
41 adequate protection of workers, public, and the environment. The nuclear safety documentation  
42 processes are highly conservative.

42

43 Nuclear safety protocols require evaluating the unmitigated accident scenarios for the purposes of  
44 designing highly conservative safety systems for work activities. Unmitigated accident scenarios and  
45 consequences are not considered reasonably foreseeable for the purposes of this EA. Hazards to the  
46 workers at the 324 and 325 buildings are controlled by safety management programs (e.g.,  
radiological protection, conduct of operations, industrial safety, etc.) and safety SSCs.

47

48 Related to the Proposed Action, hazards to the workers at the 324 and 325 buildings are controlled by  
49 safety management programs (e.g., radiological protection, conduct of operations, industrial safety,  
50 etc.) and safety SSCs. The information in this section addresses the postulated bounding radiological  
51 dose from events/accidents to a member of the public that could occur at the 324/325 buildings. A  
52 member of the public outside of DOE controlled activities and not trained in DOE emergency  
response requirements could hypothetically be subjected to the analyzed impacts.

53

54 One of the results of the nuclear safety documentation is the identification of safety SSCs required to  
55 be maintained operable to ensure adequate protection of the workers, public, and the environment.  
56 The nuclear safety documentation for Buildings 324/325 identifies safety SSCs that prevent or reduce  
57 the consequences to the public and the environment to a level of adequate protection. Adequate  
58 protection is defined as those measures that permit a facility to operate safely for its workers and the  
surrounding community.

59

60 As the phrase “adequate protection” indicates, it is not an absolute, but reflects the condition achieved  
61 when all necessary measures are being taken in a manner that is consistent with applicable  
62 requirements and regulatory processes. This is accomplished by identifying all hazards associated  
63 with facility operations and evaluating the dose consequences from events/accidents, assuming the  
safety SSC, where necessary, performs its intended function.

64 The following dose consequences and annual risk perspectives for Buildings 324 and 325 may be  
65 higher than reported in previous environmental documentation. The reason for this difference is that  
66 future remediation of the highly contaminated soil beneath the cell structure of Building 324 is now  
67 included in this analysis to ensure that the most conservative postulated bounding dose is considered.  
68 Remediation of this highly contaminated soil was not included in previous safety or environmental  
69 documentation because information about the level of contamination in the soil was not available at  
70 that time.

71 The accident analysis provides a conservative evaluation of a postulated bounding accident scenarios  
72 that could have the potentially highest impacts on members of the public in the Focused Study Area  
73 (FSA). For the 324 and 325 Buildings, respectively, the committed equivalent dose consequence (50  
74 yr) and risk from postulated bounding events/accidents are 0.18 rem/0.018 rem/yr (Building 324) and  
75 11.1 rem/0.11 rem/yr (Building 325). These doses are NOT expected, but are used for evaluating  
76 whether adequate protection has been achieved. Due to the conservatism in the accident evaluation  
77 methodology (e.g., conservative material at risk, and several orders of magnitude in dose consequence  
78 modeling, established an upper-bound to account for uncertainties) an expected dose from the hot cell  
79 powder spill and seismic event would be a small fraction of the 0.18 rem and 11.1 rem committed  
80 equivalent dose (50 year dose) for Buildings 324 and 325 respectively.

81 Building 324, a three-story building that covers approximately 102,000 square feet, was utilized  
82 between 1965 and 1996 to support research and development activities associated with material and  
83 chemical processing. DOE has been preparing for the demolition of Building 324 by stabilizing and  
84 preparing for the removal of five highly contaminated hot cells. The cells were built to allow Hanford  
85 personnel to work with highly radioactive materials without being exposed to significant levels of  
86 radiation. The greatest level of contamination is in a two-story hot cell called the Radiochemical  
87 Engineering Complex B-Cell.

88 Building 325, a two-story building that covers approximately 65,000 square feet, also known as the  
89 Radiochemical Processing Laboratory (RPL), was originally designed to provide space for  
90 radiochemical research to support Hanford projects and programs. Today, the RPL remains a fully  
91 operational facility of the Pacific Northwest National Laboratory (PNNL) where scientists and  
92 engineers conduct research related to national missions in environmental management, nuclear  
93 energy, nuclear non-proliferation, homeland-security, and science. RPL's underlying mission is to  
94 create and implement innovative processes in support of national priority areas. Some of the work  
95 taking place at the RPL involves advancements in the cleanup of radiological and hazardous wastes,  
96 processing and disposal of nuclear fuels, detection and forensics of nuclear material, and production  
97 and delivery of medical isotopes.

98 Washington Closure Hanford's 2014 Calculation/Report, *Dose Consequences from 324 Building*  
99 *Accidents to Support Land Transfer* (WCH 2014), was the primary reference utilized for estimating  
100 potential accident risks from Building 324, and PNNL's 2012 Calculation/Report, *Accident Analyses*  
101 *Scoping Analysis for the Potential TRIDEC Land Transfer* (PNNL 2012), was the primary reference  
102 utilized for estimating potential accident risks from Building 325.

103 Through a screening process, a number of distinct accident scenarios at the subject buildings were  
104 initially identified, with two ultimately determined to depict postulated bounding events: a hot cell  
105 powder spill event at Building 324, and a seismic event at Building 325. Accident risk values are not  
106 used in establishing safety or operational restrictions on the conveyed lands, but provide a perspective  
107 of potential public impacts.

108 For Building 324, the calculation report (WCH 2014) determined the radiological doses  
109 (consequences) that could result from potential releases of radioactive material to the atmosphere  
110 from the assessed hot cell powder spill event. The spill event is described as a container filled with  
111 contaminated soil/powder from beneath the B-Cell part of the 324 Building that spills its contents  
112 onto the airlock floor resulting in a release of contamination to the atmosphere.

113 For Building 325, the calculation report (PNNL 2012) determined the radiological doses  
114 (consequences) that could result from potential releases of radioactive material to the atmosphere  
115 from the assessed seismic event. The seismic event causes uncontained, dispersible material to  
116 become airborne as a direct result of the shaking and vibratory motion associated with the event. It  
117 also causes upset conditions such as spills, drops, or breach of glove boxes/containers that result in  
118 confined or normally non-dispersible material being released.

119 The analysis of this seismic event also identifies the area over which exposures could exceed 5 rem.  
120 A portion of this area overlaps the FSA. Nuclear safety protocols would require establishing  
121 additional protective features not currently available at Building 325 for dose consequences  
122 exceeding 5 rem. To provide for continued public safety and cost effective management of current  
123 and future operations, DOE would establish a Controlled Area and maintain it within the PAAL  
124 lands. This area would be comprised of a total of 188 acres (see Figure 3-15).

## 125 F.2 ANALYTICAL ASSUMPTIONS

- 126 • For a hot-cell powder spill release scenario at Building 324, a gross plume duration of 0.5  
127 hours (1,800 seconds) is assumed; for the seismic scenario at Building 325, a plume duration  
128 of 15 minutes (900 seconds) is assumed for plutonium-239 equivalence (Pu-239E) and 3  
129 minutes (180 seconds) for tritium equivalence (H-3E) (WCH 2014; PNNL 2012).
- 130 • For the Building 324 model a member of the public is assumed to be exposed to a full release  
131 duration, without any protection, located at a distance of approximately 600 meters due west  
132 of Building 324. (WCH 2014; DOE 2014).
- 133 • A Building 325 member of the public is assumed to be exposed to a full release duration,  
134 without any protection, located at a distance of approximately 587 meters to the northwest of  
135 Building 325 (PNNL 2012).
- 136 • Consequences for potential receptors as a result of plume passage were determined without  
137 regard for emergency response measures and, therefore, are more conservative than those that  
138 might actually be experienced if evacuation and sheltering occurred (Chanin and Young  
139 1997; DOE 2004).
- 140 • It was assumed that potential receptors would be fully exposed in fixed positions for the  
141 duration of plume passage, thereby maximizing their exposure to a plume (Chanin and Young  
142 1997; DOE 2004).
- 143 • A total source term gross inventory of 65,000 curies (Ci) (2.405E15 becquerels [Bq]) was  
144 assumed for the Building 324 powder spill, reduced by the airborne release fraction of 4.2E-  
145 03, yields a net source term total of 273 Ci (1.010E+13 Bq) for this case. The isotopic  
146 breakdown thereof is presented below in **Table F-1** (WCH 2014; WCH 2013).

147

**Table F-1. Isotopics and Quantities for Hot Cell Spill Event in Building 324.**

<b>Radionuclide</b>	<b>Becquerels (Bq)</b>	<b>Curies (Ci)</b>
Co-60	9.40E+08	2.54E-02
Se-79	2.02E+06	5.46E-05
Sr-90	3.51E+12	9.47E+01
Tc-99	6.92E+07	1.87E-03
Cs-137	6.53E+12	1.76E+02
Eu-154	1.31E+10	3.55E-01
Eu-155	1.02E+10	2.75E-01
Pu-238	2.01E+09	5.42E-02
Pu-239	6.09E+08	1.65E-02
Pu-240	5.99E+08	1.62E-02
Pu-241	2.99E+10	8.08E-01
Pu-242	9.95E+05	2.69E-05
Am-241	8.81E+09	2.38E-01
Cm-243	5.59E+07	1.51E-03
Cm-244	3.89E+09	1.05E-01
<b>TOTAL</b>	<b>1.010E+13</b>	<b>2.73E+02</b>

148

**Sources:** WCH 2013, 2014.

149

- The net source terms provided in **Table F-2** were used for modeling the seismic scenario in Building 325. Pu-239E is used to represent radioactive materials in solid, solution, or particulate forms, and H-3E is used to represent radioactive materials in gaseous or volatile forms. This permits the accident analysis to be generically depicted in terms of these two radionuclides, although other radionuclides may be involved (PNNL 2012).

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**Table F-2. Isotopics for postulated seismic event in Building 325.**

Event/Radionuclide	Becquerels (Bq)	Curies (Ci)
<b>Seismic</b>		
Pu-239E	3.497E+10	0.945
H-3E	7.400E+15	200,000

155

**Source:** PNNL 2012

156

**Key:** Pu-239E = plutonium-239 equivalence; H-3E = tritium equivalence.

157

158

**F.3 COMPARATIVE RADIOLOGICAL RISK**

159

Radiological risk values provide a simplified method to compare risks from radiation dose to other types of human health risks. For determining the following table, the Committee on Interagency Radiation Research and Policy Coordination (CIRRPC 1992) conversion factor of  $6 \times 10^{-4}$  fatal cancers per rem was used to determine the nominal cancer fatality probability resulting from this set of accident analyses. This risk value provides for comparative mortality estimates of risk from radiation dose to members of the general public. Note that the determination of these comparative radiological risk values does not reflect actual human health risk, but are presented for comparative information only.

166

167

**Table F-3. Nominal Public Cancer Fatality Probability (LCFs) - Building 324 & 325 Events.**

<u>Event</u>	<u>Probability of an LCF (per person)</u>
324 – Hot Cell Powder Spill –approximately 600 meters to the west	$1.1 \times 10^{-4}$
325 - Seismic: approximately 587 meters to the northwest (Stevens Drive and eastern FSA border)	$6.7 \times 10^{-3}$
325 - Seismic: approximately 1218 meters to the northwest of Building 325	$3.0 \times 10^{-3}$

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**F.4 RESULTS**

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The complete set of accident consequence results for Buildings 324 and 325 are presented in **Table**

171

**F-3.**

172

**Table F-4. Estimated radiological accident consequences for Buildings 324 and 325.**

Event	Dose (rem)*
<b>Building 324</b>	
Hot Cell Powder Spill –approximately 600 meters to the west	0.18
<b>Building 325</b>	
Seismic: approximately 587 meters to the northwest (Stevens Drive and eastern FSA border)	11.1
Seismic: approximately 1218 meters to the northwest of Building 325	5.0

173

**Sources:** WCH 2014; PNNL 2012.

174

\*The doses are based on safety SSC for Building 324 and no safety SSC for Building 325

175 As the above doses are within the DOE Controlled Areas and meet applicable nuclear safety  
 176 protocols, no explicit calculation of potential dose was calculated spanning across the FSA.  
 177 However, calculated doses from both 324 and 325 Buildings will diminish across the FSA due to  
 178 atmospheric dispersion.

179 The annual frequencies in **Table F-4** were utilized for the postulated events per safety basis  
 180 information provided in WCH (2013) and PNNL (2014).

181 **Table F-5. Estimated accident event annual frequencies for Buildings 324 and 325.**

Event	Frequency (yr <sup>-1</sup> )
<b><i>Building 324</i></b>	
Hot Cell Powder Spill – Filtered: approximately 600 meters to the west (ground level)	10 <sup>-2</sup> - 10 <sup>-1</sup>
<b><i>Building 325</i></b>	
Seismic: approximately 587 meters to the northwest (Stevens Drive and eastern FSA border)	10 <sup>-4</sup> - 10 <sup>-2</sup>

182 Sources: WCH 2013; PNNL 2014.

183

184 The resulting overall annual radiological risks, in terms of equivalent-dose, were calculated for each  
 185 event scenario based on the product of consequence times frequency. They are provided in **Table F-5**.

186 **Table F-6. Estimated annual radiological risk ranges for Building 324 and 325 accidents.**

Event	Annual Risk (rem/yr)
<b><i>Building 324</i></b>	
Hot Cell Powder Spill – Filtered: approximately 600 meters to the west (ground level)	0.0018 – 0.018
<b><i>Building 325</i></b>	
Seismic: approximately 587 meters to the northwest (Stevens Drive and eastern FSA border)	0.0011 – 0.11

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**189 F.5 EMERGENCY RESPONSE**

190 As required by law, DOE orders and policies, Hanford has established a comprehensive emergency  
191 management program that provides detailed, hazard-specific planning and preparedness measures to  
192 protect worker and public health and safety, and the environment in the event of an emergency at the  
193 Hanford Site. Following implementation of the proposed action to transfer FSA lands to TRIDEC,  
194 DOE and the local and state agencies responsible for performing the function of emergency  
195 management, would apply the same emergency planning and response actions to members of the  
196 public in the transferred lands as applied to the population at large.

197 DOE maintains DOE/RL-94-02, *Hanford Emergency Management Plan*, which addresses the full  
198 scope of emergencies that may occur at the Hanford Site. These potential emergencies include  
199 building and range fires, earthquakes, accidental release of radiological and toxicological materials  
200 from Hanford Contractor operated facilities and transportation incidents, and other external events.

201 The areas addressed by emergency planning include the following:

- 202 • Emergency Response Organization (ERO)
- 203 • Hazards analysis and consequence assessment actions
- 204 • Notification and communication
- 205 • Protective actions and incident response
- 206 • Emergency facilities and equipment
- 207 • Training, drills, and exercises
- 208 • Recovery and re-entry.

209 The Hanford ERO and its roles and responsibilities are specified in DOE/RL-94-02, Rev 4,  
210 Section 2.0. Emergency response on the Hanford Site is compliant with the National Incident  
211 Management System. As such, the Hanford Site Incident Command System is an integrated  
212 emergency management system with defined roles, responsibilities, and communication pathways  
213 that allows pre-designated, trained individuals to jointly determine and implement incident mitigation  
214 strategies.

215 The Hanford ERO has two distinct components: the Incident Command Organization and the  
216 Hanford EOC. The Incident Command Organization consists of the facility/building ERO with  
217 responsibility for implementing emergency response activities at the event facility, and emergency  
218 response personnel (i.e., Hanford Fire Department and the Hanford Patrol) that have responsibility for  
219 on-scene mitigation, depending on the event. The Incident Command Organization has the authority  
220 to commit the resources necessary for emergency response, and is required to be familiar with the  
221 applicable plans, procedures, operations, activities, and layout of the facility.

222 DOE maintains the Hanford emergency plan and implementing procedures by which DOE and its  
223 contractors will respond in the event of an accident. DOE also provides technical assistance to other  
224 federal agencies and to state and local governments. Hanford contractors are responsible for  
225 maintaining emergency plans and response procedures for all facilities, operations, and activities  
226 under their jurisdiction and for implementing those plans and procedures during emergencies. The  
227 DOE, contractor, and state and local government plans are fully coordinated and integrated. An EOC  
228 has been established by DOE to provide oversight and support to emergency response actions on the  
229 Hanford Site.

230 The Hanford EOC is an emergency response facility maintained by DOE for the purpose of providing  
231 a facility where personnel may convene during an emergency situation to provide essential response  
232 functions, including liaison with governmental officials and agencies, public information,

233 consequence assessment, offsite protective action recommendations, and oversight of onsite  
234 emergency response operations and activities. The Hanford EOC is generally operational within  
235 one hour upon declaration of an Alert or higher emergency.

236 The Hanford EOC consists of several teams. The Policy Team provides oversight of onsite activities,  
237 approval, and communication of offsite protective action recommendations, approval of  
238 reclassification recommendations, oversight of public information activities, and coordination with  
239 offsite agencies. The Joint Information Center disseminates accurate and timely information to the  
240 media, public, and employees. The Site Management Team provides support to the Incident  
241 Command Organization by providing resources not easily obtained by the IC, tracking the status of  
242 onsite protective actions, developing and directing implementation of additional onsite protective  
243 actions away from the event scene as required and providing communications support. The Site  
244 Emergency Director is responsible for coordination of Site Management Team activities. As part of  
245 the Site Management Team, the Security and Event Support team interfaces with local law  
246 enforcement agencies, coordinates with the Federal Bureau of Investigation, and oversees onsite  
247 patrol activities. The Unified Dose Assessment Center (UDAC) supports the Site Management Team  
248 by monitoring and evaluating existing emergency conditions in order to develop additional protective  
249 action recommendations. The UDAC is responsible for field team activities that include plume  
250 tracking, monitoring, and sampling.

251 Predetermined protective actions are developed in accordance with DOE/RL-94-02. Protective  
252 actions are taken to preclude or reduce the exposure of individuals after an emergency at the Hanford  
253 Site. Emergencies at site facilities may require actions only on the Hanford Site or may affect offsite  
254 areas. Emergency Planning Zones (EPZs) are designated areas, based on hazards assessments, in  
255 which predetermined protective actions may be required. The DOE develops EPZs, as determined  
256 necessary by hazard assessments, and shares them with the emergency planning authorities in the  
257 affected states and counties for their use in emergency planning.

258 The predetermined protective actions include the following:

- 259 • Methods for providing timely protective action recommendations, such as sheltering,  
260 evacuation, and relocation, to appropriate offsite agencies
- 261 • Plans for timely sheltering and/or evacuation
- 262 • Methods for controlling access to contaminated areas and for decontaminating personnel or  
263 equipment exiting the area
- 264 • Protective action criteria prepared in accordance with DOE-approved guidance applicable to  
265 actual or potential releases of hazardous materials to the environment for use in protective  
266 action decision making.

267 Evacuation routes for the Hanford Site are provided in DOE/RL-94-02. Specific routes are  
268 determined at the time of an event based on the event magnitude, location, and meteorology  
269 conditions.

270 DOE and adjacent counties have predetermined initial offsite protective action recommendations  
271 appropriate for each emergency classification. These initial, preplanned protective action  
272 recommendations, as indicated by the event classification and location, are communicated to the  
273 offsite agencies with the initial notification. The determination for the need for additional protective  
274 action recommendations are based on ongoing consequence assessments.

275 Immediate protective action decisions within the plume exposure pathway are the responsibility of the  
276 applicable county. The decision and notification process to populations within the plume EPZ is also  
277 the responsibility of the counties and is primarily provided using the Emergency Alert System (EAS).  
278 Benton, Franklin, and Grant County residents within the radiological EPZs receive the EAS messages  
279 via tone-alert radios in their homes.

280 Notifications to populations within the ingestion EPZ are accomplished by the affected counties and  
281 states using the EAS, as appropriate, and news media reports.

282 Relaxation or lifting of protective actions is based on facility conditions and consequence  
283 assessments. Based on recommendations from the Site Emergency Director, the Hanford EOC Policy  
284 Team will decide when onsite protective actions can be modified. The Policy Team will provide  
285 recommendations to affected counties and states for relaxation of offsite emergency protective  
286 actions. The states are responsible for decisions on relaxation of offsite protective actions.

287 Information on the Hanford Site's potential hazards and emergency response plans are provided to the  
288 public residing within the EPZ through a brochure distributed by county emergency management  
289 organizations. Offsite agencies participate annually in Hanford Site exercises. Area hospitals and  
290 local ambulance providers receive training on the handling and care of radiological-contaminated  
291 patients from Energy Northwest and county emergency management organizations.

## 292 **F.6 REFERENCES**

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**1 APPENDIX G – TRIBAL STUDIES EXECUTIVE SUMMARIES**

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**TABLE OF CONTENTS**

4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18

**G. APPENDIX G – TRIBAL STUDIES EXECUTIVE SUMMARIES ..... G-1**

G.1 Introduction ..... G-1

G.2 Executive Summary for the Confederated Tribes of the Umatilla Indian Reservation –  
*Hanford Land Conveyance Traditional Use Study, Benton County, Washington* ..... G-2

G.3 Executive Summary for the Confederated Tribes and Bands of the Yakama Nation –  
Yakama Nation Cultural Resources Program Hanford Land Conveyance Traditional  
Cultural Property Study..... G-4

G.4 Executive Summary for the Nez Perce Tribe – Cultural Significance of Lands to be  
Conveyed from the U.S. Department of Energy to Tri-Cities Washington Development  
Council ..... G-5

G.5 Executive Summary for the Wanapum – Traditional Cultural Property Assessment Study  
of the Proposed Hanford Land Conveyance Project, Benton County, Washington..... G-8

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21           **G. APPENDIX G – TRIBAL STUDIES EXECUTIVE SUMMARIES**

22           **G.1 INTRODUCTION**

23           The following tribal study executive summaries were requested by DOE-RL for the 4,413-acre Initial  
24           Hanford Site Land Conveyance Project Area and were provided by the respective tribal staffs. These  
25           summaries are included herein as written by the tribal staffs and have not been modified in any way.

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**G.2 EXECUTIVE SUMMARY FOR THE CONFEDERATED TRIBES OF THE  
UMATILLA INDIAN RESERVATION – HANFORD LAND CONVEYANCE  
TRADITIONAL USE STUDY, BENTON COUNTY, WASHINGTON**

<p><b>Confederated Tribes of the Umatilla Indian Reservation</b></p>		<p>46411 Timine Way Pendleton, OR 97801</p>
<p>Department of Natural Resources</p>		<p>Phone 541-276-3447</p>

January 22, 2014

James Payne  
 Executive Director  
 Fort Walla Walla Museum  
 755 Myra Road  
 Walla Walla, WA 99362

Dear Mr. Payne,

On behalf of the Confederated Tribes of the Umatilla Indian Reservation, Cultural Resources Protection Program (CRPP), enclosed is an Executive Summary pertaining to the report entitled, *Hanford Land Conveyance Traditional Use Study, Benton County, Washington* prepared by Dr. Jennifer Karson Engum, Cultural Anthropologist/Ethnographer. This document was prepared for you and for Los Alamos Technical Associates, Inc. to use in your public records.

Should you have any questions or concerns, please feel free to contact me at (541) 429-7216.

Respectfully,

Jennifer Karson Engum, Ph.D.  
 Cultural Anthropologist, Ethnographer  
 Cultural Resources Protection Program  
 Confederated Tribes of the Umatilla Indian Reservation

Cc: Mona Wright, Archaeologist. U.S. Department of Energy


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Treaty June 9, 1855 ~ Cayuse, Umatilla and Walla Walla Tribes

29

**Hanford Land Conveyance Traditional Use Study, Benton County, Washington**  
**EXECUTIVE SUMMARY**

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) Cultural Resources Protection Program (CRPP) conducted research on the traditional uses surrounding the proposed Department of Energy's Hanford Land Conveyance project resulting in a report entitled, *Hanford Land Conveyance Traditional Use Study, Benton County, Washington* prepared by Dr. Jennifer Karson Engum, Cultural Anthropologist/Ethnographer. The purpose of this study was to identify historic properties of religious and cultural significance (also called traditional cultural properties or TCP's) to the CTUIR in and in the vicinity of the project area. In addition to conducting oral history interviews with Tribal Elders, an ethnobotanical sampling inventory was also conducted by the CTUIR as part of the traditional use survey to assess potential impacts of the Hanford Land Conveyance project to the traditional plant resources of the Umatilla (*Imatalamlama*), Walla Walla (*Wahluapam*), and Cayuse (*Weyiilepu*) people.

The project is located entirely on U.S. Department of Energy (DOE) -owned lands in Benton County, Washington, in the southeastern corner of the Hanford site. The analysis area associated with this project includes 4,413 acres and runs along Horn Rapids Road to the south, Stevens Drive to the east, and Route 4S along the northeastern edge. The project's analysis area is located within the ceded territory of the CTUIR.

Within and adjacent to the project area are important historic properties of religious and cultural significance to the CTUIR. Thirty-five place names are documented in the vicinity of the project area and three of those are documented near the project area. This signifies to tribal members that the project area has been used by ancestors of today's CTUIR since time immemorial. Five historic properties of religious and cultural significance to the CTUIR are located in and adjacent to the project area. These include three place name locations, First Foods gathering areas, and the burial area known as the EMSL cemetery. The ethnobotanical survey identified seven traditional First Foods in the project area.

The CRPP believes that these are historic properties that are potentially eligible for inclusion in the National Register of Historic Places. Together these historic properties are linked in a spatial context, but also in a broad tribal narrative that include villages, fishing sites, legendary sites, native place names, ceremonial areas, First Foods procurement areas, and maintenance of burial areas. The traditional place names inform *Imatalamlama*, *Weyiilepu*, *Wahluapam* of their function, resources located in the area, and serve to place (or identify) these historic properties in ongoing stories and legends associated with these locations.

The Hanford Land Conveyance project could directly and indirectly affect the historic properties identified in this traditional use study. The project could adversely affect the integrity of setting, feeling and association of these properties and their associated cultural landscape. The project area and its larger vicinity have been and continue to be critically tied to the CTUIR's history and ongoing culture. The CRPP looks forward to working with DOE to make recommendations on how to protect, avoid, minimize, or to mitigate for effects to historic properties that this report identifies.

Based on the findings presented in this report, the CRPP recommends that a Tribal monitor be present during all ground disturbing activities and that the CRPP continues to be consulted throughout the process. Additionally, the CRPP has recommended not to nominate this area to the National Register of Historic Places due to the sensitive nature of publicizing culturally sacred areas. The CTUIR would like to ensure that the cultural and natural resources are protected, therefore the presence of a Tribal monitor is recommended if development should occur.

32 **G.3 EXECUTIVE SUMMARY FOR THE CONFEDERATED TRIBES AND BANDS**  
33 **OF THE YAKAMA NATION – YAKAMA NATION CULTURAL RESOURCES**  
34 **PROGRAM HANFORD LAND CONVEYANCE TRADITIONAL CULTURAL**  
35 **PROPERTY STUDY**

The Confederated Tribes and Bands of the Yakama Nation conducted a Traditional Cultural Property Inventory for the proposed project. The Yakama Nation Cultural Resources Program conducted a literature review and interviews with elders who are knowledgeable with the proposed project area. As a result of this Traditional Cultural Property, the Yakama Nation Cultural Resources Program identified seven Traditional Cultural Properties within the vicinity of the proposed project area. Four of these TCPs were identified as having the potential to be directly impacted by development of the project area. The other three TCPs would likely be indirectly effected by development of the proposed project area.

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38 **G.4 EXECUTIVE SUMMARY FOR THE NEZ PERCE TRIBE – CULTURAL**  
39 **SIGNIFICANCE OF LANDS TO BE CONVEYED FROM THE**  
40 **U.S. DEPARTMENT OF ENERGY TO TRI-CITIES WASHINGTON**  
41 **DEVELOPMENT COUNCIL**

**Executive Summary**

This report of work fulfills the terms of Purchase Order ABO-13-126 from Las Alamos Technical Associates, Inc (LATA). The objective of this work was "...to document Nez Perce ethnographic information to articulate the connection [of the Nez Perce Tribe] with resources in and around the project area." Standard ethnographic and ethnohistoric methods were used by the Principal Investigator, Alan G. Marshall, Ph.D., to investigate this socio-cultural relationship. Nez Perce interests in the area were acknowledged in the 1855 Treaty with the United States in Article 3, and they have continued into the present, as have the provisions of Article 3.

Little direct evidence of use at the Hanford Site by Nez Perce people was found; this finding is not surprising given the 50+ years of exclusion from this area.

Indirect evidence of a significant relationship with the area was found. This evidence is comprised of ethnohistorical data and reconstructions of Nez Perce use of this area in the early and mid-nineteenth century. The area was part of the Nez Percés' socio-economic realm during the 19<sup>th</sup> and pre-Hanford 20<sup>th</sup> centuries. Further evidence is visits to this area by contemporary Niimiipuu since access to some parts of the Hanford area has opened.

Visits are occasioned by three highly significant locations overlooking the proposed conveyance area: Rattlesnake Mountain, Saddle Mountain, and Gable Mountain. These three mountains remain significant places for the Nez Perce

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Tribe as locations for cultural maintenance. They are important for spiritual, educational, and other enculturational purposes that require looking at the geography. The proposed land conveyance area includes historical/ancestral use-areas as evidenced by four archaeological features. The area thus has contemporary significance as part of a viewshed from these mountains.

Additionally, a cemetery now called the "EMSL cemetery" is nearby. Its current name is the result of an attempt to build the Environmental Molecular Sciences Laboratory on the site. The Nez Perce Tribe is concerned for its setting; Tribal members continue to have religious, kinship, and other attachments to the place.

This indirect (i.e., not on-the-ground) socio-cultural significance underlies the concerns expressed by Tribal members regarding the area. These concerns reflect attitudes towards "the land" (cosmology). The Tribal concerns are for the cumulative negative effects of industrial development on these intangible resources. Indeed, industrial development creates significant "opportunity costs" to Nez Perce people through the loss of geographic contexts – places – for learning traditional values and knowledge.

The loss of these geographic contexts also means the loss of the material dimensions of the spiritual world. These include food and medicinal resources.

In summary, the proposed conveyance and subsequent development will have direct effects on the Nez Perce Tribe through:

- further destruction of a significant viewshed that provides contexts for education and, hence, cultural maintenance;
- encroachment on a sacred site, the EMSL cemetery;
- continued erosions of food and medicinal resources.

Three alternatives for dealing with conveyance area are presented. In descending order of preference they are: 1) do not develop the area, in accordance with the Nez Perce Tribe's "End-state Vision," 2) avoid disturbing the sites during development, and 3) "mitigate" each site through excavation and "data-recovery."

44  
45  
46

47 **G.5 EXECUTIVE SUMMARY FOR THE WANAPUM – TRADITIONAL**  
 48 **CULTURAL PROPERTY ASSESSMENT STUDY OF THE PROPOSED**  
 49 **HANFORD LAND CONVEYANCE PROJECT, BENTON COUNTY,**  
 50 **WASHINGTON**

Traditional Cultural Property Assessment Study of the Proposed  
 Hanford Land Conveyance Project, Benton County, Washington

**Executive Summary**  
 Northwest Anthropology LLC  
 Richland, WA 99352  
 6 June 2014

**Introduction**

Northwest Anthropology LLC (NWA), Richland, Washington, has conducted an assessment of the potential effects of the proposed Hanford Land Conveyance Project (Project) on traditional cultural places (TCPs) important to the Wanapum of Priest Rapids. The assessment was funded by the U.S. Department of Energy (DOE) through Fort Walla Walla Museum and Los Alamos Technical Associations. The findings are to be incorporated and addressed in a National Environmental Policy Act (NEPA) environmental assessment (EA) being prepared by the U.S. Department of Energy Richland Operations Office (DOE 2012). They may also be summarized in documents being prepared by Fort Walla Walla Museum for review under the National Historic Preservation Act (NHPA).

Per direction from DOE, the assessment sought to identify TCPs associated with resources, beliefs, and practices valued by the Wanapum people, following guidance issued by the National Park Service (NPS 1990). The assessment also sought to identify the potential impacts of the Project on such places, and on the resources, beliefs and practices that give them significance. Consideration of impacts follows directions set forth in the NEPA regulations of the Council on Environmental Quality (CEQ), specifically 40CFR1508.8 and 1508.27. Cumulative impacts were addressed following that 40CFR1508.7) and using the approach recently used by the Nuclear Regulatory Commission at the Columbia Generating Plant License Renewal Environmental Impact Statement (NRC 2011, 2013). With reference to the same regulations, we have developed recommendations for eliminating or reducing adverse effects and enhancing positive effects.

To guide the assessment of impacts of the proposed action, we used the standard of significance for impacts also used by the NRC (2013) and based on Council on Environmental Quality guidance (40 CFR 1508.27). The three significance levels and definitions are as follows:

- **SMALL** – Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
- **MODERATE** – Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
- **LARGE** – Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

The proposed action is located within the ancestral and contemporary homeland of the Wanapum people of Priest Rapids on the Columbia River in southeast Washington State (Relander 1956). The Wanapum are an indigenous group who continue to practice their religion and live a traditional subsistence lifestyle, to the extent they can, given the loss of access to traditional resources that has occurred over the last 150 years. The Wanapum have no reservation or federal funds. Agreements made with agencies and individuals during the twentieth century have enabled the Wanapum to access traditional places and resources important in maintaining their religion and way of life (Nickens 1998).

### Traditional Cultural Landscapes

The assessment began with background research and discussions with Wanapum elders and contacts designated by the Wanapum leader, Rex Buck Jr., about the importance of the project area to the Wanapum. The Wanapum, for a variety of good reasons, do not discuss their cultural places and practices with non-Wanapum, so to the extent we have been able to document the important places associated with the Project, they are described in the detailed study filed at Grant County PUD (Northwest Anthropology LLC 2014). However, we can say that the following landscapes are of deep and abiding cultural significance to the Wanapum, and appear to meet National Register Criterion "A" as TCPs for their association with significant patterns of events in Wanapum traditional history and culture. Based on this information, we have identified two specific places of traditional importance that extend into the land conveyance project area:

- One area of cultural importance is *Shu Wipa*, the Wanapum place name for the area known today as the Hanford 300 Area. This area was one of many villages and fishing areas used by Wanapum until the mid-1800s when epidemics led to depopulation and abandonment of many villages; the area continues to be important today for cosmological reasons. While activities conducted at this location have contaminated the land and groundwater, the Wanapum fully expect to make use of this area to perform traditional activities in the future when it is safe to do so. *Shu Wipa* includes the area of about a mile radius from the 300 Area and includes cemeteries, ancient living areas, and islands (Thoms 1983). *Shu Wipa* also has an integral relationship to Wanapum cosmology as it is a location where certain cultural and spiritual events occur on an annual basis.
- The second area of cultural importance is *Wanawish*, which describes both the traditional fishing area of the Wanapum at Horn Rapids on the Yakima River, and the landscape encompassing an area around the southern and eastern sides of *Lalik* (Rattlesnake Mountain/Cold Creek drainage), which is also called *Wanawish*. This landscape has an integral relationship to Wanapum cosmology as it is a location where events occur on an annual basis that must continue.

While the Wanapum choose not to document these areas on Traditional Cultural Property (TCP) forms used by the Washington Department of Archaeology and Historic Preservation, and not to evaluate them for eligibility for listing on the National Register of Historic Places, it is the position of the Wanapum that each qualifies as a TCP and each is eligible for listing on the National Register, following criteria established by the National Park Service (NPS 1990). Additional information about these two traditional cultural areas is found in the full assessment report on file in the Wanapum Archives, for which there is restricted access due to cultural sensitivity of the information. The archives are located at the Wanapum Heritage Center at the

Grant County Public Utility District's Wanapum Dam. In addition, Wanapum leaders are available to discuss the significance of these places with decision makers if that is necessary.

### **Effects**

It is traditional in NEPA and NHPA analyses to distinguish among direct, indirect and cumulative effects. Such a distinction would be fatuous in this case. The proposed DOE action will make possible the wholesale development of the area, as already outlined in various TRIDEC and DOE plans (cite plans, etc.) This development will have potentially devastating effects on the Wanapum and their culture, including relationships with the landscapes.

Because it is common to distinguish among direct, indirect, and cumulative effects, the NWA assessment team worked with Wanapum representatives to determine the significance of the direct, indirect, and cumulative impacts from the proposed action on the traditional Wanapum resources located in and adjacent to the project area.

#### Direct Effects of the Conveyance

The direct effects, that is, those effects caused by the action and occurring at the same time of the land conveyance (40CFR1508.8) are difficult to determine at this time because development plans for the area are not known and specific lands for conveyance have not been determined. In the case of *Wanawish*, the land to be conveyed is located at the eastern edge of the large *Wanawish* landscape. Depending on what is constructed and where, impacts may be adverse or not. In the case of *Shu Wipa*, the land to be conveyed is located at the western edges of the catchment area, areas used for hunting and gathering resources, and for travel to the *Wanawish* fishing site. If parts of the area that are selected for conveyance contain traditional resources (e.g., cultural plants) or archaeological resource, mitigation may be necessary. Cosmological impacts will need to be addressed through consultation as construction details are developed. For the purposes of this assessment, potential direct effects will noticeably alter the traditional resources, but not destabilize important attributes. Finally, some direct effects are likely to occur outside the lands to be conveyed, for example there will be emissions, noise, and visual impacts; there will also be additional ground disturbance on adjacent lands as infrastructure and support facilities are constructed. Based on the results of this analysis, the direct effects of the land conveyance are determined to be MODERATE, because while they will noticeably alter important attributes of *Wanawish* and *Shu Wipa*, they should not destabilize these attributes if appropriate mitigation actions are taken.

#### Indirect Effects of the Conveyance

Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (40CFR1508.8). TRIDEC, the local organization that will receive the land and ultimately transfer it to a private entity, indicates that the facilities constructed in the land conveyance area eventually will be part of a much larger development, referred to as the Mid-Columbia Energy Park (MCEI 2013). In addition to the direct effects discussed above, there will be indirect impacts from the Project because the land conveyance development will stimulate additional activity, facilities, infrastructure, and use (i.e., industrial sprawl) not tied directly to what is constructed on land conveyance lands. Indirect effects such as visual, noise, and damage to the land and its resources from industrial sprawl will be considerable on *Shu Wipa*. Those areas of *Shu Wipa* that remain undeveloped and relatively

undisturbed will be at an increased threat. Johnson Island, the EMSL Cemetery, and the fishing sites will be at increased risk as activity and development occurs in adjacent parcels. As the development moves to the west, indirect effects are possible on the larger *Wanawish* and the *Wanawish* fishing site. The indirect effects of the land conveyance to areas adjacent to the land conveyance are a major concern to the Wanapum.

For the purposes of this assessment, potential indirect effects will noticeably alter the traditional resources, and will be sufficient to destabilize the important attributes. *Shu Wipa* is in a perilous state and cannot withstand additional impact. *Wanawish*, specifically the fishery at Horn Rapids Dam, is similarly at peril; the industrial sprawl that will accompany the land conveyance and eventual implementation of the Mid-Columbia Energy Initiative will destabilize the resources. For this reason, potential impacts from the indirect effects of the Land Conveyance are determined to be LARGE.

#### Cumulative Effects of the Conveyance

To assess the cumulative effects of the proposed land conveyance, three geographic regions, described above in the Wanapum Traditional Cultural Landscapes section, were examined. The first area was the immediate cultural landscape, the area known to the Wanapum as *Shu Wipa*. Table 1 identifies the past, present and foreseeable future projects included in this analysis. The second geographic region considered was the Hanford-Tri-Cities cultural landscape. Table 2 identifies the past, present and foreseeable future projects included in this analysis. The third geographic region was the larger Wanapum landscape, the area that is used by the Wanapum historically and today to carry on their traditional way of life. The assessment of effects on this geographic region was based on the social impacts that will accrue on the Wanapum population. Social impacts refer to the consequences of the Proposed Action that will alter the ability of the Wanapum to live their traditional way of life, including their ability to practice their religion.

The cumulative assessment determined that cumulative effects of the proposed Project on the immediate *Shu Wipa* geographic region will be significant. The area has already sustained impacts from past actions by DOE in the 300 Area and north Richland. In addition to the proposed Land Conveyance are other projects ongoing or planned in the foreseeable future. For example, a natural gas pipeline is being constructed under the Columbia River and will deliver large quantities of gas to the Hanford 300 Area and 200 Area. After the Land Conveyance occurs and the lands are developed, development associated with the Mid-Columbia Energy Initiative will continue. The resulting industrial sprawl will increasingly cause visual, auditory, and direct damage to places and the resources that require a base level of integrity. Plans to open the area for public use have potential for additional impacts, ranging from direct effects associated with construction of recreational facilities, to direct effects on plants and animals associated with overuse. Further impacts on the already heavily impacted resources will destabilize the resource base of the immediate region. Therefore, the cumulative effect of the Land Conveyance on the immediate *Shu Wipa* landscape is determined to be LARGE.

In a similar way, the assessment finds that the cumulative effect of the proposed Land Conveyance on the Hanford and the Tri-Cities geographic region will be significant. This landscape has sustained considerable impact in the past from Hanford production and cleanup activities, from river erosion caused by hydroelectric dam operations, and general development in the Tri-Cities. The Hanford and the Tri-Cities geographic region will continue to be impacted by Hanford cleanup activities, development, and increasingly by recreational activities as DOE

opens Hanford to public use. Given the potential effects from the Land Conveyance associated with indirect industrial sprawl (e.g., potential diversion of natural gas to the Mid-Columbia Energy initiative and the City of Richland's development plans for the 300 Area), further impacts on the resource base will destabilize the resource base of the Hanford and Tri-Cities geographic region. Therefore, the cumulative effect of the Land Conveyance on the Hanford and Tri-Cities geographic region is determined to be LARGE.

**Table 1  
Past, Present and Foreseeable Future Projects in Immediate Geographic Area**

Project Name	Project Summary	Location	Status
DOE Comprehensive Land Use Plan	EIS designed to define industrial and conservation areas	All Hanford, and specifically area defined for industrial development	Completed in 2000, updated 2006, five year update past due
DOE 300 Area clean-up efforts	Due to radioactive contamination resulting from fuel rod production, the clean-up/removal of large amounts of topsoil occurred	300 Area operable units (surface, groundwater)	Some completed, some ongoing, some planned
City of Richland 300 Area electrical service project	City of Richland Construction of power-line to 300 Area	North Richland to Battelle 300 Area facilities	Near operational planned through 2040.
Cascade Corporation Natural Gas Pipeline	Construction of pipeline from Pasco through 300 Area to deliver natural gas to vitrification plant	Pasco through 300 Area to 200 Area	2015 start date
Port of Benton (POB) development	Continued development of POB lands	North Richland	Ongoing
DOE-Pacific Northwest Site Office	Construction of new facilities, infrastructure upgrade	North Richland, adjacent to 300 Area	Ongoing
DoD Upgrade Barge Facility	Improving barge facility to accommodate next generation of nuclear submarine reactors	Port of Benton barge facility in North Richland	Upcoming
Mid-Columbia Energy Initiative	Construction of Energy Technology Park	25+ square miles of South Hanford including all of <i>Shu Wipa</i> west of Columbia River	Incipient

**Table 2  
Past, Present and Foreseeable Future Projects in Hanford and the Tri-Cities  
Geographic Area**

Project	Project Summary	Location	Status
Energy Northwest NRC relicensing	Obtain 20 year license for operation of operating plant	East-central Hanford	Obtained 2011 (NRC 2011)
BPA power line upgrades	Upgrade and construct new power transmission lines	Throughout	Ongoing
DOE Vitrification plant	Construct plant and associated facilities	200 Area	Ongoing
Fish and Wildlife Hanford Reach National Monument	Implement Comprehensive Conservation Plan e.g., protection and recreational access	165,000 acres of Hanford lands	Completed in 2006, implementation ongoing (FWS 2006)
Columbia Irrigation District	Horn Rapids Dam and irrigation canals	Yakima River, Tri-Cities	Operational
WA Department of Transportation	Highway 240 improvement and Vernita Rest Area	Tri-Cities to Vernita	Ongoing
Local Governments	Cities, Ports, Counties, ongoing and planned developments	Tri-Cities	Ongoing

Finally, the assessment determined that the cumulative effect of the proposed Land Conveyance on the larger Wanapum geographic region will be significant. The Wanapum, whose future is tied to the integrity of their traditional landscape, cannot endure further deterioration of the landscape. The ability of the Wanapum to maintain their way of life—their subsistence lifestyle, which is inextricably tied to their religion—is at peril. The additional outright loss of traditional places and resources has made it almost impossible for the Wanapum to continue practicing their religion. When the Wanapum can no longer practice their religion, the Wanapum culture will be destabilized. Therefore, because the land conveyance will further cause deterioration of the Wanapum cultural landscape, the cumulative effect of the land conveyance on the larger Wanapum geographic region is determined to be LARGE.

**Summary and Recommendations**

DOE is preparing an EA. In an EA, one analyzes the potential impacts of a project against the variables set forth at 40 CFR 1508.27 to determine if they are likely to be significant. The assessment has considered the context of the land conveyance in three geographic settings, and documented the severity (intensity) of the impacts and determined them to be significant. Similarly, DOE is preparing an historic properties report to analyze potential impacts of the land

conveyance on historic properties, that is properties eligible for listing in the National Register of Historic Places. The assessment has identified two areas important to the Wanapum of Priest Rapids that meet the criteria established in Bulletin 38 (NPS 1990) and which will be affected by the proposed Hanford Land Conveyance. As discussed above, if these effects occur, they will be felt far beyond these two locations. They will affect the Wanapum people and their ability to survive as Indian people. Having withstood a century and a half of continual destruction of their homeland, and suffering of their families as a result of displacement (Cernea 2000:18–31), the Wanapum do not have much more to give (Longenecker, Stapp, and Buck 2002). It is time for the dominant society to reverse this trend and go beyond ambivalent mitigation, and look for ways to lift the Wanapum away from the tipping point of extinction.

The Wanapum are willing to consult with DOE and others through the EA and the NHPA process about actions to resolve the adverse effects of this undertaking. Below are examples of the actions that the Wanapum have indicated could begin to resolve some of the effects.

#### Recommendations to Address Direct and Indirect Effects of the Land Conveyance

1. DOE should continue to consult with the Wanapum throughout the planning and execution of the Hanford Land Conveyance Project.
2. DOE should explore with the Wanapum the conduct of activities to improve the condition of resources in and around *Shu Wipa* and the *Wanawish* corridor. Such activities include:
  - a. cleaning up of contamination
  - b. restoring terrestrial habitats to foster native species of both plants and animals through avoidance, compensation and rectification, with Wanapum consultation on techniques, species emphasis, and Wanapum economic participation.
  - c. restoring/renovating fishing areas in the *Shu Wipa* area, which may include habitat restoration for native fish, and/or programs for controlling non-native species, and/or programs for the promotion of culturally important species (sucker, salmon, sturgeon, etc.)
  - d. developing better fishing access in the *Shu Wipa* area when cleanup has been completed. This may include setting aside of fishing sites, assistance in constructing semi-permanent fishing stations, and providing boat access for the purpose of gillnetting.
3. The Wanapum want DOE to use its existing relationships, including those with private, local, state, and federal agencies involved in future development of the conveyed lands (e.g., the Mid-Columbia Energy Initiative) within and adjacent to *Shu Wipa*, and *Wanawish* to assist the Wanapum in making long-term agreements to improve consultation, economic opportunity, access to resources, and protection of resources.

#### Recommendations to Addressing Cumulative Effects of the Land Conveyance

The long-term cumulative effects of the Land Conveyance Project are significant. The following recommendations can help mitigate the cumulative effects of the land conveyance described above:

1. The Wanapum want to work with DOE to improve access to resources across the Hanford Site, including its lands currently administered by the U.S. Fish and Wildlife Service in the Hanford Reach National Monument;

2. The Wanapum want to discuss with DOE opportunities for identifying and protecting important resources across the Hanford Site, including on its lands currently administered by the U.S. Fish and Wildlife Service in the Hanford Reach National Monument, and the Bonneville Power Administration;
3. The Wanapum want DOE to help develop economic opportunities for the Wanapum in two areas: a) jobs across the spectrum for Wanapum individuals that will provide the training and career path and accommodate the flexibility Wanapum individuals need to practice their religion and perpetuate their culture; and b) project work for the Wanapum in the area of cultural resource protection and habitat restoration, coordinated through the Wanapum Interface Office.

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1 **APPENDIX H – WILDLIFE SURVEY**

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# **Environmental Assessment for the Proposed Conveyance of Land at the Hanford Site**

## **2013 Wildlife Survey**

**September 16, 2013**



**2805 Saint Andrews Loop  
Suite A  
Pasco, WA 99301-6121  
(509) 546-2040**

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## Table of Contents

<b>1.0</b>	<b>Introduction .....</b>	<b>1</b>
1.1	Background.....	1
<b>2.0</b>	<b>Survey Objectives .....</b>	<b>3</b>
2.1	Methods .....	3
<b>3.0</b>	<b>Results.....</b>	<b>4</b>
3.1	Birds.....	4
3.2	Mammals .....	7
3.3	Reptiles and Amphibians.....	8
<b>4.0</b>	<b>Discussion .....</b>	<b>9</b>
<b>5.0</b>	<b>References.....</b>	<b>13</b>

### List of Tables

Table 1: Bird species observed during surveys of the Hanford Land Conveyance Property in late May and early June, 2013.....	5
Table 2: Mammal species observed during surveys of the Hanford Land Conveyance Property in late May and early June, 2013. ....	8
Table 3: Reptile species observed during surveys of the Hanford Land Conveyance Property in late May and early June, 2013. ....	9

### List of Figures

Figure 1 – Project Vicinity Map.....	2
Figure 2 – Wildlife Survey Results within the Study Area .....	6

### List of Appendices

Appendix A Photos.....	A-1
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## 1.0 Introduction

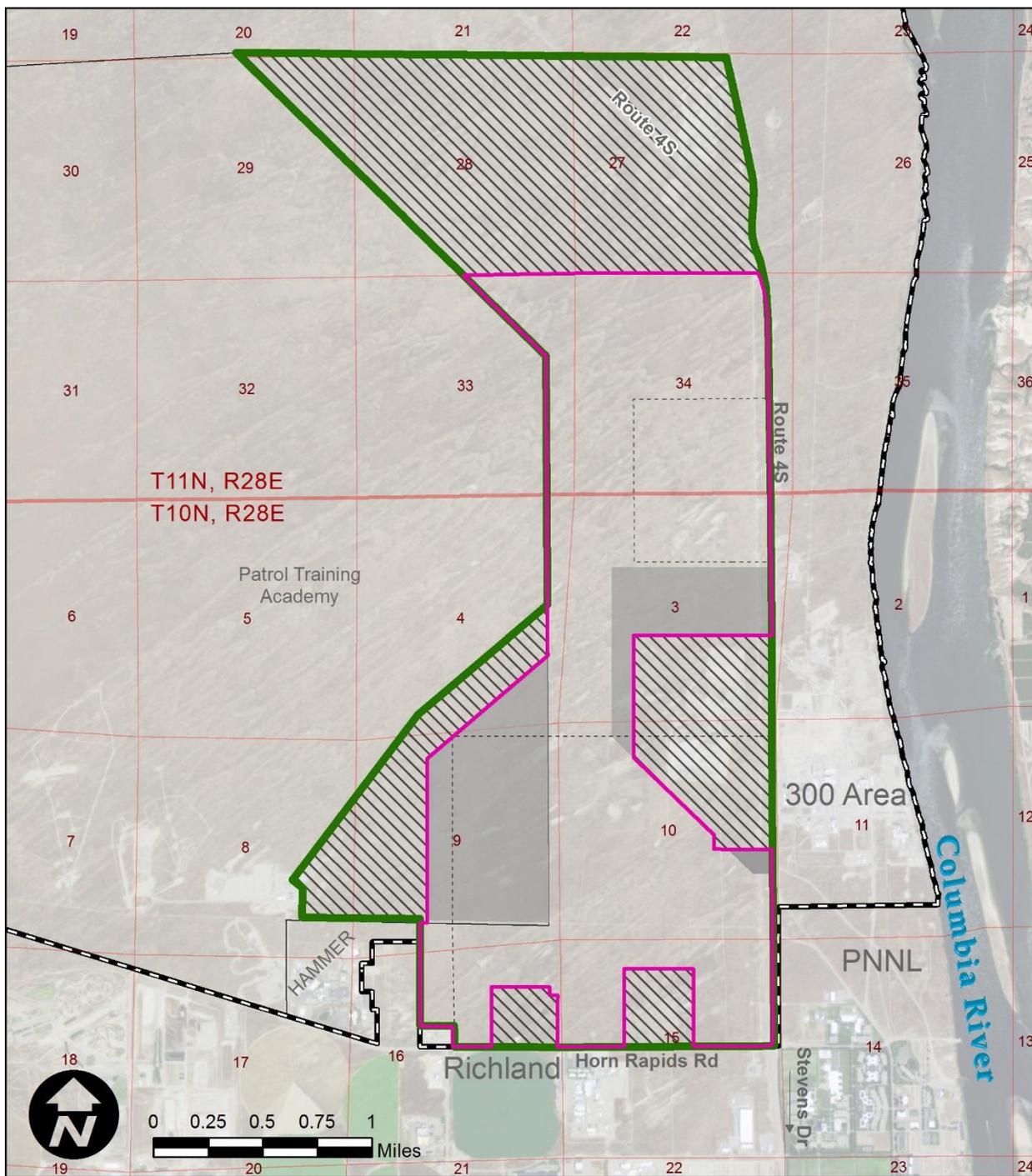
Department of Energy (DOE) is proposing a land conveyance of approximately 1,641 acres of undeveloped land to the local Community Resource Organization (CRO). Preparation of an Environmental Assessment (EA) is required under the National Environmental Policy Act (NEPA) to examine the potential impacts to the environment from a federal action. In addition to the 1,641 acres of the proposed land, DOE also anticipates that there may be continuing mission needs for retaining security and health and safety buffer zones around portions of the 1,641-acre lands. Therefore, the total study area for the proposed land conveyance encompasses 4,413 acres of undeveloped parcels that include the 1,641-acres requested, as well as, an additional 2,722 acres of adjacent parcels. During the EA data collection process, the need for technical and field studies pertaining to biological and ecological resources was identified because the entire 4,413-acre site had not been evaluated in detail to date. The purpose of this report is to document the results of the wildlife survey conducted in May and June 2013 in the 4,413 acre land conveyance study area at the Hanford Site located near the City of Richland, Washington (Figure 1).

### 1.1 Background

The Hanford Site is a relatively undisturbed area of shrub-steppe supporting a rich diversity of plant and animal species adapted to the semi-arid environment of the Columbia Plateau. The Hanford Site contains biologically diverse shrub-steppe plant communities that have been protected from most disturbances, except for fire, for more than 65 years and consequently retains the largest remaining blocks of relatively undisturbed shrub-steppe in the Columbia Basin Ecoregion (DOE 2012a). Hanford is located within the driest and hottest portion of the Columbia Basin Ecoregion (Franklin and Dyrness 1973). Although this may result in unique species assemblages relative to the rest of the ecoregion, these extreme conditions also make the Hanford shrub-steppe a fragile ecosystem that is less resilient to disturbance and not readily restored (DOE 2013a).

Inventories of plants and animals throughout Hanford were conducted in the late 1990s and provide extensive lists of the species that inhabit the upland areas. A field investigation of the 4,413 acres of the proposed conveyance land was conducted in June 2012, but did not report on wildlife species observed (DOE 2012b). Multiple field investigations of isolated areas have also been conducted at various months of the year between 2001 and 2012. These surveys provide limited snapshots of plant and animal species occurrence. These studies were done mostly in the southern area of the site, near the Hazardous Materials Management and Emergency Response (HAMMER) training facility. No Federal or Washington State listed species were reported in these earlier surveys. The entire study area is upland and therefore is not home to riparian or aquatic species. The majority of federally listed species for the Hanford area are plants and animals that inhabit the riverine and riparian environments in the Columbia River. The USFWS lists the gray wolf (*Canis lupus*) and the Columbia Basin pygmy rabbit (*Brachylagus idahoensis*) as the terrestrial species that are federally listed in Benton County. Neither of these species is known to inhabit the study area.

Figure 1 – Project Vicinity Map



**Legend**

- Project Area – 4,413 acres
- Focused Study Area – 2,474 acres
- TRIDEC Land Request – 1,641 acres
- Potential Access Agreement Land – 539 acres
- Land Not Suitable For Conveyance
- Hanford Site

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Many federal and state species of concern as well as migratory birds protected under the Migratory Bird Treaty Act (MBTA) are documented to occur in the area and throughout the Hanford Reservation. Burrowing owls (*Athene cunicularia*), a state candidate species, have been observed historically in the southern end of the study area, as have Ferruginous hawks (*Buteo regalis*) and their nest sites. Migratory bird species including western meadowlark (*Sturnella neglecta*), horned lark (*Eremophila alpestris*), and long-billed curlew (*Numenius americanus*) have been reported in the open, grassy areas, and sagebrush sparrows (*Amphispiza belli*) have been reported recently in surveys conducted in the shrub habitats of the study area.

## 2.0 Survey Objectives

Surveys were conducted to capture the occurrence of wildlife species and habitats within the 4,413 acres to be considered as part of the potential land conveyance area or the adjacent buffer area. Although all species encountered were recorded, the main goal was to determine the occurrence of listed or candidate plant and animal species protected under the Federal Endangered Species Act (ESA), species listed as threatened, endangered, candidate, sensitive, or monitor by the state of Washington, and species protected under the MBTA. Lists that document priority habitats and species of concern in Washington State are maintained by the Washington Department of Fish and Wildlife (WDFW) and Washington State Department of Natural Resources (WDNR). Washington State officials maintain additional lower level lists of species, including a monitor list for animals and review and watch lists for plants. Species on the state monitor, watch, and review lists are not considered species of concern, but are monitored for status and distribution and are managed as needed by the state to prevent them from becoming endangered, threatened, or sensitive. Lists that document plant and animal species with federally endangered, threatened, proposed, or candidate status are maintained in Title 50 of the Code of Federal Regulations (CFR) Part 17 (50 CFR 17.11; 50 CFR 17.12). A list that documents migratory birds protected under the MBTA is maintained by the U.S. Fish and Wildlife Service.

A wildlife survey was conducted in two field visits occurring in May and June 2013. A separate botanical survey was conducted in three sessions in May, June, and July 2013. HDR wildlife biologists performed pedestrian and visual surveys along transects that encompassed a representation of the entire study area, and botanists from SEE Botanical performed visual encounter surveys using a transect or grid methodology survey technique. This report summarizes the results of the wildlife survey. The results of the botanical surveys are presented in a separate report, *Vegetation Survey of the Proposed Land Conveyance, Central Hanford, Washington* (Salstrom and Easterly 2013).

### 2.1 Methods

Surveys were conducted daily from May 14 through May 16, and from June 4 through June 6, 2013. The wildlife survey consisted of pedestrian surveys, point counts, and driving surveys. During the pedestrian and driving surveys, all species including birds, mammals, reptiles, and amphibians were recorded from visual observation, sound, and sign such as

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tracks, scat, and active burrows. General habitat associations were also recorded. Surveys were conducted in the spring to capture the presence of migratory and breeding birds. Opportunistic surveying was also done any time the crew was on site including driving between sites and transects.

Pedestrian surveys were conducted along 24 transects that were placed within each of the representative habitats within the entire study area. These transect lines ranged from 1 mile to 2 miles in length. Walking transects avoid the inherent bias in roadside sampling, but reduce the area that can be covered in a given amount of time. Species data were collected along standardized walking routes.

Point counts are an easily replicable method for estimating diversity and abundance within specific habitat types. For all point count stations, the number of birds of each species seen and/or heard within a 10 minute period was recorded. Point counts for birds were conducted at sunrise each day at 6 locations accessible from unimproved access roads on the site. Starting locations for point counts were conducted in a different order each day.

Sunset and dusk driving surveys were conducted throughout the area along the unimproved access roads that spanned the north to south extent of the study area. Driving surveys have the advantage of quickly covering a large area. However, they restrict sampling to road edges, which limits the area that can be sampled and may create biases in the data. All driving between sites was also used as driving surveys, and any opportunistic sightings of birds or mammals were recorded. The sunset and dusk driving surveys were conducted on June 4, 2013.

## 3.0 Results

The following sections list the birds, mammals, and reptiles observed during all surveys. The frequency at which individuals from these species was observed was used to provide a general indicator of abundance in four broad categories: Common; Fairly Common; Uncommon; and Rare. Rare indicates that individuals were seen only once or twice throughout all surveys. These designations reflect the species relative occurrence in our surveys and do not necessarily represent the general species abundance in the region.

### 3.1 Birds

In previous studies, nearly 120 species of birds have been observed on the Hanford Site in surveys conducted during the breeding season (April-June) from 1988 through 2009. The most diverse assemblage of species was found along the river (81 species), while fewer species inhabited the shrub areas (61 species); bunchgrass habitat had the fewest (42 species) (Poston et al. 2009).

Most bird species that occur in shrub-steppe habitats also can be found in steppe habitats. Six species best characterize steppe habitats in both Washington and Oregon. These are the long-billed curlew, vesper sparrow (*Pooecetes gramineus*), grasshopper sparrow, lark sparrow (*Ammodramus savannarum*), savannah sparrow (*Passerculus sandwichensis*), and western meadowlark (*Sturnella neglecta*) (DOE 2000). Several introduced game species

also use steppe and shrub-steppe habitats within the Columbia Basin Ecoregion. These include the chukar (*Alectoris chukar*), ring-necked pheasant (*Phasianus colchicus*), and gray partridge (*Perdix perdix*) (DOE 2000). The entire study area is upland habitat, and consequently species diversity is lower compared to the riparian areas alongside the Columbia River to the east.

Table 1 below lists all bird species that were recorded during all surveys and the relative frequency at which they were observed, and Figure 2 shows the vegetation types and recorded wildlife points within the study area. The majority of bird species encountered during the surveys were most often seen during the early morning point counts, with the exception of raptors, ravens, and magpies which were most often seen during transect surveys. Meadowlarks were very abundant and seen during all surveys. Horned larks were nearly as abundant as meadowlarks and also seen during all surveys.

**Table 1: Bird species observed during surveys of the Hanford Land Conveyance Property in late May and early June, 2013.**

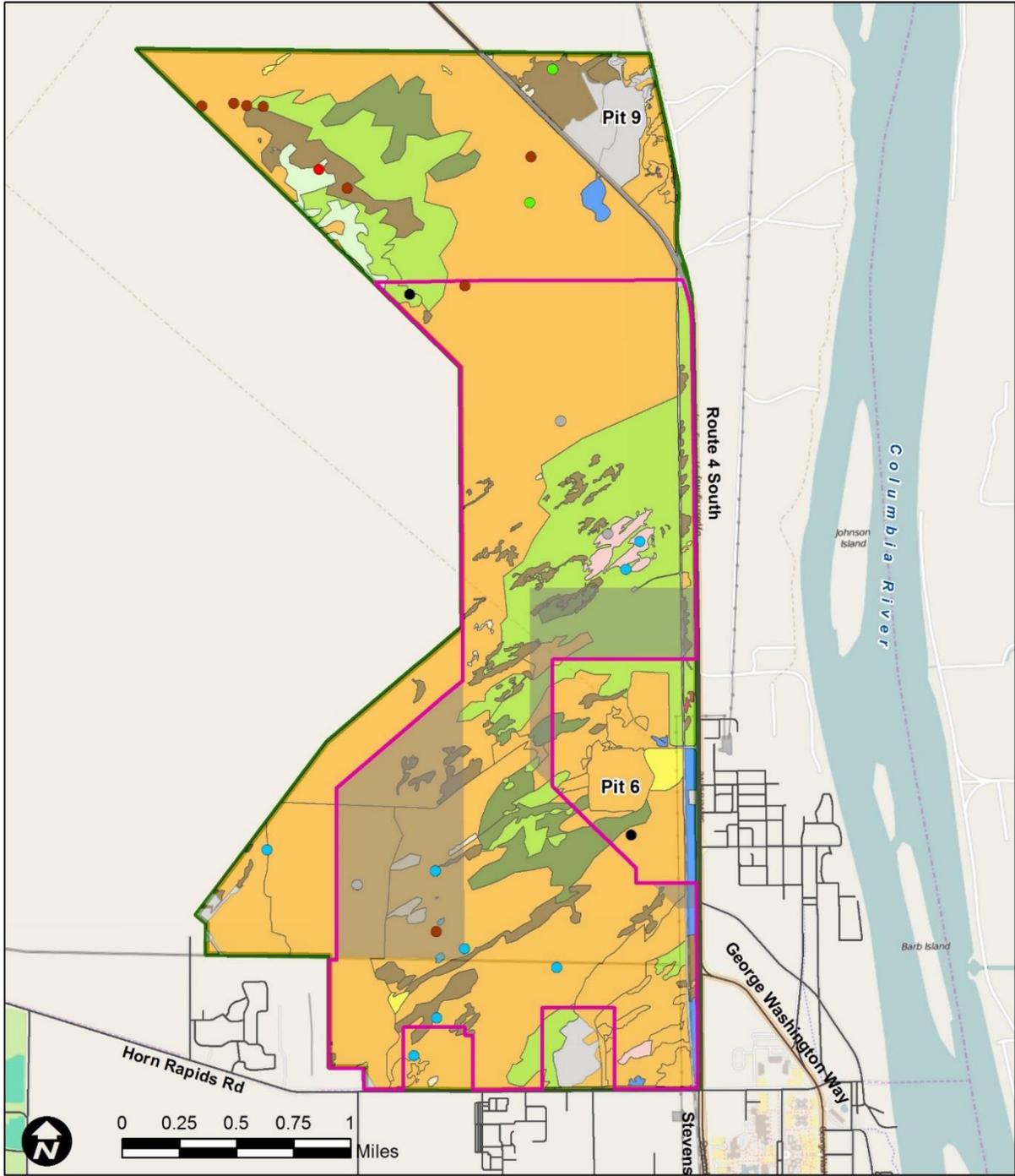
Common Name/Scientific Name	Status <sup>1, 2</sup>	Occurrence During Surveys <sup>3</sup>
Western Meadowlark ( <i>Sturnella neglecta</i> )	MBTA	C
Horned Lark ( <i>Eremophila alpestris</i> )	MBTA	C
Western Kingbird ( <i>Tyrannus verticalis</i> )	MBTA	FC
Long-billed Curlew ( <i>Numenius americanus</i> )	MBTA; State Monitored	FC
Mourning Dove	MBTA	FC
Common Nighthawk ( <i>Chordeiles minor</i> )	MBTA	FC
Black-billed Magpie ( <i>Pica hudsonia</i> )	MBTA	U
Common Raven ( <i>Corvus corax</i> )	MBTA	FC
Barn swallow ( <i>Hirundo rustica</i> )	MBTA	U
Grasshopper sparrow ( <i>Ammodramus savannarum</i> )	State Monitored; MBTA	R
Lark sparrow ( <i>Chondestes grammacus</i> )	MBTA	R
European Starling ( <i>Sturnus vulgaris</i> )		U
Chukar ( <i>Alectoris chukar</i> )		R
American kestrel ( <i>Falco sparverius</i> )	MBTA	U
Swainsons Hawk	State Monitored	U
Ferruginous Hawk ( <i>Buteo regalis</i> )	Federal Species of Concern State Threatened; MBTA	R
Red Tailed Hawk ( <i>Buteo jamaicensis</i> )	MBTA	U

<sup>1</sup>MBTA = Species is listed under the Migratory Bird Treaty Act

<sup>2</sup>Source: USFWS 2013

<sup>3</sup>C = Common, FC = Fairly Common, U = Uncommon, R = Rare

Figure 2 – Wildlife Survey Results within the Study Area



**Legend**

- |                         |  |  |                                   |
|-------------------------|--|--|-----------------------------------|
| ● Bird Nesting Location | ▭ Project Area                                   | ▭ Needle-and-threadgrass                       | ▭ Swale                           |
| ● Burrow                | ▭ FocusedStudyArea                               | ▭ Sagebrush/Sandberg bluegrass-Cheatgrass      | ▭ Disturbed                       |
| ● Reptile Sighting      | ▭ Bitterbrush/Indian ricegrass                   | ▭ Sand   | ▭ Potential Access Agreement Land |
| ● Coyote Sighting       | ▭ Bitterbrush/Needle-and-threadgrass             | ▭ Sandberg bluegrass-Cheatgrass                |                                   |
| ● Coyote Den            | ▭ Bitterbrush/Sandberg bluegrass-Cheatgrass      | ▭ Snow buckwheat/Needle-and-threadgrass        |                                   |
| ● Elk Sighting          | ▭ Gray Rabbitbrush/Sandberg bluegrass-Cheatgrass | ▭ Snow buckwheat/Sandberg bluegrass-Cheatgrass |                                   |
| — Road                  |  |  |                                   |

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Western meadowlarks, horned larks and western kingbirds were plentiful in the area and although no nests were directly observed, presence of pairs and their prevalence in the area indicated that these species were nesting throughout much of the study area. Ferruginous hawks are known to use transmission towers and utility poles for breeding in the Hanford Site (DOE 2013b), but no nests were observed within the PA, although one individual was observed flying overhead in the southern portion of the PA during the surveys. An active Swainson's hawk nest was observed in the southern portion of the study area (Photos 1 and 2, Figure 2). Nighthawks were also directly observed nesting in the area. The botanists came across an occupied Common nighthawk nest on the ground that contained 3 eggs on July 13, 2013. As they approached, the adult flushed off the nest and they briefly observed the eggs before retreating to allow the adult to return to the nest (Photo 3). Long-billed Curlews were persistently seen throughout much of the surveyed area, within the majority in the southern half of the study area. A pair of Long-billed Curlews with 3 chicks was observed in the southwest portion of the study area (Figure 2) providing evidence that this species also currently nests in the area. Signs warning people to avoid curlew nesting areas near the access road along the southeastern end of the study area also indicated that curlews have nested in the area previously (Photo 4).

Lark sparrows were observed on fences near the Pit 6 area and were only seen during the June surveys. A single Grasshopper sparrow was sighted on a fence at the western end of the study area near the boundary with the HAMMER facility firing range (Figure 2). This individual was also seen during the early June surveys. Potential sagebrush sparrow habitat lies to the north and east of the NE corner of the study area near Pit 9. Surveys in this area did not detect any sagebrush sparrows visually and no sagebrush sparrow vocalizations were heard.

### **3.2 Mammals**

Mammal diversity in the Columbia Basin Ecoregion is lower than most other arid areas of the Pacific Northwest. To inhabit this region, mammals must either be adapted to the semi-arid climate or live close to a permanent water source. Many species that occur in the Columbia Basin range far beyond its borders and most exist in greater numbers outside of the ecoregion (DOE 2000).

Very few mammals were observed during the surveys (Table 2). Coyotes were directly observed on two occasions, and scat was found throughout the surveyed area with most in the southern and western portion of the study area. There were three coyote den sites observed throughout the surveys, and all three sites appeared to be active (Figure 2; Photos 5 and 6). One den was located in the northwest portion of the study area, and the other two were in the southern end. Fresh tracks, trails in the grass, and scat were present at all three sites.

**Table 2: Mammal species observed during surveys of the Hanford Land Conveyance Property in late May and early June, 2013.**

Species	Status	Occurrence During Surveys <sup>1</sup>
Coyote ( <i>Canis latrans</i> )	None	U
Mule Deer ( <i>Odocoileus hemionus</i> )	None	R
Elk ( <i>Cervus elaphus</i> )	None	R

<sup>1</sup>C = Common, FC = Fairly Common, U = Uncommon, R = Rare

A single mule deer doe was sited at the north eastern end of the study area, north of Pit 9. During the botanical surveys, a single female elk was observed in the northern portion of the study area (Figure 2; Photo 7).

### **3.2.1 Mammal sign**

Although no small mammals were directly observed, a few burrows were observed that were of adequate size (approximately 2 inches in diameter) to be inhabited by ground squirrels, while many were smaller and potentially used by mammals such as mice, voles, and shrews. Burrows were seen periodically throughout the study area, but very few were located in the middle section (Figure 2). Most burrows appeared inactive at the time of the surveys, but some showed signs of recent digging.

Previous data shows ground squirrel (*Uroditellus spp.*) colonies located in the 300 area to the east of the study area (MSA 2013). No ground squirrels were observed during the wildlife surveys in May and June within the land conveyance site, but several small burrows were found that could potentially be inhabited by ground squirrels (Photo 8). Some of these burrows showed signs that they were recently used, but it was not possible to determine their current activity on site due to lack of conclusive evidence such as tracks.

Several larger burrows were located in the northern end of the study area (Figure 2; Photo 9). These were of adequate size for badgers (*Taxidea taxus*) and provide evidence of badger presence. These burrows were in tact, but cobwebs across the entrances and the lack of tracks indicated that they may not be currently occupied.

### **3.3 Reptiles and Amphibians**

Very few reptiles and no amphibians were observed during the surveys. The area is arid upland with no water sources located nearby; therefore, it does not provide suitable habitat for amphibian species. Only two species of reptiles were observed: a few gopher snakes and a short-horned lizard (Table 3).

**Table 3: Reptile species observed during surveys of the Hanford Land Conveyance Property in late May and early June, 2013.**

Species	Status	Occurrence during surveys <sup>1</sup>
Gopher Snake (Bull Snake) ( <i>Pituophis catenifer</i> )	None	U
Short-horned lizard ( <i>Phrynosoma douglassii</i> )	State Monitored	R

<sup>1</sup>C = Common, FC = Family Common, U = Uncommon, R = Rare

Gopher snakes, also known as bull snakes, primarily occur in the Columbia Basin and Okanogan ecoregions although a few occurrences are reported in the East Cascades Ecoregion. Gopher snakes are found in warm, dry habitat – deserts, grasslands, and open woodlands. They spend a majority of their time below the surface in animal burrows (WDNR 2013). A gopher snake was observed during the pedestrian transect surveys in the northeast portion of the project site (Figure 2). This area was dominated by snow buckwheat, sandberg bluegrass, and cheatgrass with bare sandy soil.

Short-horned lizards inhabit primarily the shrub-steppe. They also require well-drained soils so that they can burrow below the surface and substrate. Short-horned lizards in Washington are reported to occur in loamy terrain without lithosols on vegetated sand dunes and in some agricultural fields where patches of native habitat are present (WDNR 2013). During the surveys, one short-horned lizard was observed on a sand dune towards the north end of the site (Photo 10, Figure 2).

## 4.0 Discussion

Much of the shrub-steppe habitat native to the area and throughout western North America has been transformed as a result of agriculture, grazing, and urbanization (Poston et al. 2009). Along with the decrease in habitat, the bird species that depend on this habitat have also declined (Poston et al. 2009). The number of species observed in surveys at Hanford over previous years has declined since 1989 with 18 species per survey to approximately 7 species in 2008 and 2009 (Poston et al. 2009). The surveys in May and early June of 2013 demonstrated few mammals and a limited number of bird species inhabit the study area.

No federally listed threatened, endangered, or candidate species were observed or are documented to occur in the study area (WDFW 2013). The only species that have been documented as occurring in the vicinity of the study area are burrowing owls and ferruginous hawk. Ferruginous hawks are known to use transmission towers utility poles for breeding in the Hanford site (DOE 2013b; WDFW 2013), but no nests were observed within the project site and its vicinity during the wildlife survey.

Burrowing owl is federally listed as a species of concern and a Washington State candidate species. Primary causes for population declines throughout North America include habitat loss and degradation caused by land development and declines of burrowing mammal populations (Klute et al. 2003; Poston et al. 2009). In previous surveys of the Hanford area, seventy-one percent of burrowing owl nests were located in abandoned badger burrows, 26

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percent in old irrigation pipes, and 3 percent in coyote dens. Additional evidence suggests that burrowing owls frequently nest near roadsides, which may have important implications with respect to human activities (Poston et al. 2009). In 2001, burrowing owls were observed near the HAMMER facility, and one single active burrow was located during the 2001 survey (Sackschewsky 2001). This nest is located approximately 3,000 feet west of the study area, and it has not been documented that the nest is still active or not. Burrowing owl's territory tends to be located closer to their nesting sites but can expand during their foraging activities ranging from 35 to 241 hectares (Klute, et al. 2003). The project site is too far out from the recorded nesting site; therefore, they are unlikely to forage within the project site. No active nests were observed during the wildlife survey.

The bald eagle (*Haliaeetus leucocephalus*) was removed from the federal threatened and endangered species list in July 2007 and its status changed from threatened to sensitive in Washington State in January 2008. Federal and state protection is still applied to bald eagle through the Bald and Golden Eagle Protection Act, the MBTA, and the Washington Administrative Code. Bald eagles are reported to occur during the winter months in the Yakima River and along the Columbia River. They are known to use riparian trees for perching and nesting (USFWS 2008); however, they are not known to use the study area for nesting. A Bald Eagle Management Plan for the Hanford Site, South-Central Washington, (DOE/RL-94-150, Rev. 1) outlines seasonal access restrictions around documented nesting and sites at the Hanford Site between November 15 and March 15 (DOE 2012a). These sites are located in riparian areas along the Columbia River and are well outside the study area.

The WDFW currently lists the black-tailed jackrabbit (*Lepus californicus*) and white-tailed jackrabbit (*Lepus townsendii*) as 'candidate' species of concern (WDFW 2013). Recent surveys, including night spotlight surveys along seven transects throughout the Hanford Site, yielded no jackrabbit sightings (DOE 2012a). No rabbits or rabbit sign was observed during the wildlife surveys for this project.

The only mammals observed inhabiting the study area site were coyotes. Several burrows that could potentially currently be occupied by ground squirrels and badgers were observed, but it was not possible to conclusively determine if they were recently active. Incidental sightings of a single mule deer and a single female elk occurred on the study area during the wildlife and plant surveys.

The Hanford Site Biological Resources Management Plan (BRMP) was developed to provide DOE-RL and its contractors with a consistent approach to protect biological resources and monitor, assess, and mitigate impacts to them from site development and environmental cleanup and restoration activities. This approach accounts for differences in resources that warrant different levels of management attention such as rare native sagebrush/bunchgrass communities (DOE 2013a).

To address these differences in "value" DOE-RL classifies Hanford Site biological resources by six levels of management concern (0-5). Level 0 represents the lowest level of management concern and Level 5 the highest. Each level has a specific set of associated management actions and requirements (DOE 2013a). Level 0 includes non-native plants

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and animals and non-vegetated areas such as industrial sites, paved and compacted gravel areas (DOE 2013).

Biological resources categorized at Level 1 include native fish, wildlife, invertebrate and plant species not otherwise included in higher levels and require actions to minimize or avoid impacts to these species as practicable under regulatory compliance such as the Migratory Bird Treaty Act. At higher levels of concern, however, the number of management actions increases, and the actions become more restrictive. Habitats within the conveyance property are listed as Level 2 and 3 (DOE 2013a). All species observed during the wildlife surveys are classified as level 1 or level 2, with the majority as Level 2, being listed as monitor species or listed under the MBTA.

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## **Appendix A Photos**

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**Photo 1. Tree with Swainson's Hawk Nest**



**Photo 2. Swainson's hawk circling above the site**



**Photo 3. Common Nighthawk eggs observed in July 2013 located in the middle portion of the site where bitterbrush and Indian ricegrass dominate**



**Photo 4. Curlew nesting sign along the access road at the southeast end of the study area**



**Photo 5. Coyote den located southern part of the site**



**Photo 6. Coyote den located northwestern portion of the site**



**Photo 7. Elk observed at the northwest end of the project site in July 2013**



**Photo 8. Possible ground squirrel burrow**



**Photo 9. Possible badger burrow located north end of the site**



**Photo 10. Short-horned lizard observed in May 2013 on a sand dune located at the northern portion of the site**



**Photo 11. Typical vegetation type observed at the site (Sandberg bluegrass and cheatgrass primarily dominate the area)**



**Photo 12. Sand dune areas observed throughout the site, photo facing northwest**

1 **APPENDIX I – SALSTROM AND EASTERLY, VEGETATION SURVEY**  
2 **OF THE PROPOSED LAND CONVEYANCE, CENTRAL HANFORD,**  
3 **WASHINGTON**

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# Vegetation Survey of the Proposed Land Conveyance

## Central Hanford, Washington



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**September 5, 2013 (Rev 1)**

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*All photos by (or of) Richard Easterly*

## TABLE OF CONTENTS

### Introduction

Landscape Description .....	1
Disturbance History.....	1

<b>Methods</b> .....	<b>1</b>
----------------------	----------

### Results and Discussion

Rare Plants.....	5
Vegetation Communities.....	6
Swales.....	12

<b>Literature Cited</b> .....	<b>18</b>
-------------------------------	-----------

### Appendices

- A. Methods used to map vegetation.
- B. Rare plant sighting form: *Leymus triticoides*.
- C. Species observed within the proposed land conveyance, Hanford Site, 2013

### Tables

1. Plant species of conservation concern (WNHP 2013) potentially found on Central Hanford within the area proposed for conveyance. ....	2
2. Species occurring within the study area whose distributions were tracked for the map of current vegetation .....	4

### Figures

1. Beardless wildrye ( <i>Leymus triticoides</i> ) in the southern portion of the study area .....	6
2. Distribution of generalized vegetation community types on the proposed land conveyance, Hanford Site, 2013.....	7
3. Distribution of representative shrub and grass species on the proposed land conveyance study area, Hanford, 2013.....	8
4. Dune complex in central portion of the site, with Indian ricegrass, snow buckwheat, needle-and-threadgrass and antelope bitterbrush .....	10
5. Antelope bitterbrush, snow buckwheat and Indian ricegrass in the central portion of the study area.....	10
6. Small dune blowout in distance with antelope bitterbrush and snow buckwheat, interdune with needle-and-threadgrass in middle, and bluebunch wheatgrass plants near foreground. ....	11
7. Area with relatively open sand in dune complex in the northern portion of the study area, with antelope bitterbrush, turpentine wave-wing ( <i>Pteryxia terebinthina</i> ) and Carey's balsamroot ( <i>Balsamorhiza careyana</i> ).....	11
8. Cheatgrass 'crop circles' .....	12
9. Salt heliotrope, closeup.....	13
10. Portion of the central swale in the southern portion of the study area .....	13
11. Swale area: salt heliotrope in foreground, large patch of hairy crabgrass in front of vehicles.....	14
12. Yellow beeplant in front of beardless wildrye (cheatgrass in middle) .....	14
13. Exposure of thick layer of Mazama ash where old irrigation ditch cut through longitudinal dune	15
14. Detail of swale areas. ....	16
15. Areas herein identified as Level 4 and Level 3 Resources (US DOE 2013) within the Proposed Land Conveyance study area .....	17

## INTRODUCTION

### LANDSCAPE DESCRIPTION

All of the study area has been shaped by the Pleistocene cataclysmic floods. The higher elevation area in the northwest corner is part of a gravel flood terrace downstream of a major flood bar (the 200 Area). The remaining study area includes lower flood terraces within the main flood channelways of the cataclysmic floods. As flood waters became temporarily ponded behind Wallula Gap, the slackwater repeatedly deposited fine-textured sediments across the site. These slackwater fines are capped by discontinuous eolian sand sheets, which in turn are capped by an eolian parabolic dune colony (Fecht et al. 2004). The dune colony has a repeating longitudinal pattern trending to the northwest (which is the predominate direction of strong wind in the region). The dunes are stabilized by vegetation except for limited blowouts.

The blanket of eolian deposition provides limited exposure to fluvial deposits of the late Pleistocene and Holocene. While the geomorphic forms of the fluvial deposits can generally be recognized beneath the dune sheets, they are not distinguishable beneath the deeper dunes (Fecht et al. 2004).

### DISTURBANCE HISTORY

Farming and ranching was conducted throughout the region before acquisition by the government in the early 1940s (Parker 1979). In an attempt to establish irrigated farmland, a number of irrigation canals were built across some of the lower elevation portions of the study site. Portions of the canals, which were built beginning around 1908 (Parker 1979), are still evident in aerial photos and on the ground. Sites where the canals crossed through deeper stabilized dunes have created blowouts at a number of sites, and the sand remobilization has created openings that provide limited dune habitat.

Currently, powerline right-of-ways, roads, quarries and an asbestos disposal landfill occur in the study area.

The area was mapped as being burned by wildfire in 1984 and 2000 (PNNL 2011a) as well as other smaller fires (mapped and unmapped) before and after those dates.

In 2003 the southwestern area, and in 2006 most of the remaining portion of the study area, was aerially sprayed with the herbicide Tordon® to control weedy species, possibly rush skeletonweed (*Chondrilla juncea*) or perhaps a postfire increase of Russian thistle (*Salsola tragus*)<sup>1</sup>. In addition to Tordon®, Liberate © was used in the 2006 herbicide treatment, and Vetran© and Quick© were also used in 2004. Herbicide treatment is not recorded in the northeast section of the study area, east of Highway 4 South, around Pit 9 (PNNL 2011b).

### METHODS:

Rare plant species (WNHP 2013) with the potential to occur in the study area are listed in Table 1. 'Potential to occur' was broadly interpreted so as to include species not currently known from Central Hanford, but whose habitat was potentially present within the project area.

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<sup>1</sup> Cover of Russian thistle typically increases for a short period of time after fire on sandy soils, unless herbicides are used, which often prolongs the high cover of the species (personal observation).

**Table 1.** Plant species of conservation concern (WNHP 2013) potentially found on Central Hanford within the area proposed for conveyance.

Species	Common name	Status: WNHP(Federal)*	Known on Central Hanford
<i>Aliciella leptomeria</i>	Great Basin gilia	Threatened	Yes
<i>Astragalus columbianus</i>	Columbia milkvetch	Sensitive (Species of Concern)	Yes
<i>Astragalus geyeri</i>	Geyer's milkvetch	Threatened	No
<i>Atriplex canescens</i> var. <i>canescens</i>	hoary saltbush	Review Group 1	Yes
<i>Camissonia minor</i>	small-flower evening-primrose	Sensitive	Yes
<i>Camissonia pygmaea</i>	dwarf evening-primrose	Sensitive	Yes
<i>Camissonia scapoidea</i> ssp. <i>scapoidea</i>	naked-stemmed evening primrose	Sensitive	No
<i>Cistanthe rosea</i>	rosy pussypaws	Threatened	Yes
<i>Corispermum americanum</i> var. <i>americanum</i>	American bugseed	Review Group 2	No
<i>Corispermum pallidum</i>	pale bugseed	Possibly extirpated	No
<i>Corispermum villosum</i>	hairy bugseed	Review Group 2	Yes
<i>Cryptantha leucophaea</i>	Gray cryptantha	Sensitive(Species of Concern)	Yes
<i>Eremogone franklinii</i> var. <i>thompsonii</i>	Thompson's sandwort	Review Group 1	Yes
<i>Erigeron piperianus</i>	Piper's daisy	Sensitive	Yes
<i>Erigeron poliospermus</i> var. <i>cereus</i>	hairy-seeded daisy	Review Group 1	No
<i>Gilia inconspicua</i>	shy gily-flower	Review Group 1	No
<i>Lathrocasis tenerrima</i>	delicate gilia	Review Group 1	No
<i>Leymus flavescens</i>	yellow wildrye	Review Group 1	Yes
<i>Leymus triticoides</i>	beardless wildrye	Review Group 1	No
<i>Loeflingia squarrosa</i> var. <i>squarrosa</i>	loeflingia	Threatened	Yes
<i>Micromonolepis pusilla</i>	red poverty-weed	Threatened	No
<i>Mimulus suksdorfii</i>	Suksdorf's monkey-flower	Sensitive	Yes
<i>Minuartia nuttallii</i> ssp. <i>fragillis</i>	brittle sandwort	Threatened	No
<i>Minuartia pusilla</i>	annual sandwort	Review Group 1	Yes
<i>Monolepis spathulata</i>	prostrate poverty-weed	Sensitive	No
<i>Nicotiana attenuata</i>	Coyote tobacco	Sensitive	Yes
<i>Oenothera caespitosa</i> ssp. <i>caespitosa</i>	caespitose evening-primrose	Sensitive	Yes
<i>Physaria didymocarpa</i> var. <i>didymocarpa</i>	common twinpod	Threatened	No
<i>Physaria douglasii</i> ssp. <i>tuplashensis</i>	White Bluffs bladderpod	Threatened (Proposed Threatened)	No
<i>Physaria geyeri</i> var. <i>geyeri</i>	Geyer's twinpod	Review Group 1	No
<i>Polygonum austiniiae</i>	Austin's knotweed	Threatened	No
<i>Uropappus lindleyi</i>	Lindley's microserris	Review Group 1	No
<i>Verbena stricta</i>	hoary verbena	Review Group 1	No

\* Categories of conservation status are the following (WNHP 2013):

**State (Washington Natural Heritage Program)**

**E** = Endangered. In danger of becoming extinct or extirpated from Washington.

**T** = Threatened. Likely to become endangered within the near future in Washington if the factors contributing to population decline or habitat loss continue.

**S** = Sensitive. Vulnerable or declining and could become endangered or threatened in the state without active management or removal of threats.

**X** = Possibly extinct or Extirpated. Documented to have previously occurred within Washington, but no longer thought to be present here.

**Review Group 1** = Of potential concern but needs more field work to assign another rank.

**Review Group 2** = Of potential concern but with unresolved taxonomic questions.

**Federal**

**LE** = Listed Endangered. The plant is in danger of extinction throughout all or a significant portion of its range.

**LT** = Listed Threatened. The plant is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

**PE** = Proposed Endangered. A plant that is proposed to be listed as endangered and is undergoing a review process

**PT** = Proposed Threatened. A plant that is proposed to be listed as threatened and is undergoing a review process

**C** = Candidate species. A plant for which FWS or NOAA Fisheries has on file sufficient information on biological vulnerability and threats to support a proposal to list as endangered or threatened.

**Species of Concern** = An informal term referring to a species that might be in need of conservation action. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

The survey was done during three sessions: a complete survey of the study area during early May, a reconnaissance visit during early June to check the phenology of key species (particularly annuals, see below), and a follow-up survey during early July. Sites identified during the first visit as potentially having habitat for rare species with later phenology were revisited and resurveyed completely during early June and/or early July. Those habitats included areas with loose sand and blowouts, dune trains and a swale area in the southern portion of the site that hosted unusual species (see below).

The timing of the visits was adjusted to accommodate the effects of the patterns of precipitation for the year, which included a lack of significant precipitation during winter and early spring, a hot spell in early May, and significant precipitation during late May/early June. The later visits were timed to give plants that might have germinated after the spring rains time to develop. It was dry enough prior to the late spring rain that annuals typically detected in June during wet years probably would not have been present. This theory was tested during the early June visit and found to be the case. Survey time was therefore shifted to July to detect plants that may have been stimulated by the late rain, particularly species detectable throughout most of the summer such as Coyote tobacco (*Nicotiana attenuata*) and several species of bugseed (*Corispermum pallidum*, *C. villosa* and *C. americanum* var. *americanum*). Annuals with the potential to develop during late spring and early summer, including *Camissonia pygmaea* and *C. minor*, were also considered to have relatively high potential to occur later.

Updating the map of existing vegetation was approached by first reviewing imagery from aerial photos and satellites to detect locations and potential identity of existing shrubs and areas with open sand and drawing a preliminary map. These areas were subsequently visited to identify the existing vegetation and evaluate the ecological condition of the areas. To the extent practical, the dominant species were tracked independently, so that maps can be constructed from the dataset that indicate the distribution and density for each of the tracked species. Species that occurred in the area whose distributions were tracked are listed in Table 2. Mapping methodology is described in Appendix A.

**Table 2. Species occurring within the study area whose distributions were tracked for the map of current vegetation.**

Shrubs		Priority for mapping**
<b>Antelope bitterbrush</b>	<i>Purshia tridentata</i>	High
<b>Big sagebrush</b>	<i>Artemisia tridentata</i>	High
<b>Grey rabbitbrush*</b>	<i>Ericameria nauseosus</i>	Low
<b>Green rabbitbrush*</b>	<i>Chrysothamnus viscidiflorus</i>	Low
<b>Snow buckwheat*</b>	<i>Eriogonum niveum</i>	Medium
Grasses		
<b>Bluebunch wheatgrass</b>	<i>Pseudoroegneria spicata</i>	High
<b>Cheatgrass*</b>	<i>Bromus tectorum</i>	Low
<b>Indian ricegrass</b>	<i>Achnatherum hymenoides</i>	High
<b>Needle-and-threadgrass</b>	<i>Hesperostipa comata</i>	High
<b>Sandberg bluegrass*</b>	<i>Poa secunda</i>	Low

\*Distribution not closely tracked.

\*\*See Appendix A.

In addition, more than 100 photo points were established at representative and unique sites and at vantage points to document the components and patterns of the existing vegetation. These points consisted of overlapping photos taken systematically, beginning to the facing north and proceeding counterclockwise for a full rotation. Additional photos of the ground were taken to document ground cover. The location was recorded with a GPS unit (Garmin eTrex Venture; accuracy of approximately three meters). In addition to being useful for updating the map of existing vegetation, the photos will provide an archive of information about the structure and composition of the vegetation and habitat at and near those sites.

## RESULTS AND DISCUSSION

### RARE PLANTS

Plant species observed within the study area are listed in Table 2. No species currently considered to be rare were found on the study area. However, one species for which sufficient information is not currently available to assign a conservation status (beardless wildrye, WNHP Review Group 1) was present.

Beardless wildrye (*Leymus triticoides*) was associated with an unusual swale habitat located in the southern portion of the site (see below). The taxon has not been collected in Washington during recent decades (Burke Museum 2013, Consortium of PNW Herbaria 2013).<sup>2</sup> The species' distribution within the study area was limited to a sites associated with a swale complex. In the central swale, the species formed thick, monotypic swards, as it did to a lesser extent in the northernmost swale (Figure 1). To the south of the relatively high longitudinal dune, patches were much more diffuse, with significant cover of other species such as cheatgrass, along with some of the other unusual species found in the swales (see below). The overall distribution of the species at this site is likely tied to some sort of aquatard located at depth (see 'Swale', below). Additional site details are provided in Appendix B (Washington Natural Heritage Program sighting form).

No other species currently of (potential) conservation concern were found during the survey. While the study can be considered a clearance for perennial species, many of the rare annual species likely did not have their environmental conditions met during 2013. Those requirements include specific environmental conditions in order for them to be present in any given year. Thus the lack of their detection does not rule out that they are present, only that the conditions were not conducive for them to be growing in 2013. Areas with the highest potential for those species are associated with the open sands in 'blowouts' on the stabilized dunes, which is limited in the study area (see below).

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<sup>2</sup> The label from a collection made by Henderson in 1892 from Yakima County states: '*Moist meadows. A valuable grass, yielding large crops of hay.*' (Burke Museum, 2013).



Figure 1. Beardless wildrye (*Leymus triticoides*) in the southern portion of the study area.

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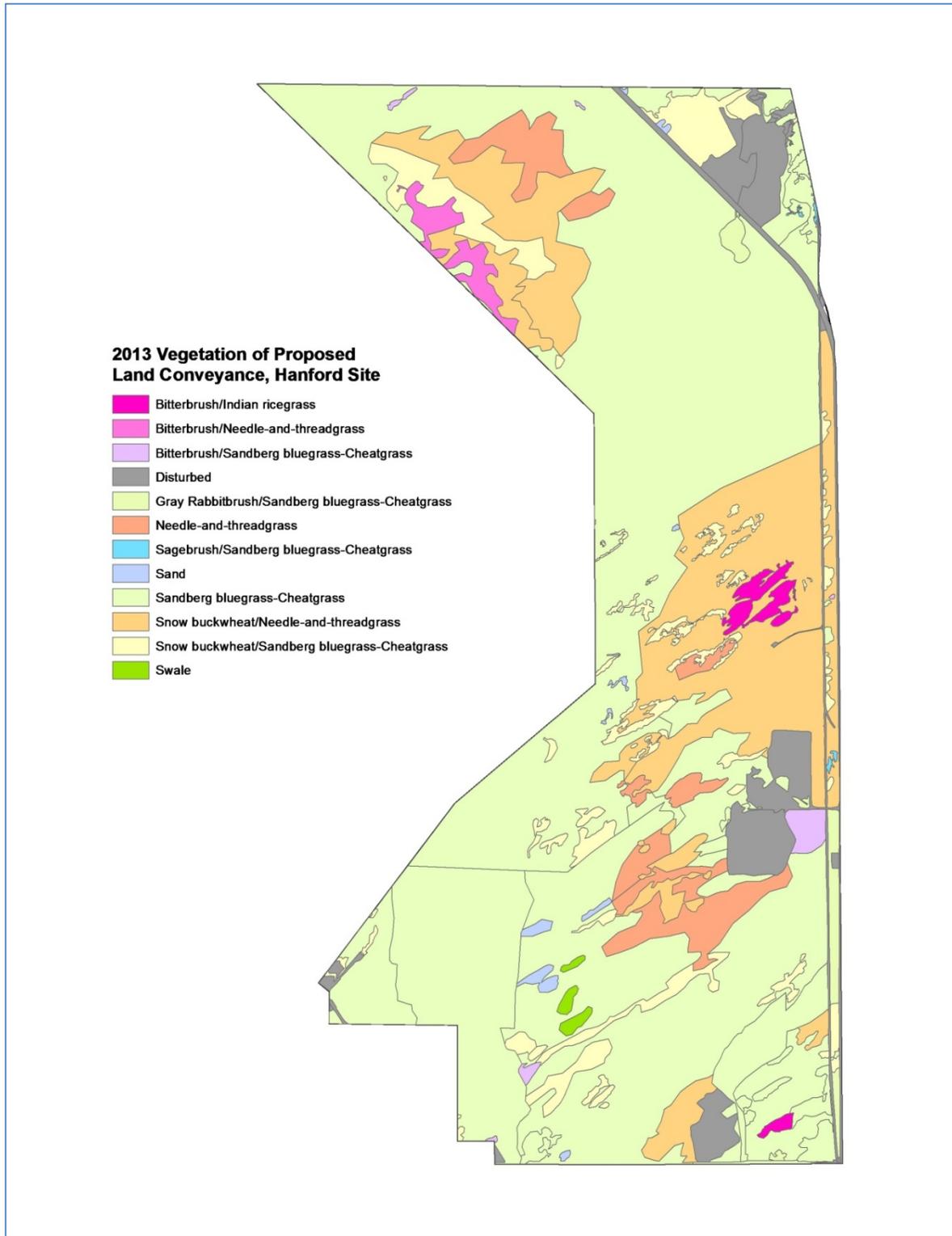
## VEGETATION COMMUNITIES

A map of the current vegetation and maps in which the distributions of dominant species are depicted are presented in figures 2 and 3.

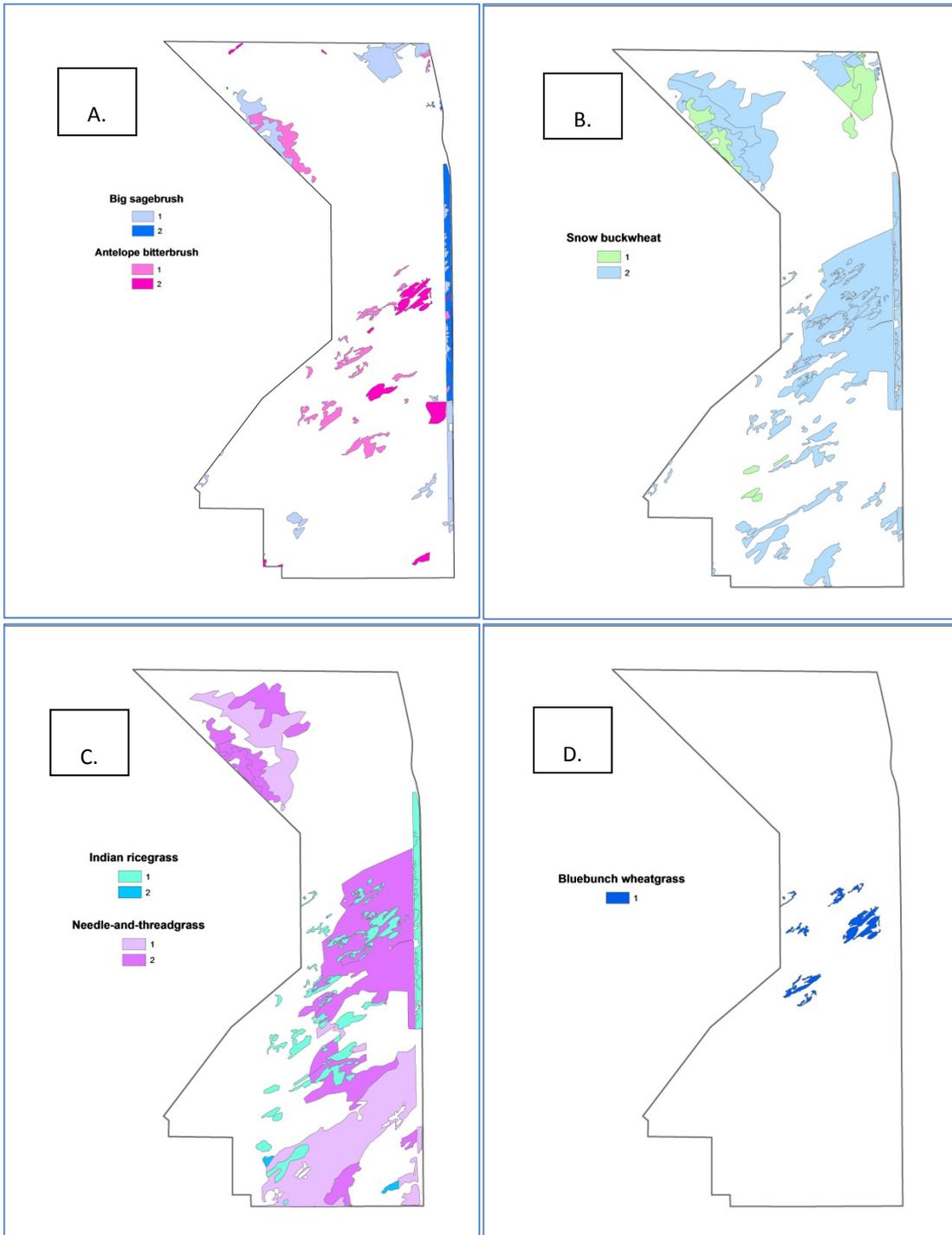
The shrub cover was burned off most of the survey area by the wildfire in 2000 (and others). While sagebrush is generally absent from areas that burned, some other shrubs have regenerated since the fire, primarily snow buckwheat and green and grey rabbitbrush.

Though most of the study area has been burned by wildfire during recent decades, limited areas on several of the larger dune blowouts have not burned, likely due to lower fuel loads and the varied local topography there. This has created limited refugia for late(r)-seral dune communities (antelope bitterbrush/Indian ricegrass dune complex). These areas, primarily in the central portion of the study area, are examples of higher quality plant communities on the Hanford Site (Level of Concern 3, Biological Resources Management Plan [BRMP, US DOE 2013]; see 'Levels of Concern' below). While limited in aerial extent, several of these sites are in relatively good condition, with a high proportion of cover and diversity of native species, and low cover of non-native species (figures 4-6). This habitat, which is adapted to openings, occurs where the dunes have been blown-out such as on tops and sideslopes, and where disturbance, such as from railroad and road cuts, has created openings for blowouts to occur downwind.

One other area that did not burn (although portions burned partially) was in the northwest of the site, which is on the edge of the higher terrace and included an area with geomorphic and topographic complexity. Shrub survival and reestablishment there includes antelope bitterbrush and sagebrush, as well as snow buckwheat and green and grey rabbitbrush (Figure 7). This area represents a model of the potential plant communities on the Hanford site and is herein identified as being in Resource Level of Concern 3 (US DOE 2013, see 'Levels of Concern' below). However, portions of that site are currently partially choked with tumbleweed carcasses that arrived from upwind (and post fire) sites.



**Figure 2.** Distribution of generalized vegetation community types on the proposed land conveyance, Hanford Site, 2013.



**Figure 3.** Distribution of representative shrub and grass species on the proposed land conveyance study area, Hanford, 2013. Distribution is noted at two levels. 1: Low cover (to approximately 5%). 2: Patchy or clumpy distribution within the polygon; the scale of the patches is not indicated and may indicate codominance with another species of that growth form (i.e., shrubs or grasses). Note that for maps with more than one species there may be an overlap of distribution that is not depicted (the map favors the species at the top of the legend). A. Big sagebrush and antelope bitterbrush. B. Snow buckwheat (under-represented on map; i.e., more widely distributed than indicated). C. Indian ricegrass and needle-and-threadgrass. D. Bluebunch wheatgrass.

Needle-and-threadgrass is regularly present in significant portions of the site (see Figure 6). Cover of the species appear to have increased after being burned, likely a result of subtle variations in the finer components of eolian soil deposition (not captured in the current soils map) and a seedbank from prefire plants that expanded after fire. We have observed and reported needle-and-threadgrass to increase in cover after fire in several other areas in the Pasco Basin with similar soils, such as on the USFWS Hanford Reach National Monument on the Wahluke (e.g., Easterly and Salstrom 2013a, 2013b, Salstrom and Easterly 2011), McGee-Riverland (Easterly and Salstrom 2003) and ALE units (personal observation). Areas with significant patches of needle-and-threadgrass are identified as being Resource Level of Concern 3 (US DOE 2013, see 'Levels of Concern' below).

Bluebunch wheatgrass plants occurred frequently on stabilized dunes, primarily on the tops and northerly aspects of those dune sets located near the middle of the site (see Figure 6). The species was usually present as scattered plants, although patches were occasionally present. A few patches of sand dropseed (*Sporobolus cryptandrus*) were observed, but the species was not dominant or widespread. In addition, while thickspike wheatgrass (*Elymus lanceolatus* ssp. *lanceolatus*) occurred intermittently (especially in more open areas), one patch of sand-dune wheatgrass (*E. lanceolatus* ssp. *psammophilus*) was observed in north-central portion of the site.<sup>3</sup>

Elsewhere the cover of cheatgrass was frequently heavy, sometimes having developed a thatch in which other species were excluded. However, this pattern typically varied at a relatively fine scale, where sites with even a slight north aspect had a more dominant cover of Sandberg bluegrass. Basins typically had high coverage of cheatgrass, although Sandberg bluegrass sometimes co-dominated. The pattern of Sandberg bluegrass being dominant on slight north aspects was typically also reflected with the cover and distribution of microbiotic crust, especially on fine-textured soils; coarser soils usually did not reflect this pattern. Areas with high cheatgrass cover typically did not support a noticeable microbiotic crust.

Cheatgrass die-off circles<sup>4</sup> were widespread in the study area, especially in the northern portion and near the unusual swale area (see below) in the south (Figure 8). These sites typically had higher cover of other species, sometimes the other species were not observed outside of the clearly-defined circular patches, such as weakstem cryptantha (*Cryptantha flaccida*), tarweed fiddleneck (*Amsinckia lycopsoides*), needle-and-threadgrass, Sandberg bluegrass, tumbled mustard (*Sisymbrium altissimum*) and microbiotic crust.

Rush skeletonweed (*Chondrilla juncea*) was present in low densities over much of the site. West of the Highway 4 South the coverage was generally low, whereas east of the highway (north of Pit 9), the species' cover was sometimes very high. The latter area also had diffuse knapweed (*Centaurea diffusa*) and a patch of Dalmatian toadflax (*Linnaria dalmatica*); that area was apparently excluded from the herbicide treatment(s).

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<sup>3</sup> We have not observed that subspecies previously, although we have been looking for it for the past couple years.

<sup>4</sup> Cheatgrass crop circles are a phenomenon that causes clearly-demarcated holes in the fabric of dense cover of cheatgrass in several areas within the Pasco Basin, as on Central Hanford (Easterly and Salstrom 1997) and the Wahluke Slope (e.g., Salstrom and Easterly 2013). The circles are typically one to four (seven) meters diameter, and appear to get progressively fuzzy edged with time. These 'circles' appear to be nurse areas (or cheatgrass-free zones) for at least a few years in which a wide assortment of species, some of which are native grasses and forbs, occur. While each footprint's clear pattern of opportunity fades, this transition towards higher diversity appears to allow for establishment of mid and later seral species. The circles likely occur as a result of a soil fungus (Dr. Ann Kennedy, WSU, personal communication).



**Figure 4.** Dune complex in central portion of the site, with Indian ricegrass, snow buckwheat, needle-and-threadgrass and antelope bitterbrush.



**Figure 5.** Antelope bitterbrush, snow buckwheat and Indian ricegrass in the central portion of the study area.



**Figure 6.** Small dune blowout in distance with antelope bitterbrush and snow buckwheat, interdunal area with needle-and-threadgrass in middle, and bluebunch wheatgrass plants near foreground.



**Figure 7.** Area with relatively open sand in dune complex in the northwest portion of the study area, with antelope bitterbrush, turpentine wave-wing (*Pteryxia terebinthina*) and Carey's balsamroot (*Balsamorhiza careyana*).



**Figure 8.** Cheatgrass ‘crop circles’ were extremely common in extensive portions of the study area.

## SWALES

There is an unusual assemblage of plant species at and near three swales in the southern portion of the area that appears to be unique on Central Hanford and possibly unique over a broader area (figures 9-12). Species that occur there include some not known to occur elsewhere on the site (Sackschewsky and Downs 2001, personal observation): beardless wildrye (*Leymus triticoides*; see above) and the non-native hairy crabgrass (*Digitaria sanguinalis*). In addition, two species considered to be ‘facultative wetland’ species that do not generally occur outside of riparian areas on Hanford were present: coyote willow (*Salix exigua*) and ‘mountain’ rush (*Juncus arcticus* var. *littoralis*). Other unusual species occurring in and around the swales were salt heliotrope (*Heliotropium curassavicum*)<sup>5</sup>, Douglas’ sedge (*Carex douglasii*) and yellow beeplant (*Cleome lutea*), none of which are typically found on Central Hanford (Sackschewsky and Downs 2001; personal observation).

The insect activity was relatively intense, being orders of magnitude higher than observed elsewhere in the study area every time we visited (during May, June and July), and included caterpillars, bees, wasps, butterflies and beetles. Nearly all the mountain rush stems had been girdled by caterpillars. The beardless wildrye and yellow beeplant plants provided aggregation sites for some insects.

Together, these species suggest that the local area has increased seasonally available moisture relative to other places in the region. Likely related to this, immediately to the south a thick layer of Mazama ash<sup>6</sup> is exposed where an old irrigation ditch bisected the dune and created a blowout (Figure 13). It seems probable that the ash underlies at least the low areas below the eolean sand, creating an aquatard and causing water to accumulate at some depth. The area with the most concentrated and diverse occurrence of the unusual species occurs within a series of basins on the topography. Elsewhere, to the south, the topography is open, but the species occurrences are likely related to an exposed shelf of the site-specific, seasonal water table.

<sup>5</sup> Salt heliotrope was known from a couple of early collections on the site with imprecise location information and which are probably not extant (Sackschewsky and Downs 2001; Sackschewsky personal communication), in addition to vernal pools on the east end of Gable Mountain (Burke Museum 2013). The species is classified as a ‘Facultative upland’ species in the arid west, although it is classified as an obligate wetland species in most other places within its range in the continental United States (USDA, NRCS. 2013)

<sup>6</sup> Mazama ash was derived from the eruption that created Crater Lake, Oregon, about 7000 years ago.



**Figure 9.** Salt heliotrope, closeup.



**Figure 10.** Portion of the northern swale in the southern portion of the study area. Salt heliotrope in the foreground, mountain rush (brown, erect stems) in the middle of the photo, Richard holding large carcass of a previous year's yellow beeplant, and sward of beardless wildrye behind him.



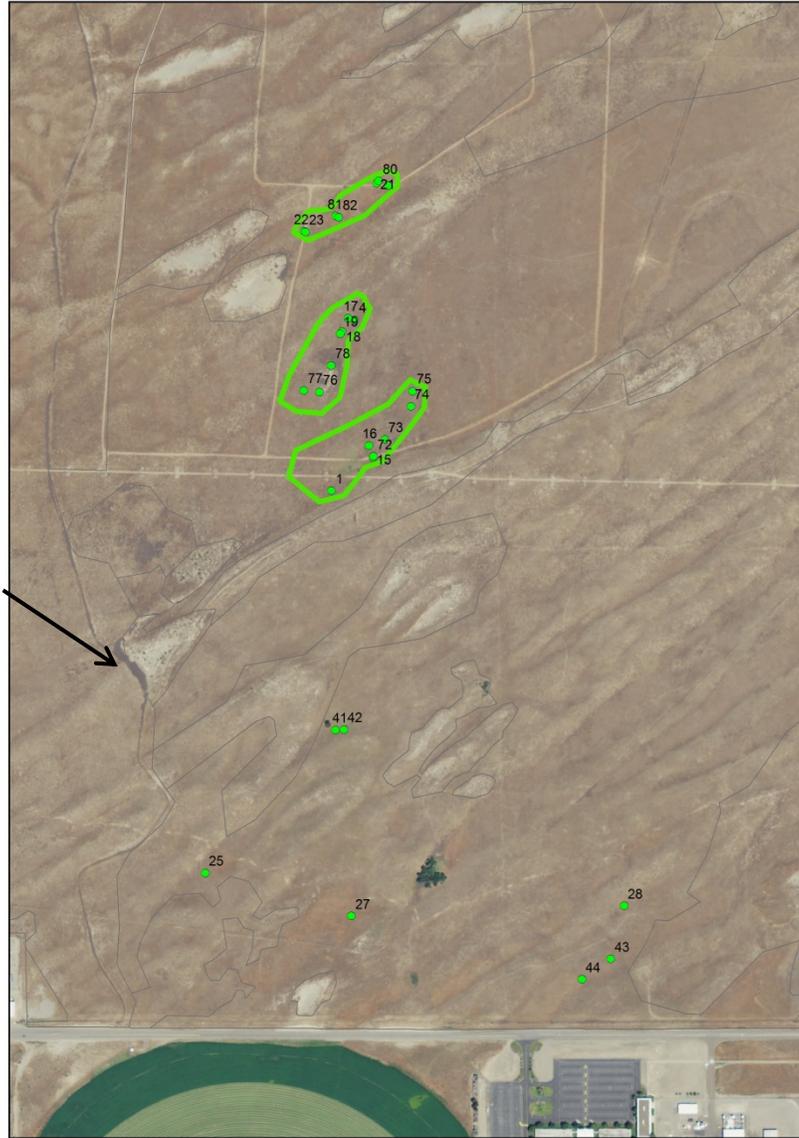
**Figure 11.** Swale area: salt heliotrope in foreground, large patch of hairy crabgrass in front of vehicles.



**Figure 12.** Yellow beeplant in front of beardless wildrye (cheatgrass in middle).



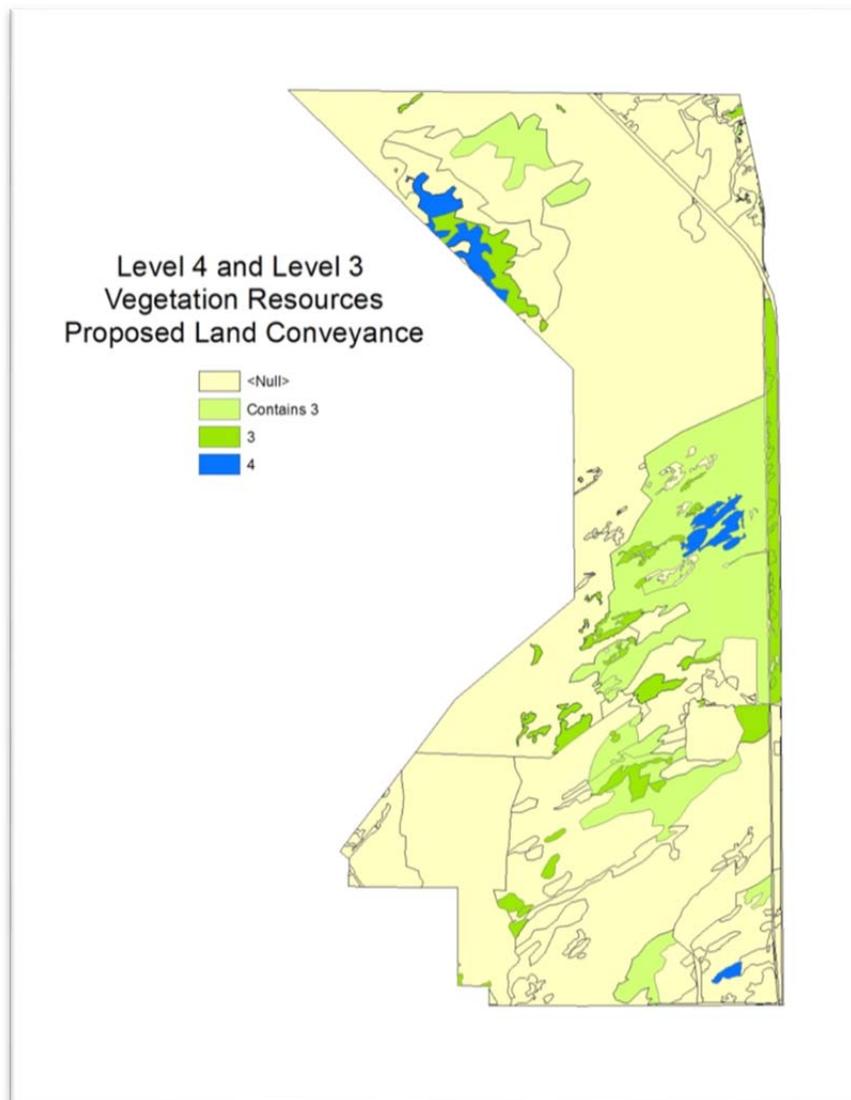
**Figure 13.** Exposure of thick layer of Mazama ash where old irrigation ditch cut through longitudinal dune (see location in Figure 14).



**Figure 14.** Detail of swale areas. Also depicted are outlier sites with the unusual species south of the longitudinal dune. 25, 27: *Leymus triticoides*. 41, 42: *Carex douglasii* and *Salix exigua*. 28, 44, 43: *Carex douglasii*. Arrow points to the location of and exposure of a thick layer of Mazama ash.

## LEVELS OF RESOURCE CONCERN

A map with provisional levels 3 and 4 Resources (see BRMP, US DOE 2013) identified within the study area is presented in Figure 15; no Level 5 Resources (vegetation based) were identified in the study area. The assessment was based on the quality of habitat and/or the presence of species of conservation concern, and includes habitat associated with dune blowouts, an unburned site dominated by antelope bitterbrush (to the north), other small occurrences of antelope bitterbrush, and the site of the unusual swales in the south where beardless wildrye occurs (Review Group 1 [WNHP 2013]; see 'Rare Plants', above). Also depicted are areas in which significant patches of needle-and-threadgrass (representing Level 3 steppe habitat) occurs within a matrix of lower quality habitat.



**Figure 15.** Areas identified as Level 4 and Level 3 Resources and areas containing patches of Level 3 Resources within the Proposed Land Conveyance study area.

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## APPENDIX A

### Methods used to map vegetation

Both the original map of existing vegetation and this updated map were created using the distributions of key plant species to delineate polygon boundaries. When observable, the species were tracked independently of one another to create map unit names that list several priority species and indicate their cover or distribution within the polygon. Tracking each species independently permits the map to be easily updated, to apply classification schemes as they are revised, and creates more detailed habitat information.

Mapping criteria for each species depended on the species' dominance, use in classifying vegetation, importance for indicating particular wildlife habitat, predictability of its distribution, and visibility from a distance. Polygon boundaries were drawn to reflect changes in cover of high- and medium-priority species. As much as possible, the boundaries were drawn to reflect the sinuosity of vegetation boundaries; this allows for better understanding of future fire behavior and recovery, wildlife use patterns, and other ecotone-driven 'edge-effects'.

High and medium priority species occurring in the polygon were listed as a component of the polygon name. High and medium priority species not listed in the polygon name were those that could be assumed to occur, given the presence of a 'trump' species (Table 2). For example, Sandberg's bluegrass generally occurs with Needle-and-thread grass (but not vice-versa) and when the latter was in a map unit, the former was not included in the name. Low priority species were also usually included in the map unit name, but precision of their cover on the map was lower, and their distributions were not generally used to draw polygon boundaries. The boundaries showing changes in shrub densities were drawn by extrapolating field observations using aerial photographs; grasses were assigned to these polygons based on field observations combined with local geomorphic patterns that they have been observed to follow.

To capture information about mosaics, ecotones, and possibly resiliency to disturbance, cover of high- and medium-priority species (see Table 1) was indicated at three levels of cover for each polygon.

- (1) **Level 1:** Low cover (present to approximately 5%), indicated by parentheses, (...), around that species name/code in map unit name.
- (2) **Level 2:** Irregular or clumpy distribution within a polygon was indicated with brackets, [...], around the species name/code in the map unit name. The scale at which the 'clumps' occurred varied; at finer scales, this designation may indicate co-dominance. No attempt was made to indicate the scale or pattern of clumps, and this designation intergrades with levels (1) and (3).
- (3) **Level 3:** Moderate to dense cover and a relatively even distribution in the polygon was indicated by no modifier of the species name in the map unit name.

The low cover and the 'clumpy' levels may be a product of historic fire patterns, site potential due to geomorphology and soils, patterns of reestablishment following disturbance (i.e. fire) or other undefined reasons. Geomorphic limits on a site's productivity and potential cover may be suggested by the map unit name with lithosol indicator species and/or level one or two of the dominant grass (generally bluebunch wheatgrass).

Cover of species with low mapping priority was noted at only levels one or two of cover. Species for which density levels of 3 were not recorded, levels 2 and 3 were not distinguished and cover greater than approximately 5% was recorded as '2'. For example, *Poa secunda* and *Bromus tectorum* are widespread in most of the drier cover types within the shrub steppe, with the latter frequently co-dominant on south-facing slopes. While we attempted to indicate their relative distributions, in many (most) cases they varied on a fine scale. We therefore extrapolated from observed distribution trends on substrate, slope, aspect, and fire and disturbance history; accuracy for these low priority species will be greater on a large scale rather than for any one polygon.

## APPENDIX B

Rare plant sighting form: *Leymus triticoides*

Washington Natural Heritage Program  
Rare Plant Sighting Form

Taxon Name: ***Leymus triticoides***

Are you confident of the identification? **Identification of specimen awaiting expert confirmation.**

Survey Site Name: **Swale, Central Hanford**

Surveyor's Name/Phone/Email: **Debra Salstrom & R. Easterly /360 481-1786/SEEbotanical@gmail.com**

Survey Date: **13-05-04** (yr-mo-day) County: **Benton**

Ownership (if known): **USDOE (Central Hanford)**

I used GPS to map the population: **Yes**

Coordinates are in electronic file on diskette (preferred)

Description of what coordinates represent: **Centers of patches**

GPS accuracy: **Garmin 60CSx**

Uncorrected

GPS datum: **WGS 1984**

To the best of my knowledge, I mapped the entire extent of this population: **Yes**

Is a revisit needed? **Yes**

Population Size (# of individuals or ramets) or estimate: **1000's**

Population (EO) Data (include population vigor, microhabitat, phenology, etc): **Patches in central and northern swales highly vigorous, in flower early June. Patches to the south diffuse, low vigor.**

Associated Species (include % cover by layer and by individual species for dominants in each layer):

Lichen/moss layer: **0**

Herb layer: ***Heliotropium curassavicum*, *Cleome lutea*, *Carex douglasii*, *Juncus arcticus ssp. littoralis*, *Bromus tectorum*, *Sisymbrium altissimum*, *Lactuca serriola*, *Digitaria sanguinalis*.**

Shrub layer(s): **0**

General Description (include description of landscape, surrounding plant communities, land forms, land use, etc.): **Unusual complex of 'swales' in the southern part of Central Hanford. Surrounding communities typical (burned) shrub-steppe on sandy substrate, heavy cover of *Bromus tectorum*, with *Poa secunda* and *Hesperostipa comata*/*Achnatherum hymenoides* in places. Area has unusual forb associates for the Site (see above) and a few *Salix exigua* shrubs occur nearby.**

Minimum elevation (ft.): **360** Maximum elevation (ft.): **380**

Size (acres): **< 2** Aspect: **0** Slope: **0**

Photo taken? **Yes**

Management Comments (exotics, roads, shape/size, position in landscape, hydrology, adjacent land use, cumulative effects, etc.): **Seasonally perched water table, possibly from an aquatard created by Mazama ash (layer exposed in blowout dip within longitudinal dune nearby).**

Protection Comments (legal actions/steps/strategies needed to secure protection for the site): **Occurrence is within area of proposed land conveyance, Central Hanford.**

Additional Comments (discrepancies, general observations, etc.): **Central Hanford: Security badge required for access.**

## APPENDIX C

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### Species observed within the proposed land conveyance, Hanford Site, 2013

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*Achillea millifolium*

*Achnatherum hymenoides*

*Agoseris heterophylla*

*Agoseris* sp.

*Ambrosia acanthicarpa*

*Amsinckia lycopsoides*

*Artemisia tridentata*

*Asperugo officanallis*

*Astragalus caricinus*

*Balsamorhiza careyana*

*Bromus tectorum*

*Cardaria pubescens*

*Carex douglasii*

*Centaurea repens*

*Chaenactis douglasii*

*Chenopodium leptophyllum*

*Chrondrilla juncea*

*Chrysothamnus viscidiflorus*

*Cleome lutea*

*Coldenia nuttallii*

*Comandra umbellatum*

*Convolvulus arvensis*

*Crepis atribarba*

*Cryptantha circumscissa*

*Crypthantha flaccida*

*Crypthantha pterocarya*

*Dalea ornata*

*Descurainia sophia*

*Digitaria sanguinalis*

*Draba verna*

*Elaeagnus angustifolia*

*Elymus lanceolatus*

*Elymus elymoides*

*Ericameria nauseosa*

*Erigeron pumilus*

*Eriogonum niveum*

*Eriogonum strictum* ssp. *proliferum* var. *anserinum*

*Eriogonum strictum* ssp. *proliferum* var. *proliferum*

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*Eriogonum vimineum/baleyi*

*Erodium circinatum*

*Erysimum occidentale*

*Euphorbia glyptosperma*

*Filago arvensis*

*Gilia sinuata*

*Heliotropium curassavicum*

*Hesperostipa comata*

*Holosteum umbellatum*

*Hymenopappus filifolius*

*Juncus arcticus* var. *littoralis*

*Kochia scoparia*

*Lactuca serriola*

*Lagophylla ramosissima*

*Layia glandulosa*

*Lepidium perfoliatum*

*Leymus triticoides*

*Linaria dalmatica*

*Lomatium macrocarpum*

*Machaeranthera canescens*

*Mentzelia albicaulis*

*Nepeta cataria*

*Oenothera pallida*

*Opuntia x columbiana*

*Penstemon acuminatus*

*Phacelia hastata*

*Phacelia linearis*

*Plantago patagonica*

*Poa bulbosa*

*Poa secunda* ssp. *secunda*

*Poa secunda* ssp. *juncifolia*

*Pseudoroegneria spicata*

*Psoralea lanceolata*

*Pteryxia terebinthina*

*Purshia tridentata*

*Robinia pseudo-acacia*

*Rumex venosus*

*Salix exigua*

*Salsola tragus*

*Sisymbrium altissimum*

*Sonchus* sp.

*Sporobolus cryptandrus*

*Stephanomeria paniculata*

*Tragopogon dubius*

*Tribulus terrestris*

*Vulpia microstachys*

*Vulpia sp.*

1 **APPENDIX J – AIR EMISSIONS ESTIMATES**

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**TABLE OF CONTENTS**

4		
5	J.	APPENDIX J – AIR EMISSIONS ESTIMATES .....J-1
6	J.1	Introduction ..... J-1
7	J.2	Construction Emissions Assumptions ..... J-1
8	J.3	Operational Emissions Assumptions ..... J-29
9	J.4	References ..... J-35
10		<b>List of Tables</b>
11	Table J-1.	Summary air emissions from construction on the 1,341-acre Parcel. ....J-2
12	Table J-2.	Combustion emissions from Construction on the 1,341-acre parcel. ....J-3
13	Table J-3.	Emission factors used for construction equipment on the 1,341-acre parcel. ....J-4
14	Table J-4.	Combustion emissions summary for Construction on the 1,341-acre parcel. ....J-6
15	Table J-5.	Construction fugitive dust emissions on the 1,341-acre parcel. ....J-7
16	Table J-6.	Construction Fugitive Dust emission factors on the 1,341-acre parcel. ....J-8
17	Table J-7.	Haul truck emissions for Construction on the 1,341-acre parcel.....J-9
18	Table J-8.	Construction commuter emissions for the 1,341-acre parcel. ....J-10
19	Table J-9.	Summary of air emissions from construction on the 300-acre parcel. ....J-11
20	Table J-10.	Combustion emissions from construction on the 300-acre parcel. ....J-12
21	Table J-11.	Emission factors used for construction equipment on the 300-acre parcel. ....J-13
22	Table J-12.	Combustion emissions summary for construction on the 300-acre parcel. ....J-15
23	Table J-13.	Construction fugitive dust emissions on the 300-acre parcel. ....J-16
24	Table J-14.	Construction fugitive dust emission factors on the 300-acre parcel. ....J-17
25	Table J-15.	Haul truck emissions for the 300-acre parcel. ....J-18
26	Table J-16.	Construction commuter emissions for the 300-acre parcel. ....J-19
27	Table J-17.	Summary of air emissions from construction on the 539-acre PAAL parcel.....J-20
28	Table J-18.	Combustion emissions from construction on the 539-acre PAAL parcel. ....J-21
29	Table J-19.	Emission factors used for construction equipment on the 539-acre PAAL parcel. ....J-22
30	Table J-20.	Combustion emissions summary for construction on the 539-acre PAAL parcel. ....J-24
31	Table J-21.	Construction fugitive dust emissions on the 539-acre PAAL parcel.....J-25
32	Table J-22.	Construction fugitive dust emission factors on the 539-acre PAAL parcel. ....J-26
33	Table J-23.	Haul truck emissions for the 539-acre PAAL parcel.....J-27
34	Table J-24.	Construction commuter emissions for the 539-acre PAAL parcel. ....J-28
35	Table J-25.	Summary of air emissions from the proposed operational activities.....J-30

36 Table J-26. Calculated emissions from the operation of natural gas-fired boilers. ....J-31

37 Table J-27. Calculated air emissions from an emergency generator. ....J-32

38 Table J-28. Truck traffic emissions. ....J-33

39 Table J-29. Commuter emissions. ....J-34

40

41

## J. APPENDIX J – AIR EMISSIONS ESTIMATES

42

### J.1 INTRODUCTION

43

Appendix J is the raw output of the program used to estimate the air emissions from the Proposed Action. It is designed to show the technical factors and assumptions that run “under the hood.”

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Pertinent details of the program have been summarized in the body of the environmental assessment as well as the paragraphs in **Sections J.2** and **J.3**.

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### J.2 CONSTRUCTION EMISSIONS ASSUMPTIONS

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Because the exact footprint and design of each building to be constructed is not known, numerous assumptions were made in the air emission estimates to establish parameters for the analysis. The intent of these assumptions was to bracket the potential air impacts to show the upper bound scenario.

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The key assumptions include the following:

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- Only 1,341 acres would be disturbed by construction in 1 year (this is the size of the larger TRIDEC parcel).

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- The proposed buildings would occupy 70 percent (939 acres); roadways, parking, and pavement 25 percent (335 acres); and landscaping and open space 5 percent (67 acres) of the 1,341-acre parcel. These are standard modeling parameters for air emissions analysis.

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- Each building proposed to be constructed would be one story in height. Even though some representative facilities are shown to be multi-story, this simplification does not appreciably affect the air quality estimates because the amount of ground disturbance would not change based on the number of floors in each building.

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- The 300-acre parcel would be disturbed during the construction of the solar site but no buildings and roadways would be constructed and no landscaping would occur at this area. Grading for the 300-acre solar site would take three months and construction of the solar site would take 1 year.

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- Only 10 percent of the 539-acre PAAL parcel would be disturbed from the construction of utilities and infrastructure.

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The following pages provide detailed background information on the air emissions estimated to be generated from construction activities.

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**Table J-1. Summary air emissions from construction on the 1,341-acre Parcel.**

**Air Emissions from Construction on the 1,341-acre Parcel**

		NO <sub>x</sub> (ton)	VOC (ton)	CO (ton)	SO <sub>2</sub> (ton)	PM <sub>10</sub> (ton)	PM <sub>2.5</sub> (ton)	CO <sub>2</sub> (ton)
Each Construction Year	Combustion	500,716	43,983	218,694	30,910	35,442	34,379	57,175,102
	Fugitive Dust	-	-	-	-	1,991,385	199,139	-
	Haul Truck On-Road	67,972	6,328	36,332	0,218	2,182	2,073	17,822,489
	Construction Commuter	9,310	9,555	91,857	0,129	1,077	0,690	13,218,305
	<b>Total</b>	<b>577,997</b>	<b>59,867</b>	<b>346,883</b>	<b>40,257</b>	<b>2,030,087</b>	<b>236,281</b>	<b>88,015,896</b>

Note: Total PM<sub>10/2.5</sub> fugitive dust emissions are assuming USEPA 50% control efficiencies.

Each Construction Year CO<sub>2</sub> emissions converted to metric tons = **79,830.42** metric tons

72  
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Summary  
Estimated Emissions from Construction on the 1,341-acre Parcel

74  
75  
76

**Table J-2. Combustion emissions from Construction on the 1,341-acre parcel.**

<b>Combustion Emissions</b>			
Combustion Emissions of VOC, NO <sub>x</sub> , SO <sub>2</sub> , CO, PM <sub>2.5</sub> , PM <sub>10</sub> , and CO <sub>2</sub> due to Construction and Demolition			
<b>Construction on the 1,341-acre Parcel</b>		<b>Area Disturbed</b>	
Total Building Construction Area		936 acres	
Total Roadway Construction Area		336 acres	
Total Landscaping or Open Space Area		67 acres	
		Total Disturbance Area:	1,341 acres
<b>Summary of Parameters</b>			
Total Building Construction Area:	40,685,772 ft <sup>2</sup>		
		936 acres	
Total Demolition Area:	0 ft <sup>2</sup>		
		0 acres	
New Roadway Construction Area:	14,603,490 ft <sup>2</sup>		
		336 acres	
Total Disturbed Area:	56,413,960 ft <sup>2</sup>		
		1,341 acres	
Construction Duration:	12 months		
Annual Construction Activity:	240 days		Assumes 4 weeks per month, 5 days per week of work.

77  
78

Project Combustion  
Estimated Emissions from Construction on the 1,341-acre Parcel

79  
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**Table J-3. Emission factors used for construction equipment on the 1,341-acre parcel.**

**Emission Factors Used for Construction Equipment**

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0  
Emission factors are taken from the NONROAD model and were provided to HDR by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US feet for CY2007.  
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading								
Equipment	No. Reqt. <sup>1</sup> per 10 acres	NO <sub>x</sub> (lb/day)	VOC <sup>2</sup> (lb/day)	CO (lb/day)	SO <sub>2</sub> <sup>3</sup> (lb/day)	PM <sub>10</sub> (lb/day)	PM <sub>2.5</sub> (lb/day)	CO <sub>2</sub> (lb/day)
Bulldozer	1	13.597	0.957	5.502	1.617	0.895	0.466	1458.904
Motor Grader	1	9.889	0.728	3.203	0.797	0.655	0.635	1141.647
Water Truck	1	18.356	0.894	7.004	1.835	0.998	0.588	2342.975
<b>Total per 10 acres of activity</b>	<b>3</b>	<b>41.841</b>	<b>2.577</b>	<b>15.710</b>	<b>3.449</b>	<b>2.546</b>	<b>2.489</b>	<b>4841.528</b>

Paving								
Equipment	No. Reqt. <sup>1</sup> per 10 acres	NO <sub>x</sub> (lb/day)	VOC <sup>2</sup> (lb/day)	CO (lb/day)	SO <sub>2</sub> <sup>3</sup> (lb/day)	PM <sub>10</sub> (lb/day)	PM <sub>2.5</sub> (lb/day)	CO <sub>2</sub> (lb/day)
Paver	1	3.831	0.374	2.955	0.281	0.350	0.340	401.932
Roller	1	4.825	0.443	2.514	0.374	0.434	0.421	535.074
Truck	2	36.712	1.788	14.008	3.721	1.892	1.832	4985.951
<b>Total per 10 acres of activity</b>	<b>4</b>	<b>45.367</b>	<b>2.609</b>	<b>18.578</b>	<b>3.926</b>	<b>2.776</b>	<b>2.603</b>	<b>5923.957</b>

Demolition								
Equipment	No. Reqt. <sup>1</sup> per 10 acres	NO <sub>x</sub> (lb/day)	VOC <sup>2</sup> (lb/day)	CO (lb/day)	SO <sub>2</sub> <sup>3</sup> (lb/day)	PM <sub>10</sub> (lb/day)	PM <sub>2.5</sub> (lb/day)	CO <sub>2</sub> (lb/day)
Loader	1	13.432	0.992	5.579	0.949	0.927	0.869	1360.096
Haul Truck	1	18.356	0.894	7.004	1.835	0.998	0.588	2342.975
<b>Total per 10 acres of activity</b>	<b>2</b>	<b>31.888</b>	<b>1.886</b>	<b>12.584</b>	<b>2.785</b>	<b>1.923</b>	<b>1.865</b>	<b>3703.074</b>

Building Construction								
Equipment <sup>1</sup>	No. Reqt. <sup>1</sup> per 10 acres	NO <sub>x</sub> (lb/day)	VOC <sup>2</sup> (lb/day)	CO (lb/day)	SO <sub>2</sub> <sup>3</sup> (lb/day)	PM <sub>10</sub> (lb/day)	PM <sub>2.5</sub> (lb/day)	CO <sub>2</sub> (lb/day)
<b>Stationary</b>								
Generator Set	1	2.381	0.317	1.183	0.149	0.227	0.220	213.059
Industrial Site	1	2.618	0.316	1.905	0.204	0.325	0.315	281.820
Welder	1	1.124	0.378	1.504	0.075	0.227	0.220	112.393
<b>Mobile (non-road)</b>								
Truck	1	18.356	0.894	7.004	1.835	0.998	0.588	2342.975
Forklift	1	5.342	0.560	3.332	0.399	0.554	0.537	572.236
Crane	1	9.575	0.665	2.363	0.851	0.900	0.485	931.829
<b>Total per 10 acres of activity</b>	<b>6</b>	<b>39.396</b>	<b>3.130</b>	<b>17.362</b>	<b>3.116</b>	<b>2.829</b>	<b>2.744</b>	<b>4484.512</b>

Note: Footnotes for tables are on following page

82  
83

Project Continuation  
Estimated Emissions from Construction on the 1,341-acre Parcel

84  
85  
86  
87

**Table J-3. Emission factors used for construction equipment on the 1,341-acre parcel (continued).**

**Architectural Coatings**

Equipment	Nm. Reqt. <sup>a</sup> per 10 acres	NO <sub>x</sub> (lb/day)	VOC <sup>b</sup> (lb/day)	CO (lb/day)	SO <sub>2</sub> <sup>c</sup>	PM <sub>10</sub> (lb/day)	PM <sub>2.5</sub> (lb/day)	CO <sub>2</sub> (lb/day)
Air Compressor	1	3.574	0.373	1.565	0.251	0.309	0.300	369.773
<b>Total per 10 acres of activity</b>	<b>1</b>	<b>3.574</b>	<b>0.373</b>	<b>1.565</b>	<b>0.251</b>	<b>0.309</b>	<b>0.300</b>	<b>369.773</b>

- a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity. (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
- b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
- c) The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Action will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO<sub>2</sub> emissions by more than a factor of two.
- d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

88  
89  
90

Project Construction  
Estimated Emissions from Construction on the 1,341-acre Parcel

91  
92  
93

**Table J-4. Combustion emissions summary for Construction on the 1,341-acre parcel.**

**PROJECT-SPECIFIC EMISSION FACTOR SUMMARY**

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day)						
		NO <sub>x</sub>	VOC	CO	SO <sub>2</sub> **	PM <sub>10</sub>	CO <sub>2</sub>	
Grading Equipment	134	5579.524	345.315	2106.127	482.214	341.099	352.866	862194.531
Paving Equipment	34	1547.488	88.594	831.867	133.475	84.387	91.555	191214.533
Demolition Equipment	1	31.806	1.886	12.984	2.585	1.823	1.885	3703.074
Building Construction	84	3703.254	284.202	1833.937	292.937	285.930	257.952	419884.297
Air Compressor for Architectural Coating	84	335.862	35.678	147.159	23.800	25.078	28.204	33818.686
Architectural Coating			521.253					

\*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.

\*\*Emission factor is from the evaporation of solvents during painting per "Air Quality Thresholds of Significance", SMOGMD, 1994

Example: SMOGMD Emission Factor for Grading Equipment NO<sub>x</sub> = (Total Grading NO<sub>x</sub> per 10 acres)/(Equipment Multiplier)

**Summary of Input Parameters**

	Total Area (ft <sup>2</sup> )	Total Area (acres)	Total Days	
Grading	58,413,860	1,341.700	6	(from "Grading" worksheet)
Paving	14,503,460	335.250	47	
Demolition	0	0.000	0	
Building Construction	40,889,772	938.700	240	
Architectural Coating	40,889,772	938.700	20	(per SMOGMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The "Total Days" estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for "Asphaltic Concrete Pavement: Lots and Driveways - 6" stone base", which provides an estimate of square feet paved per day. There is also an estimate for "Plain Cement Concrete Pavement", however the estimate for asphalt is used because it is more conservative. The "Total Days" estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from "Building Demolition - Small Buildings, Concrete", assuming a height of 30 feet for a two-story building, from "Building Footings and Foundations Demolition - 6" Thick, Plain Concrete", and from "Demolish, Remove Pavement and Curb - Concrete to 6" thick, rebar-reinforced". The "Total Days" estimate for building construction is assumed to be 240 days.

**Total Project Emissions by Activity (lbs)**

	NO <sub>x</sub>	VOC	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
Grading Equipment	33,429,847	2,071,897	12,630,759	2,773,287	2,046,584	1,865,196	3,972,887,183
Paving	72,451,656	4,181,332	28,899,751	6,269,405	4,433,426	4,300,423	8,981,469,983
Demolition	-	-	-	-	-	-	-
Building Construction	888,780,938	70,938,518	382,164,908	70,354,868	63,823,214	61,908,518	100,719,383,370
Architectural Coatings	6,719,238	11,124,636	2,942,887	472,117	581,522	564,077	678,373,524
<b>Total Emissions (lbs):</b>	<b>1,061,491,279</b>	<b>87,986,383</b>	<b>437,388,415</b>	<b>79,819,678</b>	<b>70,884,756</b>	<b>68,758,213</b>	<b>114,358,203,578</b>

**Results: Total Project Annual Emission Rates**

	NO <sub>x</sub>	VOC	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
Total Project Emissions (lbs)	1,061,491,279	87,986,383	437,388,415	79,819,678	70,884,756	68,758,213	114,358,203,578
Total Project Emissions (tons)	500,718	43,993	218,694	39,910	35,442	34,379	57,175,102

Project Combustion  
Estimated Emissions from Construction on the 1,341-acre Parcel

94  
95

96  
97  
98

**Table J-5. Construction fugitive dust emissions on the 1,341-acre parcel.**

**Construction Fugitive Dust Emissions**

**Construction Fugitive Dust Emission Factors**

	Emission Factor	Units	Source
Construction and Demolition Activities	0.190 ton PM <sub>10</sub> /acre-month		MRI 1996, EPA 2001, EPA 2006
New Road Construction	0.420 ton PM <sub>10</sub> /acre-month		MRI 1996, EPA 2001, EPA 2006

**PM<sub>2.5</sub> Emissions**

PM <sub>2.5</sub> Multiplier	0.100	(10% of PM <sub>10</sub> emissions assumed to be PM <sub>2.5</sub> )	EPA 2001, EPA 2006
Control Efficiency	0.500	(assume 50% control efficiency for PM <sub>10</sub> and PM <sub>2.5</sub> emissions)	EPA 2001, EPA 2006

**New Roadway Construction (0.42 ton PM<sub>10</sub>/acre-month)**

Duration of Construction Project	12 months
Area	335 acres

**General Construction and Demolition Activities (0.19 ton PM<sub>10</sub>/acre-month)**

Duration of Project	12 months
Area	1,006 acres

	Project Emissions (tons/year)			
	PM <sub>10</sub> uncontrolled	PM <sub>10</sub> controlled	PM <sub>2.5</sub> uncontrolled	PM <sub>2.5</sub> controlled
New Roadway Construction	1659.660	244.530	165.966	84.483
General Construction Activities	2293.110	1146.555	229.311	114.656
<b>Total</b>	<b>3952.770</b>	<b>1991.585</b>	<b>395.277</b>	<b>199.139</b>

99  
100

Project Fugitive  
Estimated Emissions from Construction on the 1,341-acre Parcel

101  
102  
103

**Table J-6. Construction Fugitive Dust emission factors on the 1,341-acre parcel.**

**Construction Fugitive Dust Emission Factors**

**General Construction Activities Emission Factor**

**0.190 ton PM<sub>10</sub>/acre-month** Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM<sub>10</sub>/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM<sub>10</sub>/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 158 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM<sub>10</sub>/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM<sub>10</sub>/acre-month) and 75% of the average emission factor (0.11 ton PM<sub>10</sub>/acre-month). The 0.19 ton PM<sub>10</sub>/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001, EPA 2006). The 0.19 ton PM<sub>10</sub>/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM<sub>10</sub> and PM<sub>2.5</sub> in PM nonattainment areas.

**New Road Construction Emission Factor**

**0.420 ton PM<sub>10</sub>/acre-month** Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM<sub>10</sub>/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM<sub>10</sub>/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001, EPA 2006).

**PM<sub>2.5</sub> Multiplier**

**0.100**

PM<sub>2.5</sub> emissions are estimated by applying a particle size multiplier of 0.10 to PM<sub>10</sub> emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

**Control Efficiency for PM<sub>10</sub> and PM<sub>2.5</sub>**

**0.500**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM<sub>10</sub> and PM<sub>2.5</sub> in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

**References:**

- EPA 2001. Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999. EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.
- EPA 2006. Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants. Prepared for Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.
- MRI 1996. Improvement of Specific Emission Factors (BACM Project No. 1). Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

104  
105

Project Fugitive  
Estimated Emissions from Construction on the 1,341-acre Parcel

106  
107  
108

**Table J-7. Haul truck emissions for Construction on the 1,341-acre parcel.**

**Haul Truck Emissions**

Emissions from hauling construction supplies are estimated in this spreadsheet.

**Emission Estimation Method:**

United States Air Force (USAF). 2009. *Air Emission Factor Guide to Air Force Mobile Sources. Methods for Estimating Emissions of Air Pollutants For Mobile Sources at U.S. Air Force Installations.* December 2009.

**Assumptions:**

Haul trucks carry 20 cubic yards of material per trip.

The average distance from the project site to the materials source is 15 miles; therefore, a haul truck will travel 30 miles round trip.

Estimated number of trips required by haul trucks = total amount of material/20 cubic yards per truck

Assumes soil would not need to be hauled to or from the site.

Amount of Building Materials = 6,057,744 cubic yards  
Amount of Paving Material = 540,870 cubic yards

Assumes 4 cubic feet of building material are needed per square foot of building sq  
Assumes 1 cubic foot of pavement material is needed per square foot of new paver

Number of trucks required = 329,931 heavy duty diesel haul truck trips  
Miles per trip = 30 miles

**Heavy Duty Diesel Vehicle (HDDV) Average Emission Factors (grams/mile)**

	NO <sub>x</sub>	VOC	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
HDDV	6.23	6.58	3.33	0.02	0.20	0.19	1615.20

**Notes:**

Assumes Haul Trucks are Class 8b (HDDV8b; >60,000 lbs Gross Vehicle Weight)

The project site is located at a low altitude (<5,000 feet above sea level)

Construction assumed to occur in Calendar Year 2015, and construction vehicles are assumed to be on average 10 years old (Model Year 2005).

Emission factors for all pollutants are from USAF 2009, Appendix A, On-Road Vehicle Emission Factors, electronic, pages 458-464.

**HDDV Haul Truck Emissions**

	NO <sub>x</sub>	VOC	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
lbs	135943.688	12856.072	72663.309	436.416	4364.163	4145.955	35244977.952
tons	67.972	6.328	36.332	0.218	2.182	2.073	17622.489

Example Calculation: NO<sub>x</sub> emissions (lbs) = 30 miles per trip \* 5,021 trips \* NO<sub>x</sub> emission factor (g/mile) \* lb/453.6 g

109  
110

Haul Truck On-Road  
Estimated Emissions from Construction on the 1,341-acre Parcel

111  
112

**Table J-8. Construction commuter emissions for the 1,341-acre parcel.**

**Construction Commuter Emissions**

Emissions from construction workers commuting to the job site are estimated in this spreadsheet.

Emission Estimation Method: Emission factors from the South Coast Air Quality Management District (SCAQMD) EMFAC 2007 (v 2.3) Model (on-road) were used. These emission factors are available online at <http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>

**Assumptions:**

Passenger vehicle emission factors for scenario year 2012 are used.

The average roundtrip commute for a construction worker = 40 miles  
 Number of construction days = 240 days  
 Number of construction workers (daily) = 2500 people

**Passenger Vehicle Emission Factors for Year 2012 (lbs./mile)**

NO <sub>x</sub>	VOC	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
0.00079	0.00080	0.00795	0.00001	0.00009	0.00006	1.10153

Source: South Coast Air Quality Management District. EMFAC 2007 (ver 2.3) On-Road Emissions Factors. Last updated April 24, 2008. Available online: <http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>. Accessed 16 November 2011.

**Notes:**

The SCAQMD 2007 reference lists emission factors for reactive organic gas (ROG). For purposes of this worksheet ROG = VOC.

**Construction Commuter Emissions**

	NO <sub>x</sub>	VOC	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
lbs	18619.880	19110.689	183713.919	257.473	2154.998	1379.896	26436609.488
tons	9.310	9.555	91.857	0.129	1.077	0.690	13218.305

Example Calculation: NO<sub>x</sub> emissions (lbs) = 40 miles/day \* NO<sub>x</sub> emission factor (lb/mile) \* number of construction days \* number of workers

113  
114  
115

Construction Commuter  
Estimated Emissions from Construction on the 1,341-acre Parcel

116  
117  
118

**Table J-9. Summary of air emissions from construction on the 300-acre parcel.**

**Air Emissions from Construction on the 300-acre Parcel**

	NO <sub>x</sub> (ton)	VOC (ton)	CO (ton)	SO <sub>2</sub> (ton)	PM <sub>10</sub> (ton)	PM <sub>2.5</sub> (ton)	CO <sub>2</sub> (ton)
Each Construction Year							
Combustion	3.748	0.232	1.414	0.310	0.229	0.222	444.737
Fugitive Dust	-	-	-	-	85.500	8.550	-
Haul Truck On-Road	-	-	-	-	-	-	-
Construction Commuter	0.372	0.382	3.674	0.005	0.043	0.028	528.732
<b>Total</b>	<b>4.120</b>	<b>0.614</b>	<b>5.088</b>	<b>0.315</b>	<b>85.772</b>	<b>8.800</b>	<b>973.470</b>

Note: Total PM<sub>10/2.5</sub> fugitive dust emissions are assuming USEPA 50% control efficiencies.

Each Construction Year CO<sub>2</sub> emissions converted to metric tons = **882.94** metric tons

119  
120

Summary  
Estimated Emissions from Construction on the 300-acre Parcel

121  
122  
123

**Table J-10. Combustion emissions from construction on the 300-acre parcel.**

<b>Combustion Emissions</b>		
Combustion Emissions of VOC, NO <sub>x</sub> , SO <sub>x</sub> , CO, PM <sub>2.5</sub> , PM <sub>10</sub> , and CO <sub>2</sub> due to Construction and Demolition		
<b>Construction on the 300-acre Parcel</b>		
Total Land Disturbance for the solar array	<b>Area Disturbed</b>	300 acres
<b>Summary of Parameters per Year</b>		
Total Building Construction Area per Year:	0 ft <sup>2</sup>	0 acres
Total Demolition Area per Year:	0 ft <sup>2</sup>	0 acres
New Roadway Construction Area per Year:	0 ft <sup>2</sup>	0 acres
Total Disturbed Area per Year:	13,098,000 ft <sup>2</sup>	300 acres
Construction Duration:	12 months	
Annual Construction Activity:	240 days	Assumes 4 weeks per month, 5 days per week of work.

124  
125

Project Combustion  
Estimated Emissions from Construction on the 300-acre Parcel

126  
127  
128

**Table J-11. Emission factors used for construction equipment on the 300-acre parcel.**

**Emission Factors Used for Construction Equipment**

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0  
Emission factors are taken from the NONROAD model and were provided to HDR by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US feet for CY2007.  
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

**Grading**

Equipment	No. Req. <sup>1</sup> per 10 acres	NO <sub>x</sub> (lb/day)	VOC <sup>2</sup> (lb/day)	CO (lb/day)	SO <sub>2</sub> <sup>3</sup> (lb/day)	PM <sub>10</sub> (lb/day)	PM <sub>2.5</sub> (lb/day)	CO <sub>2</sub> (lb/day)
Bulldozer	1	13.597	0.957	5.502	1.017	0.895	0.866	1456.904
Motor Grader	1	9.689	0.726	3.203	0.797	0.855	0.635	1141.647
Water Truck	1	18.356	0.894	7.004	1.635	0.966	0.966	2342.975
<b>Total per 10 acres of activity</b>	<b>3</b>	<b>41.641</b>	<b>2.577</b>	<b>15.710</b>	<b>3.449</b>	<b>2.546</b>	<b>2.460</b>	<b>4941.526</b>

**Paving**

Equipment	No. Req. <sup>1</sup> per 10 acres	NO <sub>x</sub> (lb/day)	VOC <sup>2</sup> (lb/day)	CO (lb/day)	SO <sub>2</sub> <sup>3</sup> (lb/day)	PM <sub>10</sub> (lb/day)	PM <sub>2.5</sub> (lb/day)	CO <sub>2</sub> (lb/day)
Paver	1	3.831	0.374	2.055	0.281	0.350	0.340	401.932
Roller	1	4.825	0.443	2.514	0.374	0.434	0.421	530.074
Truck	2	36.712	1.788	14.009	3.271	1.952	1.932	4693.961
<b>Total per 10 acres of activity</b>	<b>4</b>	<b>45.367</b>	<b>2.605</b>	<b>18.578</b>	<b>3.926</b>	<b>2.716</b>	<b>2.693</b>	<b>5623.967</b>

**Demolition**

Equipment	No. Req. <sup>1</sup> per 10 acres	NO <sub>x</sub> (lb/day)	VOC <sup>2</sup> (lb/day)	CO (lb/day)	SO <sub>2</sub> <sup>3</sup> (lb/day)	PM <sub>10</sub> (lb/day)	PM <sub>2.5</sub> (lb/day)	CO <sub>2</sub> (lb/day)
Loader	1	13.452	0.962	5.579	0.949	0.827	0.899	1360.098
Haul Truck	1	18.356	0.894	7.004	1.635	0.966	0.966	2342.975
<b>Total per 10 acres of activity</b>	<b>2</b>	<b>31.808</b>	<b>1.856</b>	<b>12.584</b>	<b>2.585</b>	<b>1.823</b>	<b>1.865</b>	<b>3703.074</b>

**Building Construction**

Equipment <sup>4</sup>	No. Req. <sup>1</sup> per 10 acres	NO <sub>x</sub> (lb/day)	VOC <sup>2</sup> (lb/day)	CO (lb/day)	SO <sub>2</sub> <sup>3</sup> (lb/day)	PM <sub>10</sub> (lb/day)	PM <sub>2.5</sub> (lb/day)	CO <sub>2</sub> (lb/day)
<b>Stationary</b>								
Generator Set	1	2.381	0.317	1.163	0.149	0.227	0.220	213.066
Industrial Saw	1	2.618	0.316	1.998	0.204	0.325	0.315	391.920
Welder	1	1.124	0.378	1.504	0.078	0.227	0.220	112.363
<b>Mobile (non-road)</b>								
Truck	1	18.356	0.894	7.004	1.635	0.966	0.966	2342.975
Forklift	1	8.342	0.580	3.332	0.369	0.554	0.537	672.236
Crane	1	9.675	0.689	2.393	0.851	0.300	0.485	931.929
<b>Total per 10 acres of activity</b>	<b>6</b>	<b>36.396</b>	<b>3.130</b>	<b>17.362</b>	<b>3.116</b>	<b>2.829</b>	<b>2.744</b>	<b>4464.512</b>

Note: Footnotes for tables are on following page

129  
130

Project Continuation  
Estimated Emissions from Construction on the 300-acre Parcel

131  
132  
133  
134

**Table J-11. Emission factors used for construction equipment on the 300-acre parcel (continued).**

**Architectural Coatings**

Equipment	No. Reqd. <sup>1</sup> per 10 acres	NO <sub>x</sub> (lb/day)	VOC <sup>2</sup> (lb/day)	CO (lb/day)	SO <sub>2</sub> <sup>3</sup>	PM <sub>10</sub> (lb/day)	PM <sub>2.5</sub> (lb/day)	CO <sub>2</sub> (lb/day)
Air Compressor	1	3.674	0.373	1.585	0.251	0.300	0.300	350.773
Total per 10 acres of activity	1	3.674	0.373	1.585	0.251	0.300	0.300	350.773

- a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 20 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
- b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emission factors for total HC and for VOC. The factors used here are the VOC factors.
- c) The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Action will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO<sub>2</sub> emissions by more than a factor of two.
- d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

135  
136

Project Construction  
Estimated Emissions from Construction on the 1,347-acre Parcel

137  
138  
139

**Table J-12. Combustion emissions summary for construction on the 300-acre parcel.**

**PROJECT-SPECIFIC EMISSION FACTOR SUMMARY**

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day)						
		NO <sub>x</sub>	VOC	CO	SO <sub>2</sub> **	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
Grading Equipment	30	1345.237	77.310	471.207	103.481	76.365	74.074	148245.790
Paving Equipment	1	45.367	2.806	16.578	3.920	2.770	2.693	5623.857
Demolition Equipment	1	31.805	1.886	12.544	2.555	1.923	1.895	3703.074
Building Construction	1	30.598	3.130	17.382	3.118	2.828	2.744	4484.512
Air Compressor for Architectural Coating	1	3.974	0.373	1.565	0.261	0.309	0.300	358.773
Architectural Coating <sup>††</sup>			0.000					

\*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.

\*\*Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994

Example: SMAQMD Emission Factor for Grading Equipment NO<sub>x</sub> = (Total Grading NO<sub>x</sub> per 10 acres)/(Equipment Multiplier)

**Summary of Input Parameters**

	Total Area (ft <sup>2</sup> )	Total Area (acres)	Total Days	
Grading	13,000,000	300,000	8	(from "Grading" worksheet)
Paving	0	0.000	0	
Demolition	0	0.000	0	
Building Construction	0	0.000	0	
Architectural Coating	0	0.000	0	(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The "Total Days" estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for "Asphalt Concrete Pavement, Lots and Driveways - 6" stone base", which provides an estimate of square feet paved per day. There is also an estimate for "Plain Cement Concrete Pavement", however the estimate for asphalt is used because it is more conservative. The "Total Days" estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from "Building Demolition - Small Buildings, Concrete", assuming a height of 30 feet for a two-story building; from "Building Footings and Foundations Demolition - 6" Thick, Plain Concrete" and from "Demolish, Remove Pavement and Curb - Concrete to 6" Thick, rod reinforced". The "Total Days" estimate for building construction is assumed to be 240 days.

**Total Project Emissions by Activity (lbs)**

	NO <sub>x</sub>	VOC	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
Grading Equipment	7,495,421	463,858	2,827,782	620,885	458,193	444,447	889,474,742
Paving	-	-	-	-	-	-	-
Demolition	-	-	-	-	-	-	-
Building Construction	-	-	-	-	-	-	-
Architectural Coatings	-	-	-	-	-	-	-
<b>Total Emissions (lbs):</b>	<b>7,495,421</b>	<b>463,858</b>	<b>2,827,782</b>	<b>620,885</b>	<b>458,193</b>	<b>444,447</b>	<b>889,474,742</b>

**Results: Total Project Annual Emission Rates**

	NO <sub>x</sub>	VOC	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
Total Project Emissions (lbs)	7,495,421	463,858	2,827,782	620,885	458,193	444,447	889,474,742
Total Project Emissions (tons)	3,748	0,232	1,414	0,310	0,228	0,222	444,737

140  
141

Project Combustion  
Estimated Emissions from Construction on the 300-acre Parcel

142  
143  
144

**Table J-13. Construction fugitive dust emissions on the 300-acre parcel.**

**Construction Fugitive Dust Emissions**

**Construction Fugitive Dust Emission Factors**

	Emission Factor	Units	Source
Construction and Demolition Activities	0.190 ton PM <sub>10</sub> /acre-month		MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.420 ton PM <sub>10</sub> /acre-month		MRI 1996; EPA 2001; EPA 2006
<b>PM<sub>2.5</sub> Emissions</b>			
PM <sub>2.5</sub> Multiplier	0.100	(10% of PM <sub>10</sub> emissions assumed to be PM <sub>2.5</sub> )	EPA 2001; EPA 2006
Control Efficiency	0.500	(assume 50% control efficiency for PM <sub>10</sub> and PM <sub>2.5</sub> emissions)	EPA 2001; EPA 2006

**New Roadway Construction (0.42 ton PM<sub>10</sub>/acre-month)**

Duration of Construction Project	3 months
Area	0.000 acres

**General Construction and Demolition Activities (0.19 ton PM<sub>10</sub>/acre-month)**

Duration of Project	3 months
Area	300.000 acres

	Project Emissions (tons/year)			
	PM <sub>10</sub> uncontrolled	PM <sub>10</sub> controlled	PM <sub>2.5</sub> uncontrolled	PM <sub>2.5</sub> controlled
New Roadway Construction	0.000	0.000	0.000	0.000
General Construction Activities	171.000	85.500	17.100	8.550
<b>Total</b>	<b>171.000</b>	<b>85.500</b>	<b>17.100</b>	<b>8.550</b>

145  
146

*Project Fugitive  
Estimated Emissions from Construction on the 300-acre Parcel*

147  
148  
149

**Table J-14. Construction fugitive dust emission factors on the 300-acre parcel.**

**Construction Fugitive Dust Emission Factors**

**General Construction Activities Emission Factor**

**0.190 ton PM<sub>10</sub>/acre-month** Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM<sub>10</sub>/acre-month for sites without large-scale outfill operations. A worst-case emission factor of 0.42 ton PM<sub>10</sub>/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM<sub>10</sub>/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM<sub>10</sub>/acre-month) and 75% of the average emission factor (0.11 ton PM<sub>10</sub>/acre-month). The 0.19 ton PM<sub>10</sub>/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM<sub>10</sub>/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM<sub>10</sub> and PM<sub>2.5</sub> in PM nonattainment areas.

**New Road Construction Emission Factor**

**0.420 ton PM<sub>10</sub>/acre-month** Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM<sub>10</sub>/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM<sub>10</sub>/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

**PM<sub>2.5</sub> Multiplier**

**0.100**

PM<sub>2.5</sub> emissions are estimated by applying a particle size multiplier of 0.10 to PM<sub>10</sub> emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

**Control Efficiency for PM<sub>10</sub> and PM<sub>2.5</sub>**

**0.500**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM<sub>10</sub> and PM<sub>2.5</sub> in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

**References:**

- EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999*. EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.
- EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants*. Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division, Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.
- MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1)*. Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

150  
151

*Project Fugitive  
Estimated Emissions from Construction on the 300-acre Parcel*

152  
153  
154

**Table J-15. Haul truck emissions for the 300-acre parcel.**

**Haul Truck Emissions**

Emissions from hauling construction supplies are estimated in this spreadsheet.

**Emission Estimation Method:**

United States Air Force (USAF). 2009. *Air Emission Factor Guide to Air Force Mobile Sources. Methods for Estimating Emissions of Air Pollutants For Mobile Sources at U.S. Air Force Installations.* December 2009.

**Assumptions:**

Haul trucks carry 20 cubic yards of material per trip.

The average distance from the project site to the materials source is 15 miles; therefore, a haul truck will travel 30 miles round trip.

Estimated number of trips required by haul trucks = total amount of material/20 cubic yards per truck

Assumes soil would not need to be hauled to or from the site.

Amount of Building Materials =	0 cubic yards	Assumes 4 cubic feet of building material are needed per square foot of building space
Amount of Paving Material =	0 cubic yards	Assumes 1 cubic foot of pavement material is needed per square foot of new pavement
Number of trucks required =	0 heavy duty diesel haul truck trips	
Miles per trip =	30 miles	

**Heavy Duty Diesel Vehicle (HDDV) Average Emission Factors (grams/mile)**

	NO <sub>x</sub>	VOC	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
HDDV	6.23	0.58	3.33	0.02	0.20	0.19	1615.26

**Notes**

Assumes Haul Trucks are Class 8b (HDDV8b; >60,000 lbs Gross Vehicle Weight)

The project site is located at a low altitude (<5,000 feet above sea level)

Construction assumed to occur in Calendar Year 2015, and construction vehicles are assumed to be on average 10 years old (Model Year 2005)

Emission factors for all pollutants are from USAF 2009, Appendix A, On-Road Vehicle Emission Factors, electronic pages 455-464.

**HDDV Haul Truck Emissions**

	NO <sub>x</sub>	VOC	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
lbs	0.000	0.000	0.000	0.000	0.000	0.000	0.000
tons	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Example Calculation: NO<sub>x</sub> emissions (lbs) = 30 miles per trip \* 5.021 trips \* NO<sub>x</sub> emission factor (g/mile) \* lb/453.6 g

155  
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Haul Truck On-Road  
Estimated Emissions from Construction on the 300-acre Parcel

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**Table J-16. Construction commuter emissions for the 300-acre parcel.**

**Construction Commuter Emissions**

Emissions from construction workers commuting to the job site are estimated in this spreadsheet.

Emission Estimation Method: Emission factors from the South Coast Air Quality Management District (SCAQMD) EMFAC 2007 (v 2.3) Model (on-road) were used. These emission factors are available online at <http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>.

**Assumptions:**

Passenger vehicle emission factors for scenario year 2012 are used.  
 The average roundtrip commute for a construction worker = 40 miles  
 Number of construction days = 240 days  
 Number of construction workers (daily) = 100 people

**Passenger Vehicle Emission Factors for Year 2012 (lbs/mile)**

NO <sub>x</sub>	VOC	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
0.56078	0.00960	0.00795	0.00001	0.00009	0.00006	1.10153

Source: South Coast Air Quality Management District. EMFAC 2007 (ver 2.3) On-Road Emissions Factors. Last updated April 24, 2008. Available online <<http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>>. Accessed 16 November 2011.

**Notes:**

The SCAQMD 2007 reference lists emission factors for reactive organic gas (ROG). For purposes of this worksheet ROG = VOC.

**Construction Commuter Emissions**

	NO <sub>x</sub>	VOC	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
lbs	744,795	764,428	7348,557	10,299	86,200	55,196	1057464,380
tons	0.372	0.382	3.674	0.005	0.043	0.028	528,732

Example Calculation: NO<sub>x</sub> emissions (lbs) = 40 miles/day \* NO<sub>x</sub> emission factor (lb/mile) \* number of construction days \* number of workers

160  
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Construction Commuter  
Estimated Emissions from Construction on the 300-acre Parcel

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**Table J-17. Summary of air emissions from construction on the 539-acre PAAL parcel.**

**Air Emissions from Construction of Infrastructure and Utilities on the PAAL**

		NO <sub>x</sub> (ton)	VOC (ton)	CO (ton)	SO <sub>2</sub> (ton)	PM <sub>10</sub> (ton)	PM <sub>2.5</sub> (ton)	CO <sub>2</sub> (ton)
<b>Each Construction Year</b>	Combustion	0.625	0.039	0.236	0.052	0.036	0.037	74.123
	Fugitive Dust	-	-	-	-	61.446	6.145	-
	Haul Truck On-Road	1.792	0.167	0.958	0.006	0.056	0.055	464.470
	Construction Commuter	0.745	0.764	7.349	0.010	0.086	0.055	1,057.464
	<b>Total</b>	<b>3.167</b>	<b>0.970</b>	<b>8.542</b>	<b>0.068</b>	<b>61.628</b>	<b>6.291</b>	<b>1,596.057</b>

Note: Total PM<sub>2.5</sub> fugitive dust emissions are assuming USEPA 50% control efficiencies.

<b>Each Construction Year</b>	CO <sub>2</sub> emissions converted to metric tons =	<b>1,447.62</b>	<b>metric tons</b>
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Summary  
Estimated Emissions from Construction of Infrastructure and Utilities on the PAAL

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**Table J-18. Combustion emissions from construction on the 539-acre PAAL parcel.**

<b>Combustion Emissions</b>		
Combustion Emissions of VOC, NO <sub>x</sub> , SO <sub>x</sub> , CO, PM <sub>10</sub> , PM <sub>2.5</sub> , and CO <sub>2</sub> due to Construction and Demolition		
Construction of utilities and infrastructure on the PAAL	<b>Area Disturbed</b> 54 acres	Assumes 10% of the PAAL would be disturbed by construction.
<b>Summary of Parameters</b>		
Total Building Construction Area:	0 ft <sup>2</sup> 0 acres	
Total Demolition Area:	0 ft <sup>2</sup> 0 acres	
New Roadway Construction Area:	0 ft <sup>2</sup> 0 acres	
Total Disturbed Area:	2,347,804 ft <sup>2</sup> 54 acres	
Construction Duration:	13 months	
Annual Construction Activity:	240 days	Assumes 4 weeks per month, 5 days per week of work.

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*Project Continuation*  
Estimated Emissions from Construction of Infrastructure and Utilities on the PAAL

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**Table J-19. Emission factors used for construction equipment on the 539-acre PAAL parcel.**

**Emission Factors Used for Construction Equipment**

References: Guide to Air Quality Assessment, SMAQMD, 2004, and U.S. EPA NONROAD Emissions Model, Version 2005 0.0  
Emission factors are taken from the NONROAD model and were provided to HDR by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fuel for CY2007.  
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Equipment	No. Reqd. <sup>1</sup> per 10 acres	NO <sub>x</sub> (lb/day)	VOC <sup>2</sup> (lb/day)	CO (lb/day)	SO <sub>2</sub> <sup>3</sup> (lb/day)	PM <sub>10</sub> (lb/day)	PM <sub>2.5</sub> (lb/day)	CO <sub>2</sub> (lb/day)
Excavator	1	13.567	0.957	5.502	1.017	0.895	0.888	1456.904
Motor Grader	1	9.658	0.726	3.203	0.787	0.685	0.626	1141.847
Water Truck	1	18.356	0.894	7.004	1.605	0.995	0.995	2342.975
<b>Total per 10 acres of activity</b>	<b>3</b>	<b>41.581</b>	<b>2.577</b>	<b>15.710</b>	<b>3.449</b>	<b>2.569</b>	<b>2.489</b>	<b>4841.626</b>

Equipment	No. Reqd. <sup>1</sup> per 10 acres	NO <sub>x</sub> (lb/day)	VOC <sup>2</sup> (lb/day)	CO (lb/day)	SO <sub>2</sub> <sup>3</sup> (lb/day)	PM <sub>10</sub> (lb/day)	PM <sub>2.5</sub> (lb/day)	CO <sub>2</sub> (lb/day)
Paver	1	3.831	0.374	2.055	0.281	0.350	0.340	401.802
Roller	1	4.625	0.483	2.514	0.374	0.434	0.421	526.074
Truck	2	36.712	1.788	14.009	3.271	1.997	1.932	4665.951
<b>Total per 10 acres of activity</b>	<b>4</b>	<b>45.168</b>	<b>2.606</b>	<b>18.578</b>	<b>3.926</b>	<b>2.776</b>	<b>2.693</b>	<b>5623.967</b>

Equipment	No. Reqd. <sup>1</sup> per 10 acres	NO <sub>x</sub> (lb/day)	VOC <sup>2</sup> (lb/day)	CO (lb/day)	SO <sub>2</sub> <sup>3</sup> (lb/day)	PM <sub>10</sub> (lb/day)	PM <sub>2.5</sub> (lb/day)	CO <sub>2</sub> (lb/day)
Loader	1	13.452	0.952	5.576	0.949	0.927	0.899	1360.086
Haul Truck	1	18.356	0.894	7.004	1.605	0.995	0.995	2342.975
<b>Total per 10 acres of activity</b>	<b>2</b>	<b>31.808</b>	<b>1.886</b>	<b>12.584</b>	<b>2.565</b>	<b>1.923</b>	<b>1.895</b>	<b>3703.074</b>

Equipment <sup>4</sup>	No. Reqd. <sup>1</sup> per 10 acres	NO <sub>x</sub> (lb/day)	VOC <sup>2</sup> (lb/day)	CO (lb/day)	SO <sub>2</sub> <sup>3</sup> (lb/day)	PM <sub>10</sub> (lb/day)	PM <sub>2.5</sub> (lb/day)	CO <sub>2</sub> (lb/day)
<b>Stationary</b>								
Generator Set	1	2.381	0.317	1.183	0.149	0.227	0.220	213.059
Industrial Saw	1	2.818	0.316	1.896	0.204	0.325	0.315	291.920
Welder	1	1.124	0.378	1.504	0.079	0.227	0.220	112.360
<b>Mobile (non-road)</b>								
Truck	1	18.356	0.894	7.004	1.605	0.995	0.995	2342.975
Forklift	1	5.342	0.590	3.332	0.388	0.564	0.537	972.235
Crane	1	8.575	0.955	2.363	0.651	0.500	0.485	831.829
<b>Total per 10 acres of activity</b>	<b>6</b>	<b>39.396</b>	<b>3.130</b>	<b>17.382</b>	<b>3.119</b>	<b>2.529</b>	<b>2.744</b>	<b>4454.912</b>

Note: Footnotes for tables are on following page

Project Combustion  
Estimated Emissions from Construction of Infrastructure and Utilities on the PAAL

175  
176

177  
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**Table J-19. Emission factors used for construction equipment on the 539-acre PAAL parcel (continued).**

Architectural Coatings

Equipment	No. Equip. <sup>a</sup> per 10 acres	NO <sub>x</sub> (lb/day)	VOC <sup>b</sup> (lb/day)	CO (lb/day)	SO <sub>2</sub> <sup>c</sup>	PM <sub>10</sub> (lb/day)	PM <sub>2.5</sub> (lb/day)	CO <sub>2</sub> (lb/day)
Air Compressor	1	3.574	0.373	1.985	0.251	0.309	0.300	359.773
Total per 10 acres of activity	1	3.574	0.373	1.985	0.251	0.309	0.300	359.773

- a) The SMOQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity. (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 25 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
- b) The SMOQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emission factors for total HC and for VOC. The factors used here are the VOC factors.
- c) The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Action will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO<sub>2</sub> emissions by more than a factor of two.
- d) Typical equipment fleet for building construction was not itemized in SMOQMD 2004 guidance. The equipment list above was assumed based on SMOQMD 1994 guidance.

181  
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Project Construction  
Estimated Emissions from Construction of Infrastructure and Utilities on the PAAL

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**Table J-20. Combustion emissions summary for construction on the 539-acre PAAL parcel.**

**PROJECT-SPECIFIC EMISSION FACTOR SUMMARY**

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day)						
		NO <sub>x</sub>	VOC	CO	SO <sub>2</sub> **	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
Grading Equipment	3	265,208	12,835	78,548	17,347	12,728	12,348	24707,532
Paving Equipment	1	45,307	2,695	18,573	3,928	2,778	2,850	5923,857
Demolition Equipment	1	37,408	1,885	17,554	2,545	1,933	1,935	2701,074
Building Construction	1	38,196	3,130	17,582	3,118	2,859	2,744	4484,512
Air Compressor for Architectural Coating	1	3,574	0,573	1,959	0,281	0,309	0,300	359,773
Architectural Coating**			0,000					

\*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.

\*\*Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994

Example: SMAQMD Emission Factor for Grading Equipment NO<sub>x</sub> = (Total Grading NO<sub>x</sub> per 10 acre)/(Equipment Multiplier)

**Summary of Input Parameters**

	Total Area (ft <sup>2</sup> )	Total Area (acres)	Total Days
Grading	2,347,884	53,900	8 (from "Grading" worksheet)
Paving	0	0.000	0
Demolition	0	0.000	0
Building Construction	0	0.000	0
Architectural Coating	0	0.000	0 (per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The "Total Days" estimate for paving is calculated by dividing the total number of acres by 0.21 acre/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for "Asphaltic Concrete Pavement, Lots and Driveways - 8" stone base", which provides an estimate of square feet paved per day. There is also an estimate for "Plain Cement Concrete Pavement", however the estimate for asphalt is used because it is more conservative.

The "Total Days" estimate for demolition is calculated by dividing the total number of acres by 0.02 acre/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from "Building Demolition - Small Buildings, Concrete", assuming a height of 30 feet for a two-story building; from "Building Footings and Foundations Demolition - 8" Thick, Plain Concrete", and from "Demolish, Remove Pavement and Curb - Concrete to 8" thick, not reinforced". The "Total Days" estimate for building construction is assumed to be 240 days.

**Total Project Emissions by Activity (lbs)**

	NO <sub>x</sub>	VOC	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
Grading Equipment	1,248,237	77,310	471,267	103,481	78,365	74,074	148,245,790
Paving	-	-	-	-	-	-	-
Demolition	-	-	-	-	-	-	-
Building Construction	-	-	-	-	-	-	-
Architectural Coatings	-	-	-	-	-	-	-
<b>Total Emissions (lbs)</b>	<b>1,248,237</b>	<b>77,310</b>	<b>471,267</b>	<b>103,481</b>	<b>78,365</b>	<b>74,074</b>	<b>148,245,790</b>

**Results: Total Project Annual Emission Rates**

	NO <sub>x</sub>	VOC	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
Total Project Emissions (lbs)	1,248,237	77,310	471,267	103,481	78,365	74,074	148,245,790
Total Project Emissions (ton/yr)	0.626	0.029	0.299	0.052	0.038	0.037	74,123

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Project Construction  
Estimated Emissions from Construction of Infrastructure and Utilities on the PAAL

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**Table J-21. Construction fugitive dust emissions on the 539-acre PAAL parcel.**

**Construction Fugitive Dust Emissions**

**Construction Fugitive Dust Emission Factors**

	Emission Factor	Units	Source
Construction and Demolition Activities	0.190 ton PM <sub>10</sub> /acre-month		MRI 1996, EPA 2001, EPA 2006
New Road Construction	0.420 ton PM <sub>10</sub> /acre-month		MRI 1996, EPA 2001, EPA 2006
<b>PM<sub>2.5</sub> Emissions</b>			
PM <sub>2.5</sub> Multiplier	0.100	(10% of PM <sub>10</sub> emissions assumed to be PM <sub>2.5</sub> )	EPA 2001, EPA 2006
Control Efficiency	0.500	(assume 50% control efficiency for PM <sub>10</sub> and PM <sub>2.5</sub> emissions)	EPA 2001, EPA 2006

**New Roadway Construction (0.42 ton PM<sub>10</sub>/acre-month)**  
 Duration of Construction Project: 12 months  
 Area: 0 acres

**General Construction and Demolition Activities (0.19 ton PM<sub>10</sub>/acre-month)**  
 Duration of Project: 12 months  
 Area: 54 acres

	Project Emissions (tons/year)			
	PM <sub>10</sub> uncontrolled	PM <sub>10</sub> controlled	PM <sub>2.5</sub> uncontrolled	PM <sub>2.5</sub> controlled
New Roadway Construction	0.000	0.000	0.000	0.000
General Construction Activities	122.892	61.446	12.289	6.145
<b>Total</b>	<b>122.892</b>	<b>61.446</b>	<b>12.289</b>	<b>6.145</b>

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Project Fugitive  
Estimated Emissions from Construction of Infrastructure and Utilities on the PAAL

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**Table J-22. Construction fugitive dust emission factors on the 539-acre PAAL parcel.**

**Construction Fugitive Dust Emission Factors**

**General Construction Activities Emission Factor**

**0.190 ton PM<sub>10</sub>/acre-month** Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM<sub>10</sub>/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM<sub>10</sub>/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM<sub>10</sub>/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM<sub>10</sub>/acre-month) and 75% of the average emission factor (0.11 ton PM<sub>10</sub>/acre-month). The 0.19 ton PM<sub>10</sub>/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM<sub>10</sub>/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM<sub>10</sub> and PM<sub>2.5</sub> in PM nonattainment areas.

**New Road Construction Emission Factor**

**0.420 ton PM<sub>10</sub>/acre-month** Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM<sub>10</sub>/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM<sub>10</sub>/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

**PM<sub>2.5</sub> Multiplier**

**0.100**

PM<sub>2.5</sub> emissions are estimated by applying a particle size multiplier of 0.10 to PM<sub>10</sub> emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

**Control Efficiency for PM<sub>10</sub> and PM<sub>2.5</sub>**

**0.500**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM<sub>10</sub> and PM<sub>2.5</sub> in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

**References:**

- EPA 2001. Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999. EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.
- EPA 2006. Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants. Prepared for Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.
- MRI 1996. Improvement of Specific Emission Factors (BACM Project No. 1). Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Project Fugitive  
Estimated Emissions from Construction of Infrastructure and Utilities on the PAAL

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**Table J-23. Haul truck emissions for the 539-acre PAAL parcel.**

**Haul Truck Emissions**

Emissions from hauling construction supplies are estimated in this spreadsheet.

Emission Estimation Method:  
United States Air Force (USAF): 2009. Air Emission Factor Guide to Air Force Mobile Sources. Methods for Estimating Emissions of Air Pollutants For Mobile Sources at U.S. Air Force Installations. December 2009.

**Assumptions:**

Haul trucks carry 20 cubic yards of material per trip.  
The average distance from the project site to the materials source is 15 miles; therefore, a haul truck will travel 30 miles round trip.  
Estimated number of trips required by haul trucks = total amount of material/20 cubic yards per truck.  
Assumes soil would not need to be hauled to or from the site.

Amount of Building Materials = 173,917 cubic yards      Assumes 2 cubic feet of building material are needed per square foot of utility disturbance  
Number of trucks required = 8,696 heavy duty diesel haul truck trips  
Miles per trip = 30 miles

**Heavy Duty Diesel Vehicle (HDDV) Average Emission Factors (grams/mile)**

	NO <sub>x</sub>	VOC	CO	SO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
HDDV	6.33	0.58	3.33	0.02	0.20	0.19	1615.36

**Notes:**

Assumes Haul Trucks are Class 8b (HDDV8b: +60,000 lbs Gross Vehicle Weight)  
The project site is located at a low altitude (+5,000 feet above sea level)  
Construction assumed to occur in Calendar Year 2015, and construction vehicles are assumed to be on average 10 years old (Model Year 2005).  
Emission factors for all pollutants are from USAF 2009, Appendix A, On-Road Vehicle Emission Factors, electronic pages 455-464.

**HDDV Haul Truck Emissions**

	NO <sub>x</sub>	VOC	CO	SO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
lbs	3583.019	333.572	1915.161	11.502	115.025	106.273	928936.407
tons	1.792	0.167	0.958	0.006	0.058	0.055	464.476

Example Calculation: NO<sub>x</sub> emissions (lb) = 30 miles per trip \* 5,021 trips \* NO<sub>x</sub> emission factor (g/mile) \* lb/453.6 g

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Haul Truck On-Road  
Estimated Emissions from Construction of Infrastructure and Utilities on the PAAL

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**Table J-24. Construction commuter emissions for the 539-acre PAAL parcel.**

**Construction Commuter Emissions**

Emissions from construction workers commuting to the job site are estimated in this spreadsheet.

Emission Estimation Method: Emission factors from the South Coast Air Quality Management District (SCAQMD) EMFAC 2007 (v 2.3) Model (on-road) were used. These emission factors are available online at <http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>.

**Assumptions:**

Passenger vehicle emission factors for scenario year 2012 are used.  
 The average roundtrip commute for a construction worker = 40 miles  
 Number of construction days = 240 days  
 Number of construction workers (daily) = 200 people

**Passenger Vehicle Emission Factors for Year 2012 (lbs/mile)**

NO <sub>x</sub>	VOC	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
0.00278	0.00560	0.00765	0.00001	0.00009	0.00004	1.10163

Source: South Coast Air Quality Management District. EMFAC 2007 (ver 2.3) On-Road Emissions Factors. Last updated April 24, 2008. Available online: <http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>. Accessed 16 November 2011.

**Notes:**

The SCAQMD 2007 reference lists emission factors for reactive organic gas (ROG). For purposes of this worksheet ROG = VOC.

**Construction Commuter Emissions**

	NO <sub>x</sub>	VOC	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
lbs	1488.590	1528.855	14897.113	20.598	172.400	110.392	2114926.759
tons	0.745	0.764	7.349	0.010	0.086	0.055	1057.464

Example Calculation: NO<sub>x</sub> emissions (lbs) = 40 miles/day \* NO<sub>x</sub> emission factor (lb/mile) \* number of construction days \* number of workers

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Construction Commuter  
Estimated Emissions from Construction of Infrastructure and Utilities on the PAAL

### 208 J.3 OPERATIONAL EMISSIONS ASSUMPTIONS

209 Because the specific types of development and industries that would occupy the proposed land  
210 conveyance area are not known at this time, it is difficult to make accurate estimates on the amount of  
211 air emissions that would be produced from the operation of the proposed future development. Key  
212 variables, such as the square footage of the building space to be heated, the number and capacity of  
213 the emergency electrical generators, the types of industry-specific manufacturing equipment used  
214 onsite, and the number of staff to commute to work by vehicle, are unknown and won't be known  
215 until well into the facility planning process. Therefore, numerous simplifying assumptions were  
216 developed and used in this air emissions estimate to establish parameters for the analysis. The key  
217 assumptions used include those listed below.

218 For building heating:

- 219 • Natural gas-fired boilers would provide heating to all buildings.
- 220 • Each building would be one story in height. Total interior building space would measure 939  
221 acres or 40,902,840 square feet. All interior building space would be heated.
- 222 • On average, heating would consume 35 cubic feet of natural gas per square foot of building  
223 space annually. The actual amount of natural gas consumed would vary based on daily  
224 weather conditions and the types of industries that could occupy the proposed buildings. (By  
225 comparison, office spaces use approximately 32 cubic feet of natural gas annually;  
226 warehouses use approximately 20 cubic feet of natural gas annually; and industrial facilities  
227 use highly variable amounts of natural gas depending on the industrial subsector [TXU  
228 Energy 2013].) Generally, the types of industries proposed would not use large quantities of  
229 natural gas.

230 For the emergency electrical generators:

- 231 • A total of 50 emergency generators would be installed.
- 232 • Each emergency generator would have 500 kilowatts of electrical output.
- 233 • Each generator would be used for 150 hours per year.

234 For truck traffic:

- 235 • The number of truck trips per day is 250.
- 236 • Trucks would travel 100 miles on average per trip.
- 237 • Trucks would travel on 240 days per year.

238 For employee commuter emissions:

- 239 • A total of 4,000 personnel would work at the proposed buildings. Each employee would  
240 travel 30 miles roundtrip, each day, for 240 days per year.

241 Operational emissions are only from the main Focused Study Area because no operational air  
242 emissions are expected from the 300-acre solar array parcel. The following pages provide detailed  
243 background information on the air emissions estimated to be generated from operational activities.

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**Table J-25. Summary of air emissions from the proposed operational activities.**

**Air Emissions from the Proposed Operational Activities**

		NO <sub>x</sub> (ton)	VOC (ton)	CO (ton)	SO <sub>2</sub> (ton)	PM <sub>10</sub> (ton)	PM <sub>2.5</sub> (ton)	CO <sub>2</sub> (ton)
Each Operational Year	Boiler	71,580	3,937	80,127	0.429	5.440	5.440	85,895,984
	Diesel Generator	94,110	7,662	20,273	6.189	6.615	6.615	3,499,787
	Truck Traffic	41,204	3,836	22,024	0.132	1.323	1.257	10,682,540
	Employee Commuter	11,172	11,466	110,226	0.154	1,293	0.828	15,861,966
<b>Total</b>		<b>218,066</b>	<b>26,922</b>	<b>212,652</b>	<b>6.905</b>	<b>14,671</b>	<b>14,140</b>	<b>115,940,256</b>

Note: Total PM<sub>10/2.5</sub> fugitive dust emissions are assuming USEPA 50% control efficiencies.

Each Operational Year CO<sub>2</sub> emissions converted to metric tons = **105,157.81** metric tons

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Summary  
Estimated Emissions for the Proposed Action

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**Table J-26. Calculated emissions from the operation of natural gas-fired boilers.**

Calculates Emissions from the Operation of Natural Gas-Fired Boilers:

Assumptions:

35	cubic feet of natural gas are required annually per square foot
40,902,840	square feet are to be heated (assumes all building space)
1,431,599,400	cubic feet of natural gas would be burned each year
1,431,599,400	million cubic feet (mmcf) of natural gas would be burned each year under normal operating conditions

Pollutant	Emission Factor	Units	Potential Annual Emissions (lb/yr)	Conversion to Tons	Estimated Annual Emissions (tons/yr)
SO <sub>2</sub>	0.6	lb/mmcf	858.96	0.0005	0.429
Pb	7.6	lb/mmcf	10,880.16	0.0005	5.440
NO <sub>x</sub>	100	lb/mmcf	143,159.94	0.0005	71,580
CO	84	lb/mmcf	120,254.35	0.0005	60,127
CO <sub>2</sub>	120,000	lb/mmcf	171,791,928.00	0.0005	85,895,964
VOC	5.5	lb/mmcf	7,873.30	0.0005	3.937

Source: EPA 1990, AP-42, Emission Factors for Natural Gas Combustion, Table 1.6.1 and Table 1.6.2, Pages 1.6.1 and 1.6.2

Assumption: Uncontrolled (Small Boilers <100 MMBtu/yr) for NO<sub>x</sub>.

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Boiler Emissions  
Estimated Emissions from the Proposed Action

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**Table J-27. Calculated air emissions from an emergency generator.**

**Calculates Air Emissions from an Emergency Generator**

Assumptions:

Number of Generators: 50  
 Generator Power Rating: 500 kilowatts  
 Generator Fuel: Diesel

Generator Kilowatts	Conversion from kW to Btu/hr	Engine Btu/hr (Assume 30% efficiency converting mechanical to electrical power)	Engine MMBtu/hr
500	3414.4	5,690,710	5.69

Diesel Industrial Engine Emission Factors from AP-42, Section 3.3	NOx	CO	TOC	PM-10	SO <sub>2</sub>	CO <sub>2</sub>
	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu
Emission Factor	4.41	0.95	0.36	0.31	0.29	164

Source: EPA 1996. AP-42. Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines. Table 3.3-1. Page 3.3-6.

Assume max. 150 hrs/yr	NOx	CO	TOC	PM-10	SO <sub>2</sub>	CO <sub>2</sub>
	(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)
Emissions (lbs/yr)	188,220.23	40,546.31	15,364.92	13,230.90	12,377.29	6,999,573.10

	NOx	CO	TOC	PM-10	SO <sub>2</sub>	CO <sub>2</sub>
	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)
Emissions (tons/yr)	94.110	20.273	7.682	6.615	6.189	3499.787

Total Organic Compounds (TOCs) have been used in place of VOCs for this analysis

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*Diesel Generator  
Estimated Emissions for the Proposed Action*

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**Table J-28. Truck traffic emissions.**

**Truck Traffic Emissions**

Emissions from truck traffic associated with the various industries are estimated in this spreadsheet.

**Emission Estimation Method**

United States Air Force (USAF). 2008. *Air Emission Factor Guide to Air Force Mobile Sources: Methods for Estimating Emissions of Air Pollutants For Mobile Sources at U.S. Air Force Installations*. December 2008.

**Assumptions:**

Number of truck trips associated with the proposed industries per day= 250  
 Number of truck trips per year = 60,000 Assumes 240 days of work per year  
 Average distance driven by a truck per trip = 100 miles  
 Total miles per year = 6,000,000

**Heavy Duty Diesel Vehicle (HDDV) Average Emission Factors (grams/mile)**

	NO <sub>x</sub>	VOC	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
HDDV	6.23	0.56	3.33	0.02	0.20	0.19	1615.20

**Notes:**

Assumes Haul Trucks are Class 8b (HDDV8b: >80,000 lbs Gross Vehicle Weight)  
 The project site is located at a low altitude (~5,000 feet above sea level)  
 Emission factors for all pollutants are from USAF 2008, Appendix A, On-Road Vehicle Emission Factors, electronic pages 455-464.

**HDDV Haul Truck Emissions**

	NO <sub>x</sub>	VOC	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
lbs	82407.407	7671.958	44047.619	264.550	2645.903	2513.228	21385079.365
tons	41.204	3.856	22.024	0.132	1.323	1.257	10682.540

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Truck Traffic  
Estimated Emissions for the Proposed Action

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**Table J-29. Commuter emissions.**

**Commuter Emissions**

Emissions from workers commuting to the job site are estimated in this spreadsheet.

Emission Estimation Method: Emission factors from the South Coast Air Quality Management District (SCAQMD) EMFAC 2007 (v 2.3) Model (on-road) were used. These emission factors are available online at <http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>.

**Assumptions:**

Passenger vehicle emission factors for scenario year 2012 are used.

The average roundtrip commute for a worker = 30 miles  
 Number of work days = 240 days  
 Number of workers (daily) = 4000 people

**Passenger Vehicle Emission Factors for Year 2012 (lbs/mile)**

NO <sub>x</sub>	VOC	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
0.00079	0.00080	0.02795	0.00021	0.00009	0.00006	1.10153

Source: South Coast Air Quality Management District. EMFAC 2007 (ver 2.3) On-Road Emissions Factors. Last updated April 24, 2008. Available online: <http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>. Accessed 16 November 2011.

**Notes:**

The SCAQMD 2007 reference lists emission factors for reactive organic gas (ROG). For purposes of this worksheet ROG = VOC.

**Commuter Emissions**

	NO <sub>x</sub>	VOC	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
lbs	22343.057	22932.027	220456.702	308.968	2585.990	1855.875	31722931.385
tons	11.172	11.466	110.228	0.154	1.293	0.828	15861.966

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*New Employee Commuter Emissions  
 Estimated Emissions for the Proposed Action*

269 **J.4 REFERENCES**

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300 2015).

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## **APPENDIX K – MEMORANDUM OF AGREEMENT**

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**MEMORANDUM OF AGREEMENT****AMONG THE U.S. DEPARTMENT OF ENERGY RICHLAND OPERATIONS OFFICE, THE WASHINGTON STATE DEPARTMENT OF ARCHAEOLOGY AND HISTORIC PRESERVATION, THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, CONFEDERATED TRIBES AND BANDS OF THE YAKAMA NATION, CONFEDERATED TRIBES OF THE UMATILLA INDIAN RESERVATION, NEZ PERCE TRIBE, AND WANAPUM REGARDING THE ADVERSE EFFECT OF THE FINAL AREA OF POTENTIAL EFFECT DEED TRANSFER ON YAKAMA TRADITIONAL CULTURAL PROPERTY, FIRST FOODS GATHERING AREAS TRADITIONAL CULTURAL PROPERTY, ÓYKALA AYN WÉETES TRADITIONAL CULTURAL PROPERTY, SHU WIPA TRADITIONAL CULTURAL PROPERTY, HANFORD SITE PLANT RAILROAD (45BN1107), THE RICHLAND IRRIGATION CANAL (45BN1125), AND WOODED ISLAND ARCHAEOLOGICAL DISTRICT (DT31)**

The purpose of this memorandum of agreement (MOA) is to establish the U.S. Department of Energy, Richland Operations Office (RL) mitigation, stipulations and actions through consultation with the Department of Archaeology and Historic Preservation (DAHP), the Advisory Council on Historic Preservation (ACHP), Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, and Wanapum for adverse effects to the National Register eligible historic properties of the Yakama Nation Traditional Cultural Property, First Foods Gathering Areas Traditional Cultural Property, Óykala ayn wéetes Traditional Cultural Property, Shu Wipa Traditional Cultural Property, the Hanford Site Plant Railroad, the Richland Irrigation Canal and the National Register listed Wooded Island Archaeological District, in association with deed transfer actions outlined in the National Defense Authorization Act (NDAA).

**WHEREAS**, the NDAA for Fiscal Year 2015 includes language directing the Secretary of Energy to convey more than 1600 acres of real property to the Community Reuse Organization of the Hanford Site before the end of September 2015; and

**WHEREAS**, the U.S. Department of Energy, Richland Operations Office (RL) plans to convey 1,641 acres of undeveloped or minimally developed land located within the U.S. Department of Energy's Hanford Site in Benton County, Washington (Undertaking); and

**WHEREAS**, RL will provide that the Undertaking is in accordance with requirements and processes in the National Historic Preservation Act (NHPA) and its government-to-government relationship with the Tribes; and

**WHEREAS**, RL has established the Undertaking area of potential effects (APE) in accordance with Section 106 of the NHPA (16 U.S.C. § 470f) under implementing regulations at 36 CFR 800.4(a) within which the 1,641 acre Undertaking may have direct or indirect effects to historic properties in the 600 Area of the Hanford Site in Benton County, Washington, as defined in HCRC#2012-600-042; and

**WHEREAS**, RL has consulted with the Confederated Tribes and Bands of the Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, the Nez Perce Tribe, and the Wanapum (hereafter Tribes), for which, the Yakama Nation Traditional Cultural Property, First Foods Gathering Areas Traditional Cultural Property, Óykala ayn wéetes Traditional Cultural Property, and Shu Wipa Traditional Cultural Property have religious and cultural significance; and

**WHEREAS**, RL has invited the East Benton County Historical Society, the Franklin County Historical Society and Museum, and the Benton County Historical Society to consult on the deed transfer; and

**WHEREAS**, the State Historic Preservation Officer (SHPO) has concurred in the delineation of the APE; and

**WHEREAS**, RL completed a cultural resource inventory and investigation for the APE and made a reasonable and good faith effort to identify properties within the APE that are eligible for listing or are listed in the National Register of Historic Places; and has determined that the Undertaking will have an adverse effect to these historic properties within the APE:

Yakama Nation Traditional Cultural Property,  
First Foods Gathering Areas Traditional Cultural Property,  
Óykala ayn wéetes Traditional Cultural Property,  
Shu Wipa Traditional Cultural Property,  
Hanford Site Plant Railroad (45BN1107),  
Richland Irrigation Canal (45BN1125),  
Wooded Island Archaeological District (DT31), and

has consulted with the SHPO pursuant to 36 CFR Part 800 and Section 106 of the NHPA (16 U.S.C. § 470f); and

**WHEREAS**, RL has determined that the Undertaking will have an indirect adverse effect on the viewshed to these historic properties which are eligible for listing in the National Register of Historic Places:

Laliik,  
Wanawish (45BN1299),  
Nookshai/Nukšáy/Gable Mountain (DT102); and

**WHEREAS**, the Hanford Site Plant Railroad (45BN1107) has been mitigated through implementation of the Programmatic Agreement among the U.S. Department of Energy Richland Operations Office, the Advisory Council on Historic Preservation, and the Washington State Historic Preservation Office for the Maintenance, Deactivation, Alteration, and Demolition of the Built Environment on the Hanford Site, Washington; and

**WHEREAS**, RL, in consultation with the SHPO, has determined that the transfer of lands out of federal ownership is an adverse effect to historic properties as defined in 36 CFR 800.5; and

**WHEREAS**, nothing in this MOA expands or diminishes rights reserved in the Treaties with Tribes; and

**WHEREAS**, RL has consulted with the Tribes and has invited the Tribes to participate in the MOA as Invited Signatories; and

**WHEREAS**, in accordance with 36 CFR § 800.6(a)(1), RL has notified the ACHP of its adverse effect determination with specified documentation, and the ACHP has chosen to participate in the consultation pursuant to 36 CFR § 800.6(a)(1)(iii); and

**WHEREAS**, there are Washington State laws in effect for the protection of cultural resources:

- a. Indian Graves and Records Act (RCW 27.44),
- b. Archaeological Sites and Resources Act (RCW 27.53),
- c. Abandoned and Historic Cemeteries and Historic Graves Act (RCW 68.60),
- d. Archaeological Excavation and Removal Permit process (WAC 25-48),
- e. Human Remains (RCW 68.50), and

DOE will retain ownership of pre-contact archaeological resources as DOE shall modify the Grantees' state law responsibilities for pre-contact archaeological resources; and

**WHEREAS**, RL will impose a deed restriction that the Grantee agrees to return all contaminated human remains and associated materials found on the premises to DOE for Tribal consultation and reburial on the Hanford Site; and

**WHEREAS**, the Signatories agree that this MOA may be signed in counterparts and the executed MOA, and each signature, will be effective and binding as if all Parties had signed the same document.

**NOW, THEREFORE**, RL, the SHPO, ACHP and Tribes agree that the Undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the Undertaking on historic properties. The executed and implemented MOA evidences the federal agency's compliance with Section 106 of the NHPA and shall govern the Undertaking and all of its parts until this MOA expires or is terminated.

## **I. GENERAL STIPULATIONS**

RL shall ensure that the following actions to avoid, minimize or mitigate adverse effects are carried out. The general stipulations apply to the entire land parcel to be transferred as part of this Undertaking.

1. If DOE becomes aware of a Grantee's non-compliance with a deed restriction, DOE will communicate with the owner of the property and bring to the owner's attention the deed restriction, and request that the owner comply with the restriction. This communication could be oral or written. If this initial communication does not result in an appropriate response, a formal demand letter will be written that places the owner on notice that they must come into compliance with the deed restriction. If the owner of the property still does not come into compliance with the deed restriction, DOE may file a lawsuit, depending on the circumstances, to force compliance with the deed restriction. RL will include two deed restrictions:

"On an annual basis Grantee shall submit a report to DOE-RL regarding their compliance with the Stipulations in this MOA and any challenges encountered during the previous year."

"In the event of non-compliance with the deed restrictions, the United States of America, the SHPO, or its authorized representative may institute a suit for damages and seek to enjoin any non-compliance. If such identified party ultimately prevails, it shall be entitled to recover all reasonable costs and expenses incurred in connection with such a suit, including, but not limited to all court costs and reasonable attorney's fees."

2. RL, in consultation with the Tribes, will finalize a protocol within 12 months of signing the MOA. The protocol will address discoveries of contaminated human remains and of contaminated pre-contact archaeological materials and define a place for final disposition.

3. RL will include in a deed restriction a listing of Washington State Laws for cultural resource protection:

"Grantee is required to comply with Washington State laws, as amended, for cultural resource protection:

- a. Indian Graves and Records Act (RCW 27.44),
- b. Archaeological Sites and Resources Act (RCW 27.53),
- c. Abandoned and Historic Cemeteries and Historic Graves Act (RCW 68.60),
- d. Archaeological Excavation and Removal Permit process (WAC 25-48), and
- e. Human Remains (RCW 68.50)."

4. Pursuant to the Atomic Energy Act of 1954, RL will impose a deed restriction that the Grantee agrees to return all contaminated human remains and associated materials found on the premises to DOE (Grantor) for Tribal consultation and reburial on the Hanford Site:

“Grantee is required to return any and all contaminated pre-contact artifacts or human remains found on the premises to Grantor for Tribal consultation and reburial on the Hanford Site.”

5. After approval of this MOA and consistent with and supportive of DOE's Native American Indian Policy and Order 144.1, DOE-RL shall consult individually with each Tribe, on a government-to-government basis, to establish any additional and appropriate mitigation to resolve adverse effects to historic properties and the removal of the conveyed lands from federal ownership. DOE-RL shall initiate the aforementioned consultation with each of the Tribes as soon as possible but in no event later than October 30, 2015.

## II. MINIMIZE

1. RL will impose a deed restriction on noise as follows:

“Grantor requires Grantee’s acoustic and noise signature on the Premises will not exceed current Washington State standards and exemptions for Class C Industrial Areas.”

2. RL will impose a deed restriction on vibration, magnetic interference, and electric field as follows:

“By acceptance of this Deed, the Grantee, its successors and assigns, covenants and agrees to restrict or prohibit activities on the Premises that generate vibration in excess of the PNNL Vibration Standard and the LIGO Vibration Standard described below:

- a. PNNL Vibration Standard. The parties are in agreement that, after the date of this deed transfer, vibration impacts arising from the Premises shall be limited such that:
  - i. Any Heavy Reciprocating Machinery must be at least three (3) kilometers from the PNNL Site boundary.
  - ii. Any Balanced Non-Reciprocating Industrial Machinery must be at least one (1) kilometer from the PNNL Site boundary.
  - iii. Activities on the Premises that result in vibrations created by continuous and/or routine blasting are prohibited. To the extent any uncertainty arises with respect to the application of this vibration standard for non-routine blasting, Article 12, Periodic Discussions and Development Plans, of Exhibit H of this Quitclaim Deed shall be utilized to mitigate those non-routine blasting activities.
- b. LIGO Vibration Standard. The parties are in agreement that, after the date of this deed transfer, vibration (dependent on frequency) emanating from the Premises shall be consistent with non-reciprocating power plant machinery or balanced industrial machinery operating above 300 RPM (5Hz) or must meet the following specifications below 300 RPM (5 Hz):
  - i. In the frequency range from 0.3 Hz to 1.5 Hz, ground vibration levels as measured 100 meters from the source should not exceed 0.3 micrometers/sec/root (Hz). For example, in the frequency band from 0.5 Hz to 1.5 Hz this would be equivalent to a vibration level of 0.3 micrometers/sec RMS.
  - ii. In the frequency range from 1.5 Hz to 2.5 Hz, ground vibration levels as measured 100 meters from the source should not exceed 0.3 micrometers/sec/root (Hz). For example, in the frequency band from 1.5 Hz

to 2.5 Hz this would be equivalent to a vibration level of 0.3 micrometers/sec RMS.

- iii. In the frequency range from 2.5 Hz to 3.5 Hz, ground vibration levels as measured 100 meters from the source should not exceed 0.5 micrometers/sec/root (Hz). For example, in the frequency band from 2.5 Hz to 3.5 Hz this would be equivalent to a vibration level of 0.5 micrometers/sec RMS.
  - iv. In the frequency range from 3.5 Hz to 5 Hz, ground vibration levels as measured 100 meters from the source should not exceed 2.5 micrometers/sec/root (Hz). For example, in the frequency band from 3.5 Hz to 5 Hz this would be equivalent to a vibration level of 3 micrometers/sec RMS.
  - v. These vibration levels should be compatible with operation of motor vehicles driven on smooth pavement. However trucks driven off-pavement, over pavement in poor repair, or over speed bumps would likely cause these vibration levels to be exceeded.
  - vi. Reciprocating power-plant machinery, rock crushers and heavy machinery would likely cause these vibration levels to be exceeded.”
3. RL will impose a deed restriction on magnetic and electrical interference as follows:
- “Grantee agrees to restrict or prohibit activities on the Premises that generate electrical field (EF) and magnetic (M) interferences in excess of the EF/M Interference Standard described below.
- a. “EF/M Interference Standard. The parties are in agreement that, after the date of this deed transfer, all Intentional Radiators on the Premises shall not exceed the Federal Communications Commission Standard at 47 CFR Part 15, Subpart C.”
4. RL will impose a deed restriction on prohibition of mining:
- a. “Grantee is prohibited from mining the Premises including extraction or production of any coal, oil, gas, geothermal steam, associated geothermal resources, aggregate and any other minerals.”
5. RL will impose a deed restriction on Concentrating Solar Power (CSP) Farms to eliminate glint and glare:
- a. “Grantee is prohibited from constructing and operating a CSP Solar Farm System on the Premises.”
6. RL will impose a deed restriction on criteria for buildings with natural color that is consistent with the surrounding natural landscape and native landscaping:
- a. “The Grantee agrees that the height of buildings that are constructed on the conveyed land will not exceed the height limits that are authorized pursuant to Chapter 23.28.030 of the Richland Municipal Code (RMC); as amended. Grantee agrees that it shall not seek a waiver of the height limitations contained in these provisions of the RMC by utilizing the variance provisions of RMC 23.70.150, or by application of any other process that may allow the Grantee to construct a building with a height greater than that explicitly allowed by RMC Chapter 23.28.030.”

- b. "The Grantee agrees that buildings (including roofs) will be finished in colors that are non-reflective and that emulate those of the natural surroundings."
- c. "The Grantee agrees to xeriscaping utilizing native plants to lessen impacts to adjacent plant communities and eliminate need for supplemental watering."

### III. MITIGATE

1. RL will impose a deed restriction requiring implementation of a Cultural Resource Protection Protocol:
  - a. "The Grantee shall implement the attached Cultural Resource Protection Protocol. The Cultural Resource Protection Protocol can be amended as agreed to by Tribes." (See Appendix B).
2. RL will impose a deed restriction providing access to the conveyed land by tribal members prior to its development for tribal activities:
  - a. "Grantee is required to provide access to the Premises prior to its development to members of the Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, the Nez Perce Tribe, and the Wanapum Band of Indians (collectively "Tribes") for tribal activities. An access agreement will be developed between the Tribes and the land owners to facilitate access."
3. RL will impose a deed restriction retaining ownership of all pre-contact archaeological materials. All archaeological materials will be returned to DOE (Grantor) for relocation in consultation with Tribes:
  - a. "Grantor retains ownership of all pre-contact archaeological materials. Grantee is required to return all pre-contact archaeological material to Grantor for relocation in consultation with Tribes."
4. RL will approve use of Tribal cooperative agreement funds to participate in implementation of mitigation and deed restriction activities associated with this MOA and RL will seek to identify supplemental funding for cooperative agreements to cover additional expenses associated with this MOA.

### IV. MITIGATIONS FOR ADVERSE EFFECTS TO INDIVIDUAL HISTORIC PROPERTIES AND TRADITIONAL CULTURAL PROPERTIES

The following stipulations and mitigations apply to the individual historic properties:

#### 1. Wooded Island Archaeological District (DT31)

- a. RL will **AVOID** the 1860 trail location and associated artifacts considered to be contributing elements of the Wooded Island Archaeological District (DT31). These elements are also elements of the Shu Wipa Traditional Cultural Property, First Foods Gathering Areas Traditional Cultural Property, Óykala ayn wéetes Traditional Cultural Property, and Yakama Nation Traditional Cultural Property. The northern boundary of the APE was adjusted to avoid the 1860 trail features and associated artifacts located within Cluster 1.
  - i. RL will update site form/archaeological district form within 3 months of deed transfer.
- b. RL, in consultation with the SHPO and Tribes, will collect and relocate the archaeological materials in Cluster 2 and 3 considered to be associated with the Wooded Island Archaeological District that are located in the 1,641 acres to be transferred out of

federal ownership in order to **MINIMIZE** the adverse effect. The artifacts may be stored in a temporary storage location. These actions will take place prior to deed transfer.

- c. RL will ensure that all records resulting from collection and relocation are curated in a Tribal repository or museum that meets 36 CFR 79. Any agreements concerning curation will be retained by RL. RL will ensure the final relocation of collected artifacts is on DOE lands and the location will be determined in consultation with the Tribes within 3 months of deed transfer.
- d. The following sites and isolated finds are included in the collection and relocation activities:
  - i. 45BN535
  - ii. 45BN1121
  - iii. 45BN1775
  - iv. 45BN1778
  - v. 45BN1795
  - vi. 45BN1796
  - vii. 45BN1797
  - viii. 45BN1780
  - ix. 45BN1801
- e. RL will complete documentation for the relocated archaeological materials within 6 months of deed transfer.

## 2. Shu Wipa Traditional Cultural Property

- a. RL will ensure that portions of Shu Wipa Traditional Cultural Property are **AVOIDED** through retention of DOE owned and managed land.
- b. RL will develop and initiate implementation of a plan to remove miscellaneous debris from within Shu Wipa Traditional Cultural Property, outside the 1,641 acres, in consultation with the Wanapum within 6 months from the date of deed transfer. This action will **MITIGATE** for the adverse effect to the TCP.
- c. RL will develop and initiate implementation of a native revegetation plan within Shu Wipa Traditional Cultural Property, outside the 1,641 acres, in consultation with the Wanapum within 6 months from the date of deed transfer. This action will **MITIGATE** for the adverse effect to the TCP.
- d. RL, in consultation with the Wanapum, will collect and relocate the archaeological materials considered to be associated with the Shu Wipa Traditional Cultural Property that are located in the 1,641 acres to be transferred out of federal ownership in order to **MINIMIZE** the adverse effect. The artifacts may be stored in a temporary storage location. These actions will take place prior to deed transfer.
- e. RL will ensure that all records resulting from data recovery are curated in a Wanapum repository or museum that meets 36 CFR 79. Relocation of archaeological material will be determined by RL in consultation with the Wanapum.

## 3. First Foods Gathering Areas Traditional Cultural Property

- a. RL will develop and implement a native revegetation plan on DOE lands outside the 1,641 acres in consultation with the CTUIR following 18 months of the date of deed transfer. This action will **MITIGATE** for the adverse effect to the TCP.

**4. Óykala ayn wéetes Traditional Cultural Property**

- a. RL will develop and initiate implementation of a rehabilitation plan for a culturally significant area outside but near the 1,641 acres in consultation with the Tribes within 18 months of deed transfer. This action will **MITIGATE** for the adverse effect.

**5. Yakama Nation Traditional Cultural Property**

- a. Consistent with and supportive of DOE's Native American Indian Policy and Order 144.1, DOE-RL will consult on a government-to-government basis with Yakama Nation (see General Stipulation I.5).

**6. Richland Irrigation Canal (45BN1125)**

- a. RL will make historic contexts and history information available to the general public through a variety of mechanisms, including by working with local historical societies and Hanford history organizations, utilizing existing educational partnerships, and assisting interactive web-based platforms and/or tools no later than 18 months from the date of deed transfer.
- b. RL will provide information collected for 45BN1125 to local historical societies, Hanford history organizations, and partnering educational institutions for their exhibit use or public dissemination no later than 18 months from the date of the deed transfer.
  - i. RL will consult with the historic society, history organizations and/or partnering educational institutions to determine the information needs and interests.
  - ii. RL will update the site form for 45BN1125, as needed within 18 months from the date of deed transfer.

**7. Hanford Site Plant Railroad (45BN1107)**

- a. RL will take photographs of the current condition of the Hanford Site Plant Railroad (45BN1107) within the final APE. Copies of the photographs along with explanatory text shall be provided to the DAHP no later than 18 months following deed transfer.
- b. RL will provide historic context statements to local historical societies for their use in a publically available format no later than 18 months following deed transfer.

**8. State Historic Preservation Office Mitigation**

Within 60 days of MOA signature, RL will approve use of DOE-RL's state of Washington Comprehensive Environmental Response, Compensation, and Liability Act grant funds for the DAHP to create an online e-archaeological site/isolate form application for use by DOE staff and secure online e-traditional cultural property application for use by the consulted tribal governments. DAHP shall provide the applications' beta version to professional cultural resource staff of DOE and the consulted tribal governments.

**V. ANTI-DEFICIENCY ACT**

RL's obligations under this MOA are subject to the availability of appropriated funds, and the stipulations of this MOA are subject to the provisions of the Anti-Deficiency Act 31 U.S.C. § 1341. RL shall make reasonable and good faith efforts to secure the necessary funds to implement this MOA in its entirety. If compliance with the Anti-Deficiency Act alters or impairs RL's ability to implement the stipulations of this agreement, RL shall consult in accordance with the amendment and termination procedures found at Stipulation VIII and IX of this agreement.

## VI. DURATION

This MOA will expire when its terms and stipulations are complete or Signatories mutually agree to amend the stipulation. Prior to such time, RL may consult with the other Signatories to reconsider the terms of the MOA and amend it in accordance with Stipulation VIII below.

## VII. DISPUTE RESOLUTION

1. RL, the SHPO, and the ACHP will work together to collaborate and resolve any differences or disputes informally. If necessary, RL, the SHPO and the ACHP will elevate significant disputes to the appropriate management levels of the organization for resolution.
  - a. Forward all documentation relevant to the dispute, including RL's proposed resolution, to the ACHP. The ACHP shall provide RL with its advice on the resolution of the objection within thirty (30) days of receiving adequate documentation. Prior to reaching a final decision on the dispute, RL shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP and Signatories and provide them with a copy of this written response. RL will then proceed according to its final decision.
  - b. If the ACHP does not provide its advice regarding the dispute within the thirty (30) day time period, RL may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, RL shall prepare a written response that takes into account any timely comments regarding the dispute from the Signatories to the MOA, and provide them and the ACHP with a copy of such written response.
2. Public Objections: If an objection pertaining to this MOA is raised by a member of the public at any time during implementation of the stipulations contained in this MOA, DOE shall notify the Consulting Parties and take the objection into account, and consult with Signatories and Invited Signatories to resolve the objection if DOE decides that such consultation is appropriate.

## VIII. AMENDMENTS

The Signatories and Invited Signatories may propose, in writing, and will consider amendments to this MOA. This MOA may be amended when such an amendment is agreed to in writing by all Signatories. The amendment will be effective on the date a copy signed by all of the Signatories is filed with the ACHP.

## IX. TERMINATION

If any signatory to this MOA determines that its terms will not or cannot be carried out, that party shall immediately consult with the other Signatories to attempt to develop an amendment per Stipulation VIII, above. If within thirty (30) days (or another time period agreed to by all Signatories) an amendment cannot be reached, any Signatory may terminate the MOA upon written notification to the other Signatories.

Once the MOA is terminated, RL must either (a) execute an MOA pursuant to 36 CFR § 800.6 or (b) request, take into account, and respond to the comments of the ACHP under 36 CFR § 800.7. RL shall notify the Signatories as to the course of action it will pursue.

Execution of this MOA by RL, SHPO, and ACHP and implementation of its terms evidence that RL has taken into account the effects of this Undertaking on historic properties and afforded the ACHP an opportunity to comment.

**X. SIGNATORY:**

**MEMORANDUM OF AGREEMENT**

**AMONG THE U.S. DEPARTMENT OF ENERGY RICHLAND OPERATIONS OFFICE, THE WASHINGTON STATE DEPARTMENT OF ARCHAEOLOGY AND HISTORIC PRESERVATION, THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, CONFEDERATED TRIBES AND BANDS OF THE YAKAMA NATION, CONFEDERATED TRIBES OF THE UMATILLA INDIAN RESERVATION, NEZ PERCE TRIBE, AND WANAPUM REGARDING THE ADVERSE EFFECT OF THE FINAL AREA OF POTENTIAL EFFECT DEED TRANSFER ON YAKAMA TRADITIONAL CULTURAL PROPERTY, FIRST FOODS GATHERING AREAS TRADITIONAL CULTURAL PROPERTY, ÓYKALA AYN WÉETES TRADITIONAL CULTURAL PROPERTY, SHU WIPA TRADITIONAL CULTURAL PROPERTY, HANFORD SITE PLANT RAILROAD (45BN1107), THE RICHLAND IRRIGATION CANAL (45BN1125), AND WOODED ISLAND ARCHAEOLOGICAL DISTRICT (DT31)**

**U.S. Department of Energy, Richland Operations Office**

By: Stacy Charboneau  
Stacy Charboneau, Manager

Date: 9/15/15

Final MOA, Rev. 7  
September 14, 2015

**SIGNATORY:**

**MEMORANDUM OF AGREEMENT**

**AMONG THE U.S. DEPARTMENT OF ENERGY RICHLAND OPERATIONS OFFICE, THE WASHINGTON STATE DEPARTMENT OF ARCHAEOLOGY AND HISTORIC PRESERVATION, THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, CONFEDERATED TRIBES AND BANDS OF THE YAKAMA NATION, CONFEDERATED TRIBES OF THE UMATILLA INDIAN RESERVATION, NEZ PERCE TRIBE, AND WANAPUM REGARDING THE ADVERSE EFFECT OF THE FINAL AREA OF POTENTIAL EFFECT DEED TRANSFER ON YAKAMA TRADITIONAL CULTURAL PROPERTY, FIRST FOODS GATHERING AREAS TRADITIONAL CULTURAL PROPERTY, OYKALA AYN WÉETES TRADITIONAL CULTURAL PROPERTY, SHU WIPA TRADITIONAL CULTURAL PROPERTY, HANFORD SITE PLANT RAILROAD (45BN1107), THE RICHLAND IRRIGATION CANAL (45BN1125), AND WOODED ISLAND ARCHAEOLOGICAL DISTRICT (DT31)**

**Washington State Department of Archaeology and Historic Preservation**

By:   
Dr. Allyson Brooks, Washington State Historic Preservation Officer/Director

Date: 9/21/15

**SIGNATORY:**

**MEMORANDUM OF AGREEMENT**

**AMONG THE U.S. DEPARTMENT OF ENERGY RICHLAND OPERATIONS OFFICE, THE WASHINGTON STATE DEPARTMENT OF ARCHAEOLOGY AND HISTORIC PRESERVATION, THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, CONFEDERATED TRIBES AND BANDS OF THE YAKAMA NATION, CONFEDERATED TRIBES OF THE UMATILLA INDIAN RESERVATION, NEZ PERCE TRIBE, AND WANAPUM REGARDING THE ADVERSE EFFECT OF THE FINAL AREA OF POTENTIAL EFFECT DEED TRANSFER ON YAKAMA TRADITIONAL CULTURAL PROPERTY, FIRST FOODS GATHERING AREAS TRADITIONAL CULTURAL PROPERTY, OYKALA AYN WÉETES TRADITIONAL CULTURAL PROPERTY, SHU WIPA TRADITIONAL CULTURAL PROPERTY, HANFORD SITE PLANT RAILROAD (45BN1107), THE RICHLAND IRRIGATION CANAL (45BN1125), AND WOODED ISLAND ARCHAEOLOGICAL DISTRICT (DT31)**

**Advisory Council on Historic Preservation**

By:   
John M. Fowler, Executive Director

Date: 9/25/15

**INVITED SIGNATORY:**

**MEMORANDUM OF AGREEMENT**

**AMONG THE U.S. DEPARTMENT OF ENERGY RICHLAND OPERATIONS OFFICE, THE WASHINGTON STATE DEPARTMENT OF ARCHAEOLOGY AND HISTORIC PRESERVATION, THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, CONFEDERATED TRIBES AND BANDS OF THE YAKAMA NATION, CONFEDERATED TRIBES OF THE UMATILLA INDIAN RESERVATION, NEZ PERCE TRIBE, AND WANAPUM REGARDING THE ADVERSE EFFECT OF THE FINAL AREA OF POTENTIAL EFFECT DEED TRANSFER ON YAKAMA TRADITIONAL CULTURAL PROPERTY, FIRST FOODS GATHERING AREAS TRADITIONAL CULTURAL PROPERTY, OYKALA AYN WÉETES TRADITIONAL CULTURAL PROPERTY, SHU WIPA TRADITIONAL CULTURAL PROPERTY, HANFORD SITE PLANT RAILROAD (45BN1107), THE RICHLAND IRRIGATION CANAL (45BN1125), AND WOODED ISLAND ARCHAEOLOGICAL DISTRICT (DT31)**

**Confederated Tribes and Bands of the Yakama Nation**

By: \_\_\_\_\_  
JoDe L. Goudy, Chairman, Yakama Nation Tribal Council

Date: \_\_\_\_\_

**INVITED SIGNATORY:**

**MEMORANDUM OF AGREEMENT**

**AMONG THE U.S. DEPARTMENT OF ENERGY RICHLAND OPERATIONS OFFICE, THE WASHINGTON STATE DEPARTMENT OF ARCHAEOLOGY AND HISTORIC PRESERVATION, THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, CONFEDERATED TRIBES AND BANDS OF THE YAKAMA NATION, CONFEDERATED TRIBES OF THE UMATILLA INDIAN RESERVATION, NEZ PERCE TRIBE, AND WANAPUM REGARDING THE ADVERSE EFFECT OF THE FINAL AREA OF POTENTIAL EFFECT DEED TRANSFER ON YAKAMA TRADITIONAL CULTURAL PROPERTY, FIRST FOODS GATHERING AREAS TRADITIONAL CULTURAL PROPERTY, OYKALA AYN WÉETES TRADITIONAL CULTURAL PROPERTY, SHU WIPA TRADITIONAL CULTURAL PROPERTY, HANFORD SITE PLANT RAILROAD (45BN1107), THE RICHLAND IRRIGATION CANAL (45BN1125), AND WOODED ISLAND ARCHAEOLOGICAL DISTRICT (DT31)**

**Confederated Tribes of the Umatilla Indian Reservation**

By:   
Gary Burke, Chairman, Board of Trustees

Date: 9.29.15

Final MOA, Rev. 7  
September 14, 2015

**INVITED SIGNATORY:**

**MEMORANDUM OF AGREEMENT**

**AMONG THE U.S. DEPARTMENT OF ENERGY RICHLAND OPERATIONS OFFICE, THE WASHINGTON STATE DEPARTMENT OF ARCHAEOLOGY AND HISTORIC PRESERVATION, THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, CONFEDERATED TRIBES AND BANDS OF THE YAKAMA NATION, CONFEDERATED TRIBES OF THE UMATILLA INDIAN RESERVATION, NEZ PERCE TRIBE, AND WANAPUM REGARDING THE ADVERSE EFFECT OF THE FINAL AREA OF POTENTIAL EFFECT DEED TRANSFER ON YAKAMA TRADITIONAL CULTURAL PROPERTY, FIRST FOODS GATHERING AREAS TRADITIONAL CULTURAL PROPERTY, OYKALA AYN WÉETES TRADITIONAL CULTURAL PROPERTY, SHU WIPA TRADITIONAL CULTURAL PROPERTY, HANFORD SITE PLANT RAILROAD (45BN1107), THE RICHLAND IRRIGATION CANAL (45BN1125), AND WOODED ISLAND ARCHAEOLOGICAL DISTRICT (DT31)**

**Nez Perce Tribe**

By: Anthony D. Johnson  
Anthony D. Johnson, Chairman, Nez Perce Tribal Executive Committee

Date: 9/17/15

Final MOA, Rev. 7  
September 14, 2015

**INVITED SIGNATORY:**

**MEMORANDUM OF AGREEMENT**

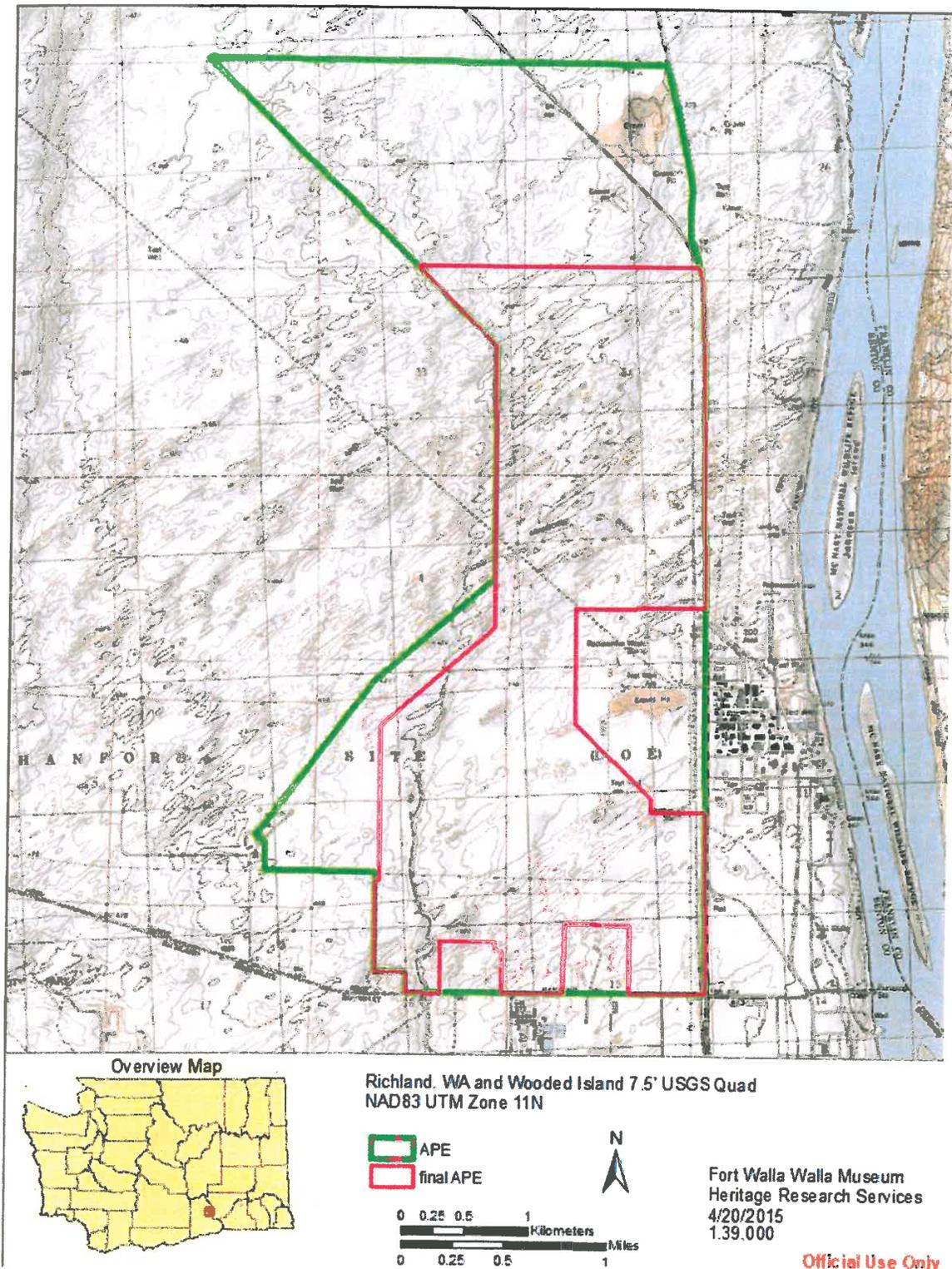
**AMONG THE U.S. DEPARTMENT OF ENERGY RICHLAND OPERATIONS OFFICE, THE WASHINGTON STATE DEPARTMENT OF ARCHAEOLOGY AND HISTORIC PRESERVATION, THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, CONFEDERATED TRIBES AND BANDS OF THE YAKAMA NATION, CONFEDERATED TRIBES OF THE UMATILLA INDIAN RESERVATION, NEZ PERCE TRIBE, AND WANAPUM REGARDING THE ADVERSE EFFECT OF THE FINAL AREA OF POTENTIAL EFFECT DEED TRANSFER ON YAKAMA TRADITIONAL CULTURAL PROPERTY, FIRST FOODS GATHERING AREAS TRADITIONAL CULTURAL PROPERTY, OYKALA AYN WÉETES TRADITIONAL CULTURAL PROPERTY, SHU WIPA TRADITIONAL CULTURAL PROPERTY, HANFORD SITE PLANT RAILROAD (45BN1107), THE RICHLAND IRRIGATION CANAL (45BN1125), AND WOODED ISLAND ARCHAEOLOGICAL DISTRICT (DT31)**

**Wanapum**

By   
Rex Buck, Representative

Date: \_\_\_\_\_

**APPENDIX A. AREA OF POTENTIAL EFFECT**



**APPENDIX B. CULTURAL RESOURCE PROTECTION PROTOCOL**

The Inter-Tribal Advisory Board (ITAB) will consist of one representative from the Confederated Tribes and Bands of the Yakama Nation, the Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian Reservation and the Wanapum. ITAB will meet once a month with a designated representative from TRIDEC and/or potential land owners as the land is sold. The purpose of the meeting will be to discuss ground disturbing activities and coordinate how to best comply with the cultural resource protection procedures below. It is noted the land has been transferred with the intent of development. It is not the intent of the ITAB to hold up development projects. The only interest of the ITAB is to ensure the protection of cultural resources through identification, evaluation and relocation.

The land owners are responsible for funding compliance with the protocol.

1. **Project Location Planning.** Prior to the selection of potential locations the project proponent shall consider the likelihood of the project impacting burial sites and cultural resources that may be within or adjacent to the proposed project's area of potential effect. Methods to be involved in making this assessment may include but not be limited to literature reviews, oral history reviews, archaeological survey and/or testing, and remote sensing as recommended by ITAB.
2. **Selected Project Location.** Once a preferred project location (area of potential effect) has been chosen, ITAB shall recommend the appropriate level of cultural resource investigation to be conducted. Methods to be involved in this assessment may include but not be limited to literature reviews, archaeological survey and/or testing, monitoring, and/or remote sensing investigation, as recommended by ITAB.
  - a. Any cultural resources work required must comply with applicable professional standards. All contractors shall comply with the Secretary of Interior professional qualification standards at 36 CFR 61.
  - b. The associated cultural resource report must be sent to the ITAB and Department of Archaeology and Historic Preservation (DAHP) for review. The ITAB shall review and either concur or not concur with the findings of the report within 30 days.
  - c. Clearance shall be granted by the ITAB & DAHP if one of the following conditions is satisfied:
    - i. The action has no potential to cause an effect to cultural resources; or
    - ii. The action has no effect to cultural resources; or
    - iii. The action will have no adverse effect to cultural resources; or
    - iv. The action will have an adverse effect to cultural resources, then one of the following actions will be taken:
      - a). Avoid the impact to cultural resources;
      - b). Minimize the effects of the project to the cultural resource; or,
      - c). Mitigate through the development of a data recovery plan, as approved by the ITAB, to include relocation of the cultural material to resolve those effects.
3. If items suspected to be cultural resources are observed, cease activities occurring within 100 feet of the discovery in order to protect the integrity of such resources. Reasonable steps shall be taken to secure the area. No cultural resources will be further disturbed or transported from its original location, unless approved by the ITAB. Contact the ITAB to

determine the next steps. These may include, but shall not be limited to, documentation, avoidance, excavation, determining site eligibility, or no additional work needed. Activities in the area of the find may resume only after receipt of written approval from the ITAB.

4. These projects may be subject to fees based on clearance work required.
5. For projects meeting the definition of a federal undertaking as defined by 36 CFR 800.16, the National Historic Preservation Act Section 106 process will be followed.

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## **APPENDIX L – RESPONSES TO PUBLIC COMMENTS**

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L.1	Introduction.....	L-1
L.2	General Responses (#1-15).....	L-2
L.3	United States Environmental Protection Agency, Region 10 (#18-22).....	L-8
L.4	United States Navy (#23-32).....	L-11
L.5	Oregon Department of Energy (#33-42).....	L-17
L.6	City of Richland Community & Development Services (#43-45).....	L-21
L.7	Confederated Tribes of the Umatilla Indian Reservation (#46-54).....	L-22
L.8	Confederated Tribes and Bands of the Yakama Nation (#55-142).....	L-26
L.9	Nez Perce Tribe (#143-164).....	L-45
L.10	Wanapum (#165-189).....	L-49
L.11	Lower Columba Basin Audubon Society (#190-205).....	L-55
L.12	Debbie Berkowitz (#206-217).....	L-57
L.13	Monica Billings (#218-224).....	L-59
L.14	Columbia Riverkeeper (#225-235).....	L-60
L.15	J. Dunford (#236).....	L-65
L.16	Carl Grando (#237-242).....	L-66
L.17	Michael Luzzo (#243).....	L-69
L.18	John McDonald (#244-259).....	L-70
L.19	Laurie Ness (#260-272).....	L-74
L.20	Patrick Paulson (#273-282).....	L-78
L.21	Dana Ward (#283-308).....	L-81
L.22	Public Meeting (#309-337).....	L-85

## **APPENDIX L – RESPONSES TO PUBLIC COMMENTS**

### **L.1 INTRODUCTION**

The Draft Environmental Assessment (EA) was published for 30-day public review from July 13, 2015, to August 12, 2015. The public notification indicated the various methods the public could provide comments on the Draft EA including via e-mail, US mail, and verbally during the public meeting held on July 30, 2015.

This appendix presents the written and verbal comments received, with DOE responses next to a comment so a reader can see the comments in the context of the full letter or e-mail. Since many of the comments and issues are the same or similar, the first section of Responses to Comments is called “General Responses.” These are DOE’s responses to multiple comments regarding the same issue or concern. Generally, if comments were statements or opinions, those comments did not require a response.

A table of contents is provided that lists the names of the commenters, the comment response numbers associated with each commenter, and the pages on which the letter or e-mail can be found.

The transcripts from the public meeting on the Draft EA are provided at the end of this appendix.

## L.2 GENERAL RESPONSES (#1-15)

### 1. Reason for Preparing an EA Rather than an EIS

- a. 10 CFR 1021.321 allows the U.S. Department of Energy (DOE) to “prepare an EA on any action at any time to assist the agency in planning and decision-making.” This EA was developed in accordance with the Council on Environmental Quality (CEQ) and DOE-specific *National Environmental Policy Act* (NEPA) regulations. The Proposed Action (transfer of approximately 1,641 acres) was specifically required by the *National Defense Authorization Act of FY 2015* (NDAA). The acreage analyzed in the EA is part of approximately 59 square miles of Hanford Site lands previously designated by DOE for industrial uses under the Hanford Comprehensive Land-Use Plan (CLUP), based on analyses presented in the Hanford CLUP Environmental Impact Statement (HCP–EIS) [DOE/EIS–0222; September 1999; Record of Decision (ROD) (64 FR 61615; November 12, 1999)]. The HCP–EIS recognized the potential for future conveyance of some industrial-designated lands to the local community for economic development. This EA provides sufficient evidence and analysis for determining whether to prepare a Finding of No Significant Impact (FONSI) or an Environmental Impact Statement (EIS). While the EA does not indicate that significant impacts would be expected to occur from the Proposed Action, DOE has identified mitigation measures for the purpose of minimizing or avoiding potential impacts, which would be included in a mitigation action plan (MAP).
- b. **Evaluation of Potential for Significant Environmental Impact**  
Impacts for each resource topic were evaluated in terms of context and intensity as required by the CEQ regulations for determining whether there would be potential for significant impacts (see Chapter 3). DOE identified mitigation measures that would become requirements of a deed for transferred land, as well as mitigation measures that would be implemented by DOE to minimize or avoid potential impacts, which would be included in a MAP.
- c. **Potential Impact to Shrub-Steppe Habitat and Use of the 300 Area**  
The EA describes the importance of shrub-steppe habitat and acknowledges that the Proposed Action would result in habitat loss. Native vegetation in the project area has been impacted by historical agricultural activities, wildfire, and herbicide applications. The dominant vegetation is a Sandberg bluegrass/cheatgrass community, with shrubs comprising less than three percent of the project area, and sagebrush mostly absent. The CEQ regulations define significance of an impact taking into consideration the context, which includes the presence of other shrub-steppe habitats on the Hanford Site, including the Hanford Reach National Monument. Consideration of transfer of the 300 Area as an alternative to the focused study area (FSA) lands would not meet the stated purpose and need in the EA regarding the Tri-City Development Council (TRIDEC’s) request for lands evaluated in the FSA.

### 2. Deed Restrictions and Oversight by Local Jurisdictions

The Draft EA identified mitigation measures that could become deed restrictions or that DOE could implement, as well as mitigation measures that could be implemented by local jurisdictions and future landowners, such as for traffic reduction, water conservation, or waste reduction. The Final EA identifies mitigation measures that DOE would implement for land conveyance. These mitigation measures include those deed restrictions and covenants identified in EA Table 5-2, and stipulations in the *National Historic Preservation Act* (NHPA) Memorandum of Agreement (MOA) in Appendix K. These mitigation measures were developed for the purpose of protecting the interests of the federal

government (e.g., ongoing mission needs) and for mitigating effects to cultural and environmental resources. The deed restrictions and covenants would run with the land and be binding upon future owners pursuant to applicable laws.

### **3. DOE Control of Development**

Upon conveyance the land would be subject to local comprehensive land uses plans, zoning and ordinances. The EA assumes that a solar farm would be developed on the 300-acre parcel specifically requested by TRIDEC for this purpose. Local governments would be responsible to account for utility and infrastructure needs in their development planning, permitting, and approval processes. While DOE would not be directly involved in development processes, DOE would include deed restrictions and covenants protecting its interests relative to future development of the conveyed lands.

### **4. Consideration of Reasonably Foreseeable Projects**

The EA analyzed the reasonably foreseeable future uses of FSA land, based on industry targets described in TRIDEC's proposal (TRIDEC 2011a) and target marketing industries (TMI) (TRIDEC 2014a). See Chapter 1. A NEPA document does not speculate nor is it required to evaluate projects that are not reasonably foreseeable. For EA Chapter 4, Cumulative Effects, reasonably foreseeable projects included those known and proposed at the time the EA was being prepared and in the region of influence (ROI).

### **5. Mitigation Measures and Enforceability**

The Draft EA was based on the information DOE had available at that time. Chapter 3 described potential mitigation measures for each resource area, where appropriate and necessary to reduce or eliminate potential impacts. The Draft EA distinguished between those measures that could be taken by DOE and those that could, or would be anticipated to, be taken by future landowners. DOE would not retain control over future development of the land following transfer, as explained in #3 above. The need for some DOE mitigation measures had been identified at the time of development of the Draft EA (e.g., the need for a deed restriction to prevent access to groundwater). Based upon input received during the Draft EA public comment period, and the results of government-to-government consultation in the NHPA Section 106 process, DOE has identified additional mitigation measures in the Final EA and MOA.

### **6. Accidents and Risk Evaluation from Hanford Site Activities and Buildings 324 and 325**

The impact of DOE activities on public use of FSA lands was addressed by examining bounding conditions for both current and future DOE activities on the Hanford Site. The FSA is located such that current and future Hanford Site activities would not present a risk to human health and safety for future economic development activities. Due to the proximity of Hanford Site buildings 324 and 325 (approximately 600 meters away), current and future activities at these buildings represent the bounding condition, or greatest relative risk to the public on FSA lands. The analyses found that accident dose consequences to the public within the FSA are minimal and would not require any additional mitigation measures beyond safety measures normally provided at the facilities to ensure the adequate protection of the public health, safety, and environment. See Appendix F for a discussion of the radiological risks resulting from current and future activities at the 324 and 325 buildings.

## **7. Radiological Hazard Evaluation**

a. The radiological clearance of the FSA followed the processes in DOE Order 458.1, “Radiation Protection of the Public and the Environment,” and the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM). This included a historical site assessment, a field investigation, soil samples, surface surveys, and an independent verification. The MARSSIM process revealed no areas of elevated radioactivity within the FSA. Radionuclide soil concentrations in the FSA were found to be approximately one percent of the authorized limits and similar to the background levels existing in the geographic area around the Hanford Site. DOE’s compliance with Order 458.1 and other applicable federal, state, and local regulations relative to protection of the public from residual radioactive material and other hazardous substances is discussed in EA Section 3.14 and Appendix F.

### **b. Emergency Planning, Off-Site Facilities**

EA Section 3.14.3 provides a discussion of emergency planning programs. Upon conveyance, emergency management for FSA lands would be incorporated into existing emergency response planning, notification, and evacuation processes administered by Washington state and local authorities. A communication structure has been established that allows the state and local emergency organizations to coordinate activities during an emergency, including requests for support from either organization. As required by DOE Order 151.1, “Comprehensive Emergency Management System,” DOE also coordinates and integrates emergency management activities with Washington and Oregon states and the affected county emergency management organizations. This includes providing the agencies in charge of public health and safety during emergencies with information and support for determining appropriate public protective actions. The Nuclear Regulatory Commission (NRC), Washington state and/or local authorities currently require a periodic risk analysis for non-DOE nuclear licensed facilities—such as the Columbia Generating Station, AREVA, Perma-Fix—and other potentially contributing sources of risk. It is assumed that non-DOE licensed facilities would continue to complete their required analysis of changing conditions, such as air emissions and location of the public and report to their respective governing agencies. In regard to nuclear and/or radiological risk, the non-DOE licensed facilities treat the FSA lands as if they are currently used by the public, therefore no change in their risk decision analysis is anticipated.

## **8. Historic Properties, Traditional Cultural Properties, and Cultural Resources**

See EA Section 3.6.1.2, “Identification of Cultural Resources and Historic Properties” and Section 3.6.3, “Mitigation Measures.” In the Draft EA, DOE identified three NRHP-eligible properties. The Draft EA was issued to allow for public comment concurrent with the NHPA Section 106 process. DOE continued the NHPA Section 106 identification and consultation process, which resulted in DOE identifying additional NRHP-eligible properties: Four traditional cultural properties (TCPs) and features linked to an archeological district (contributing elements). DOE has taken into consideration all comments. DOE has completed NHPA Section 106 consultation with all consulting parties and has reached an MOA that includes measures to avoid, minimize, or mitigate potential adverse effects to historic properties, TCPs and cultural resources. See Appendix K, “Memorandum of Agreement.” Furthermore, the MOA contains language to be used for various deed restrictions related to development of the site, which would mitigate potential effects. Through the MOA, DOE has agreed to implement mitigation measures that will apply to the entire land parcel to be conveyed. DOE will also implement mitigation measures for the individual historic properties, TCPs, and cultural resources as indicated in the MOA. Not all mitigation requires funding, but DOE will fund mitigation

as agreed to and will allow tribes to use cooperative agreement funds as indicated in the MOA. There are various timeframes for implementing the mitigation measures, as indicated in the MOA. DOE will continue to consult with tribes regarding the land conveyance as tribes may determine topics for consultation under DOE's Native American Indian Policy and Order 144.1, "Department of Energy American Indian Tribal Government Interactions and Policy" (2009).

## 9. **Ecological Resources**

### a. **Mitigation measures**

DOE completed the environmental analysis and considered comments received during the public comment period. DOE would complete the following mitigation measures for loss of shrub-steppe vegetation communities and wildlife habitat from the Proposed Action.

- Enhance native vegetation communities to benefit migratory bird and pollinator habitats by planting native forbs at the 120-acre 100 C-7 backfill and re-vegetation site.
- Collaborate with tribal nations to include an appropriate mixture of native shrubs, grasses and forbs in re-vegetation projects identified in the NHPA MOA for the land conveyance project.
- Identify the swale habitats located in the PAAL and described in the EA for protection within the larger area designated for industrial uses under the CLUP. Provide administrative protection from disturbance from future development proposals or management actions consistent with the CLUP management plans, including the BRMP. Identify the swale habitats as Biological Resources Management Plan (BRMP) Level 4 habitat based upon the documented intensity of pollinator use and unique vegetation assemblages.
- Conduct a Pollinator Habitat study for the Hanford Site, focusing on identifying pollinator species and the plants and habitats they require for their life cycle. The study shall provide data and recommendations needed to carry out habitat enhancement, proper management, and collaboration with other agencies and institutions to ensure this valuable resource is protected. Following the initial study, incorporate pollinator and habitat surveys into the Hanford Site ecological monitoring program.
- To protect migratory birds and pollinators, the deed would prohibit concentrating solar power technology on the conveyed lands.
- Install burrowing owl boxes in a location to be determined in consultation with the U.S. Fish and Wildlife Service and the Washington Department of Fish and Wildlife, for the purposes of supporting new colonies or enhancing existing colony habitat on the Hanford Site.
- To protect migratory birds and their habitats, the deed would include a covenant that bird-friendly building design would be incorporated into buildings, structures, and improvements to the extent it is reasonably practical to do so.

### b. **Biological Resources Management Plan Classifications**

Vegetation and wildlife surveys were completed for the EA to ensure that the analyses reflects current conditions. Vegetation maps shown in Revision 1 of DOE/RL-96-32 (BRMP) rely on data from the late 1990's and do not reflect changes in the project area that have resulted from several wildfires and subsequent noxious weed control efforts. The current survey data used in the EA will be used to update the BRMP in the next revision, currently scheduled for publication during fiscal year 2016.

## **10. Land Conveyance and Fair Market Value**

Section 5.2 of the EA provides an explanation of the NDAA that requires DOE to convey approximately 1,641 acres of land at the Hanford Site to TRIDEC by September 30, 2015. Under Section 3013 of the NDAA, the Secretary of DOE may convey the property without consideration or for consideration below the estimated fair market value of the property if the organization (TRIDEC) agrees that the net proceeds from any sale or lease of the property (or any portion thereof) received by the organization during at least the seven-year period beginning on the date of such conveyance will be used to support the economic redevelopment of, or related to, the Hanford Site.

## **11. DOE's "Discretionary Authority" Under the NDAA to Avoid Conveying Land**

The NDAA requires DOE to convey a total of approximately 1,641 acres of land at the Hanford Site to TRIDEC by September 30, 2015. Section 3013(a)(2) provides:

(2) Modification of conveyance.--Upon the agreement of the Secretary and the Organization, the Secretary may adjust the boundaries of one or both of the parcels specified for conveyance under paragraph (1).

Chapter 2 and Appendix A of the EA describe the land suitability review process where DOE determined which lands were suitable for conveyance. Of the 4,413 acres initially considered, there are 2,474 acres potentially suitable for conveyance and 1,935 of those acres could be transferred by deed. Any alternative based on the transfer of approximately 1,641 acres of land would therefore differ only by 294 acres (i.e., 1,935 acres minus 1,641 acres), which is not an appreciable enough difference to identify additional alternatives. DOE is not aware of any other alternatives to the Proposed Action that would reasonably meet purpose and need for the Proposed Action described in Chapter 1. As a result of the suitability review process, DOE used avoidance as a mitigation measure where appropriate. In addition, a number of deed restrictions were developed to mitigate potential impacts.

## **12. Contaminated Groundwater, Stormwater Runoff, and Hazardous Materials Left in Place**

As discussed in EA Section 3.2, "Water Resources," there is contaminated groundwater (nitrate and uranium) under and around the boundaries of the FSA. Some of the contamination originated from sources outside the Hanford Site and some originated from Hanford Site operations in the vicinity of the FSA. Deed restrictions prohibit any access or use of groundwater and any interference with DOE groundwater monitoring wells or DOE access routes to the monitoring wells.

Additional discussion on contaminated groundwater plumes and potential impacts from stormwater runoff has been added to EA Section 3.2. While it is not anticipated that stormwater could impact contaminated groundwater plumes, a deed restriction has been applied to prohibit placement of swales, ponds, and other storm water drainage facilities in certain areas of the FSA. DOE is conducting a quantitative analysis to evaluate whether stormwater runoff could impact contaminated groundwater plumes. Also based on review of existing hydrologic information, it is reasonably anticipated that there is no potential for elevated groundwater levels to mobilize contamination from waste sites and disposal facilities in the vicinity of the FSA. Additional confirmatory modeling of this will be included in the quantitative analysis described above. The aforementioned deed restriction could be removed or modified depending upon findings from this analysis.

Currently, water table elevations range from about 348 to 367 feet (above mean sea level) while ground surface is at above 393 feet (above mean sea level) within most of the area. The biologically active zone over the entire Hanford Site is known to be less than 10 feet. Therefore, there is no risk of biomobilization of groundwater contamination (e.g., by plant roots) from this area. In addition, DOE employs a range of monitoring and surveillance programs that continuously evaluate conditions within the groundwater aquifer and across the area surrounding the Hanford Site.

### **13. Time to Review Draft EA and for DOE to Consider Public Comments in Final EA**

Per CEQ and DOE regulations, a Draft EA is not required to be publicly reviewed, however, DOE elected to provide 30 days for public review. DOE has considered public comments; added or revised the EA, as appropriate; and provided responses to comments in Appendix L.

### **14. Bounding Case Analysis and Overestimation of Potential Impacts**

As explained in Chapter 2 of the EA, a “bounding case analysis” was used per DOE NEPA guidelines to provide a range of potential impacts, to simplify assumptions, address uncertainty, or because expected values are unknown. A bounding analysis is used to provide conservatism, or overestimate impacts, in the face of uncertainty. DOE used analytical assumptions in the EA that maximized estimates of reasonably foreseeable environmental impacts associated with footprint, infrastructure, utilities, emissions, construction of buildings, projected workforce and traffic, water usage, and similar requirements. Thus, the maximum levels of potential impacts described in the EA (e.g., air emissions) are not likely to occur.

### **15. Natural Resource Damage Assessment and Restoration**

The *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) does not preclude the conveyance of Hanford land based on the status of the Natural Resource Damage Assessment and Restoration (NRDAR) process. DOE will fulfill its role as the lead natural resource trustee and the ongoing NRDAR process may take into consideration lands conveyed out of federal ownership, if appropriate. Section 107(f) of CERCLA makes DOE a trustee of natural resources located on, over, and under DOE-managed land, including the Hanford Site. DOE will meet its obligations under CERCLA.

### **16. Not Used**

### **17. Not Used**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue, Suite 900  
Seattle, WA 98101-3140

OFFICE OF  
ECOSYSTEMS, TRIBAL AND  
PUBLIC AFFAIRS

August 12, 2015

Paula Call, NEPA Document Manager  
Land Conveyance EA  
U.S. Department of Energy  
Richland Operations Office  
P.O. Box 550, Mailstop A2-15  
Richland, Washington 99352

Dear Ms. Call:

In accordance with our responsibilities under Section 309 of the Clean Air Act and the National Environmental Policy Act (NEPA), and the Council on Environmental Quality regulations for implementing NEPA, the US Environmental Protection Agency (EPA) has reviewed the draft Environmental Assessment (EA) for the proposed **Conveyance of Land and Potential Floodplain and Wetland Involvement** (EPA Project: 12-0050-DOE) at the Hanford Site in Richland, Washington.

The draft EA analyzes potential environmental impacts of conveying about 1,641 acres of the Hanford Site land to Tri-City Development Council (TRIDEC), a local economic development organization. The analysis area would be nearly 2,500 acres, which would include transfer lands, a solar farm (300 acres) and about 539 acres of Potential Access Agreement Land (PAAL) i.e., lands not suitable for transfer but could be used for utilities. The conveyance would involve title transfer, lease, easement, license, or a combination of these realty actions. In addition, TRIDEC would engage in warehousing and distribution, research and development, technology manufacturing, food processing and agriculture, and other business services. The EA tiers to the 1999 Hanford Comprehensive Land-Use Plan Environmental Impact Statement (EIS) and related 2008 amendments and Record of Decision, which included provisions to transfer lands designated for industrial use to the local community for economic development.

We note that the EA addresses many of the issues we raised during the project scoping period in October, 2012. Overall, the EA includes a good description of resources within the project area, analysis of potential impacts, and potential actions to address the impacts. The EA indicates that most impacts will be addressed by the transferee when development takes place after the land transfer. To assure implementation of appropriate avoidance, minimization and mitigation of environmental impacts, we recommend use of some mechanism associated with the land transfer, such as deed restrictions. The following topics are areas of potential concern.

**Water Resources**

The EA indicates that construction activities would expose soil to wind and precipitation resulting in potential erosion and sedimentation from stormwater runoff and that development would also create large areas of impervious surface (e.g., buildings and pavement) resulting in stormwater runoff. A National Pollutant Discharge Elimination Permit will likely be required.

18. See General Response #2

Because of anticipated impacts to water resources, we recommend consideration of Low Impact Development (LID) techniques<sup>1</sup> during the proposed project activities due to their potential to reduce stormwater volumes, and thus mimic natural conditions as closely as possible. The techniques also lessen impacts of stormwater runoff from impervious surfaces, such as paved roads, parking lots, and roofs and can provide energy and other utility savings. Other measures to conserve energy and resources may include those under the Energy Independence and Security Act of 2007<sup>2</sup>. The EPA Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act can be accessed online<sup>3</sup>. We also encourage DOE to require TRIDEC to adhere to both federal and state water resources' protection and preservation requirements as site developments and other activities are implemented.

**Radiological Clearance of Land**

Section 3.14.1.1 of the EA discusses radiation, sources and standards. Under the Radiological Clearance of Land topic (p. 3-90), it is said that DOE's maximum allowable administrative (or "authorized") limit for permitting radiological clearance of lands (i.e., "real" property) to the proposed industrial workforces is 25 millirem/year. This dose limit would principally be applicable to upcoming construction and operational workforces within the FSA. Although the intended use of the FSA is industrial, DOE O 458.1 was developed to address three separate potential receptor scenarios: the intended industrial use, the low-probability use of land by a resident farmer, and the potential dose to biota (vegetation and wildlife). The EA should note that any waste sites were cleaned up to the EPA standards, which is lower than the DOE standard of 25 millirem/year. For better protection of human health and the environment, we recommend use of DOE's higher standard in the EA, which is especially important because of other sources (p. 3-93) that may contribute to radiological impact but have not been surveyed for land clearance.

**Tribal Concerns**

Information in the EA indicates that development and land-disturbing activities on lands to be transferred may result in the destruction of archeological sites and may affect other cultural resources that are important to tribes. Cultural resources may also be affected by construction noise, vibration, artificial light, and odors. While the EA indicates that DOE communicated with the Tribes, it is not clear how the issues raised by the tribes were resolved. We understand that Tribes are concerned about preservation of treaty rights after land transfer, radiological exposure, health risk assessments, and accuracy of site usage patterns. We recommend that the final EA include further information addressing these points.

- 19. See General Response #3
- 20. A key assumption underlying and reiterated throughout the EA analysis is that TRIDEC or future landowners comply with all applicable federal, state, and local laws, rules, and regulations, and obtain any necessary permits. The deed would also reaffirm this requirement.
- 21. See General Responses #6 and #7a.
- 22. DOE has completed NHPA Section 106 consultation with tribes, which resulted in a completed MOA. DOE has revised the final EA to include further information addressing these points, including revisions to Sections 3.6.1.2 and 3.6.3, and incorporation of the MOA as Appendix K.

<sup>1</sup> <http://www.epa.gov/owow/NPS/lid/>

<sup>2</sup> <http://www2.epa.gov/laws-regulations/summary-energy-independence-and-security-act>

<sup>3</sup> <http://www.epa.gov/owow/NPS/lid/section438/techguid>

## United States Environmental Protection Agency

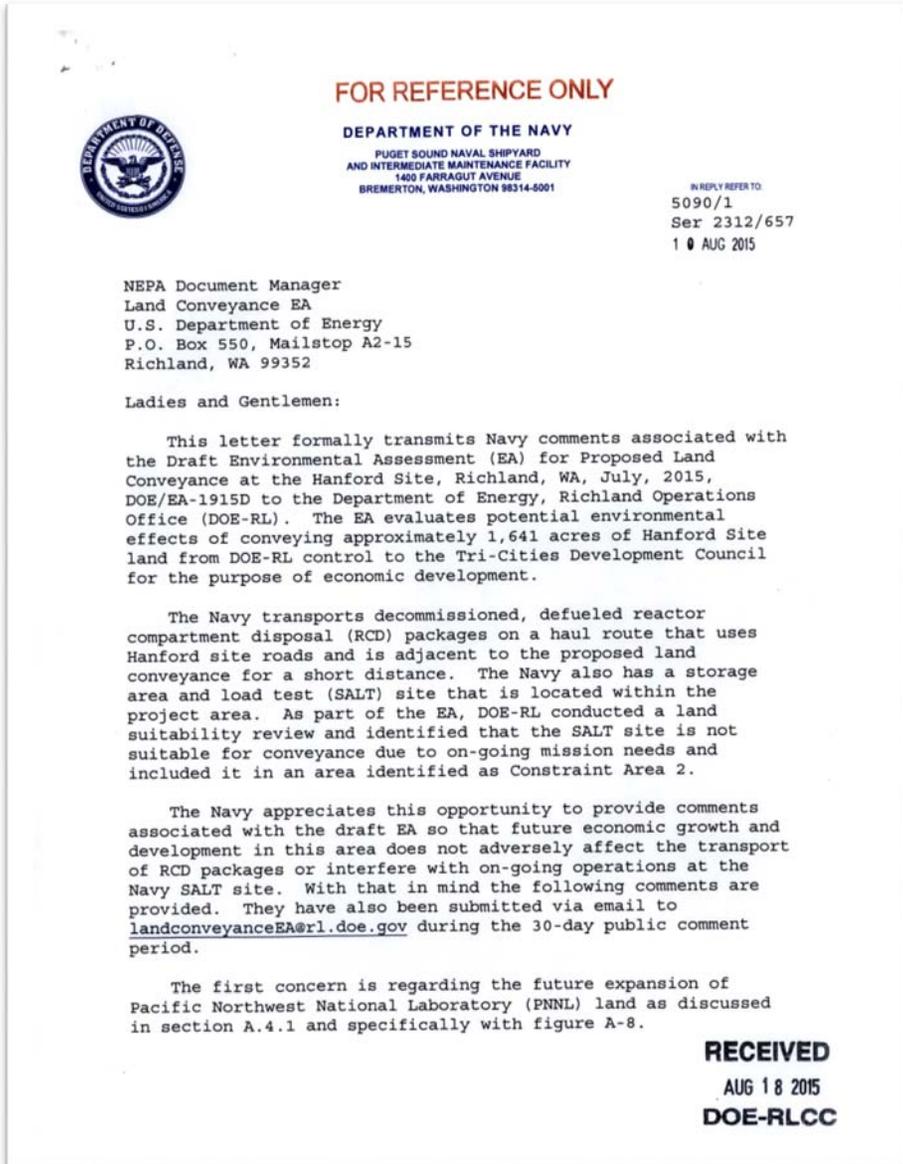
## APPENDIX L - RESPONSES TO PUBLIC COMMENTS

Thank you for the opportunity to review this EA. If you have questions about our comments, please contact me at (206) 553-1601 or by electronic mail at [reichgott.christine@epa.gov](mailto:reichgott.christine@epa.gov), or you may contact Theo Mbabaliye of my staff at (206) 553-6322 or electronic mail at [mbabaliye.theogene@epa.gov](mailto:mbabaliye.theogene@epa.gov).

Sincerely,



Christine B. Reichgott, Manager  
Environmental Review and Sediment Management Unit



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Ser 2312/657

Even though the land in figure A-8 is not part of the land conveyance, the figure shows that the PNNL campus could expand and encompass a portion of the current Navy haul route. This would adversely affect the ability of the Navy to transport RCD packages from the Port of Benton barge slip to Route 4 South. There are current agreements between the Navy, DOE-RL and DOE Pacific Northwest Site Office (PNSO) that govern the use of this route and provide the Navy with unobstructed access for the transport of RCD packages. Some of these agreements are listed below:

a. Memorandum of Understanding between the Department of Navy and the Department of Energy, of December 4, 1996 for disposal of decommissioned, defueled Naval reactor compartments at the Hanford site, states in part that "DOE will prepare the route for transport of the reactor compartments from the boundary of the Hanford site to and including the burial trench."

b. DOE-RL Real Estate Permit #R006-08PR-14941, of September 18, 2008, Storage Area and Load Test Site, states in part that "DOE-RL grants to the United States Navy a use permit to establish a load test site in support of the disposal of naval reactor compartments and for the right of ingress and egress over the existing government-owned roads for such disposal."

c. DOE-RL Memorandum #AMRC:HBH/06-AMRC-0350, of October 6, 2006, Approval for Reassignment of Programmatic Control of a Parcel of Hanford Site Real Property from the Office of Environmental Management (EM) to the Office of Science (SC), states in part, "Naval Reactor Compartment Transport Road ...The Navy will continue to use this gravel road as a corridor as needed to transport and dispose of decommissioned defueled naval reactor compartments to the Hanford Site."

d. Operational Agreement of May 2013, between the Office of Science PNSO and the Office of Environmental Management Richland Operations Office (RL). The agreement is used to "...define responsibilities and establish expectations, services and interface requirements with respect to...EM access to the PNNL site; RL and its contractor will maintain

} 23 The comment is outside the scope of the EA as it does not relate to the Proposed Action. The comment has been provided to the appropriate DOE-RL and DOE PNSO personnel for consideration.

5090/1  
Ser 2312/657

responsibility for the maintenance, repair, and funding of the reactor compartment haul road that goes through the PNNL site; RL will coordinate planned use of the haul road with PNSO. PNSO will not authorize any utility or facility interferences that will effect operation of this haul road."

The Navy has an ongoing operational need for the use of this haul route well into the future. Changes to the route would require considerable cost to the government to ensure that all environmental, cultural, ecological, biological, Tribal, engineering, and federal/state/city requirements are met, in addition to any construction costs. A change to the routing could also require the re-routing/reinforcement of existing water, gas, sewer, electrical, or other utilities due to the RCD package width, height and load requirements. It may also invoke additional federal/state/city regulations pertaining to the transport of RCD packages. Any changes to the current routing would adversely affect the RCD program and are unacceptable to the Navy.

The second concern is that some of the conveyed land is adjacent to Route 4 South as shown on EA, figure S-2. The Navy haul route also uses Route 4 South in this same location. Any construction activities or utility improvements near this location that could run along the side of, or cross over, or be buried under the Navy haul route or the SALT site access road (figure A-4) will need to comply with the RCD package width, height and load requirements. Also, any construction activities affecting the haul route will need to be coordinated with the Navy so that they do not interfere with any planned RCD shipments.

Additional comments regarding the clarification of statements, potential inconsistencies or are editorial in nature are provided in the enclosure.

- 24. Section 2.2.3 and Figure 2-6 of the EA identifies the land included and excluded from the land conveyance to Tri-City Development Council. The Navy's Storage Area and Load Test (SALT) Site is not part of the potential conveyance. In addition, this area and Route 4 South will stay under the federal government's institutional control and ownership. DOE would coordinate any construction activities proposed in this area with the Navy.

**United States Navy**

**APPENDIX L - RESPONSES TO PUBLIC COMMENTS**

5090/1  
Ser 2312/657

The point of contact for this letter is Ms. Amy O'Malia.  
She may be reached at (360) 476-4800 or via her cell phone at  
(360) 710-3169.

Sincerely,



M. A. HEESACKER  
By direction  
of the Commander

Enclosure: Navy Clarification Comments to the Draft EA for  
Proposed Conveyance of Land at the Hanford Site.

Copy to: Naval Reactors Representative's Office, Puget Sound  
Naval Sea Systems Command (SEA 08R)  
Department of Energy-Richland (M. Collins, A. Farabee)

NAVY CLARIFICATION COMMENTS TO DRAFT ENVIRONMENTAL ASSESSMENT FOR PROPOSED LAND CONVEYANCE

This enclosure provides additional comments to the Draft Environmental Assessment (EA) for Proposed Land Conveyance at the Hanford Site, Richland, WA, July 2015, DOE/EA-1915D that are clarifying and editorial in nature.

a. Section 2.2.3 discusses land considered for conveyance and then provides a series of figures that shows the chronology of the Suitability Review (appendix A). The figures identify land that is potentially suitable or not suitable for conveyance (line 352). Figure 2-8 shows a 340 acre parcel that includes the SALT site. This parcel is determined to be unsuitable because a radiological clearance review identified that it will take too long and be too costly to clear and therefore "removed it from consideration for conveyance". However section 3.14.2.2 (line 311) discusses the "Radiological Clearance Survey" but makes no mention of the 340 acre parcel. The "emphasis and evaluation was placed primarily upon the FSA" which does not include the SALT site. Even though the emphasis of the evaluation was on the FSA, section 3.14.2.2 could also include a discussion on the 340 acre parcel (which includes the SALT site), and state why it is unsuitable for conveyance from a radiological clearance perspective. The narrative in the table on figure 2-8 should be revised from "Lift Test site to "Load Test site.

b. Appendix A, section A.1, line 116 discusses "suitability constraints" and defines four types of constraints which would restrict or put limitations on a defined parcel of land. Section A.2.2 discusses a Type I Suitability Constraint titled "Constraint Area 2 (line 159). The SALT site is located within Constrained Area 2. The narrative for this section identifies constraints due to operational, safety and security needs but fails to mention any constraints due to the "radiological clearance review" mentioned in a table on figure 2-8. Section A.2.2 could include a discussion regarding this constraint due to the radiological clearance review.

c. Appendix A, section A.2.2, line 160 discusses a 320 acre parcel and refers to figure A-2 and figure A-4. However, Constrained Area 2 is not specifically identified in figure A-2 with relation to the project area and the location of the Navy SALT site as shown in figure A-4 is incorrect. Figure A-1 shows Constrained Area 2 and it appears to be similar to the 340 acre parcel as shown in figure 2-8. It is unclear if reference to the 320 acres should be 340 acres or if it is correct as written.

Enclosure

- 25. Section 3.14 provides summary-level details about the radiological clearance process that is appropriate for the EA. The radiological clearance process is documented at Section 3.14, Human Health and Safety.
- 26. Change has been made in the EA.
- 27. See response to comment #25. The Navy SALT Site is located in an area determined not suitable for conveyance for two reasons; difficulty in completing the radiological clearance process, and ongoing mission needs.
- 28. This reference in the EA has been changed to Figure A-1.
- 29. EA Appendix A was corrected to state that Constrained Area 2 is 340 acres. Figure A-4 was modified to show the correct location of the Navy SALT Site.

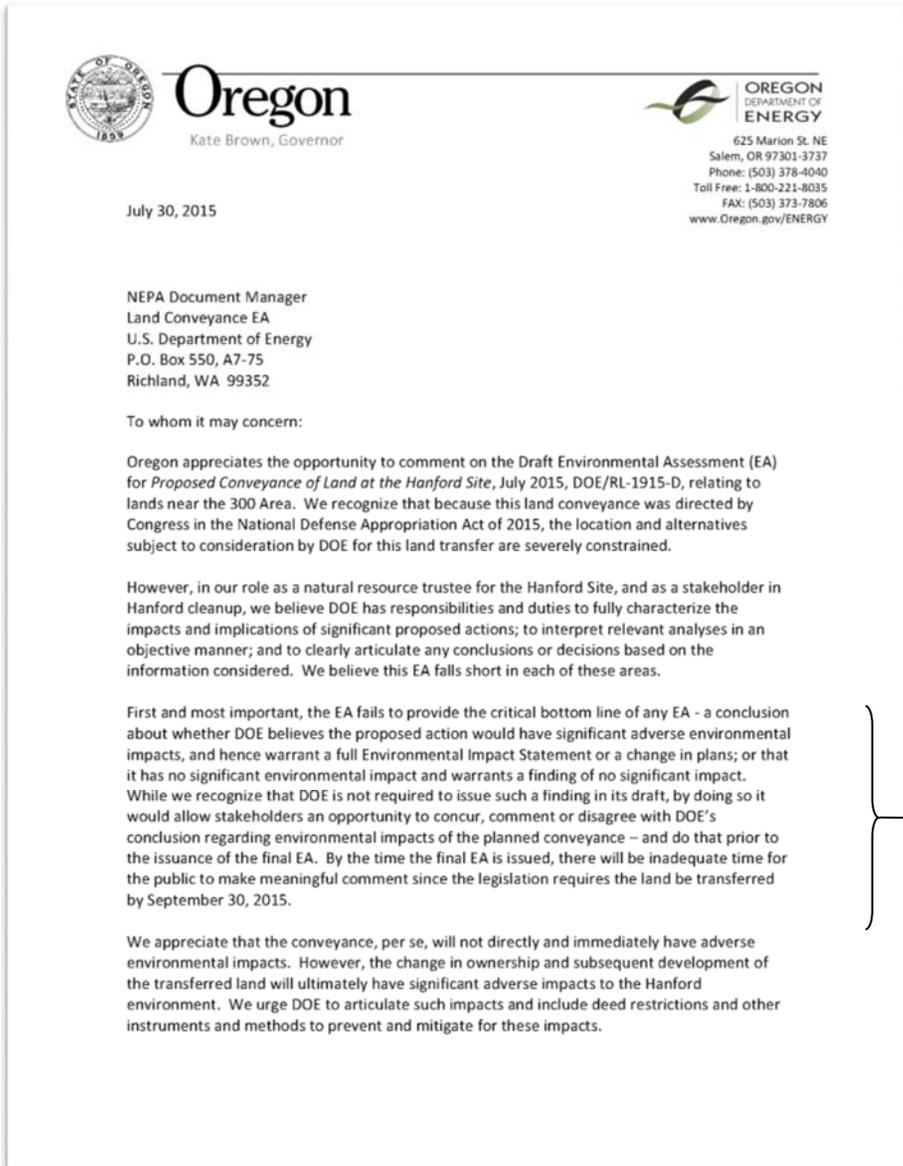
NAVY CLARIFICATION COMMENTS TO DRAFT ENVIRONMENTAL ASSESSMENT FOR PROPOSED LAND CONVEYANCE

d. Appendix A, section A.3, line 221 discusses Type II Suitability Constraints and includes "A DOE-controlled area for Hanford site Area 300 and PNNL (line 229) as shown on figure A-6. The "DOE Controlled Area" as shown on figure A-6 and discussed in section A.3.3 (line 251) includes both the 188 acre parcel as shown on figure 2-12 and the 340 acre "unsuitable" parcel as shown on figure 2-8. However the narrative of section A.6 (line 399) states that the "DOE controlled area is evaluated in section 3.14 and appendix F, for impacts and mitigation and does not result in removal of any lands for suitability but may require mitigation." This statement implies that no land was unsuitable for conveyance yet the 340 acre parcel was removed for this reason. The inconsistency between these figures, the narrative regarding the 188 acre parcel, the 340 acre parcel, the PAAL lands and how the Controlled Area is defined is confusing.

e. Appendix F, evaluates "the postulated bounding radiological accident impacts that could exist in or near the FSA from nearby facility accidents" (line 30). Appendix F, line 129 states that "DOE would establish a Controlled Area and maintain it within the PAAL lands. This area would be comprised of a total of 188 acres (see figure 3-15)". Figure 3-15 shows the "Building 325 Maximally Exposed Individual Boundary" but is only partially in the 188 acre parcel and covers most of the 340 acre parcel. The 188 acre parcel is shown on figure 2-12. The 340 acre parcel is shown on figure 2-8. The inconsistency between figure 3-15, the narrative in appendix F regarding the 188 acre parcel, the 340 acre parcel, the PAAL lands and how the Controlled Area is defined is confusing. Also see item #4 above.

f. A general comment regarding the Navy SALT site: the draft EA uses three different terms when referring to the SALT site - SALT Facility, SALT Area or SALT Site. The Navy prefers the use of SALT site. This would include the reference to the SALT facility on figure A-4. See item #3 above regarding figure A-4.

- 30. Figure 2-12 was modified to more clearly show the 188- and 351-acre PAAL areas. The 340-acre parcel is Constrained Area II, identified on Figure 2-8 as land removed from the PA as not being suitable for conveyance due to continuing agency mission needs- including the Navy SALT Site and radiological constraints.
- 31. Figure A-6 was modified to show that the total DOE-controlled area includes both the constrained area (which is not suitable for conveyance due to continuing agency mission needs, including the Navy SALT Site and radiological constraints) and the PNNL operational buffer. The DOE-controlled area includes both the 188-acre PAAL and the 340-acre Constrained Area II because the PNNL operational buffer covers both.
- 32. The EA has been revised to refer to this facility as the SALT Site.



- 33. See General Response #1a. Also the NEPA and NHPA processes were integrated. The Draft EA was provided for public review and input, and consultation with tribes was ongoing. The results of those processes were considered in the development of the Final EA. DOE chose not to, nor would it have been appropriate to, issue a draft FONSI with the Draft EA. Mitigation measures have been further identified and refined for ecological and cultural resources, and deed restrictions have been included in the Final EA. Per CEQ and DOE regulations, a Draft EA is not required to be publicly reviewed, however, DOE elected to provide 30 days for public review.

The EA presents little consideration of the effects of water used on the transferred property, whether for dust suppression during construction; infiltration of runoff following development; from intentional discharge; or from other releases. The EA does discuss the potential for the use of swales to augment infiltration or evaporation, and the increased infiltration expected from the construction of structures, parking lots and roads. However, it does not then adequately consider the impact this added water movement may have on contaminant migration in Hanford's 300 Area, and the resulting direct and significant environmental impacts. DOE also does not consider or restrict the types of vegetation or land use to prevent intentional irrigation, planting of lawns or the use of fertilizers. The salts used in fertilizers, if allowed to discharge to the soils and groundwater, will likely have a direct and significant impact on contaminant mobility in the 300 area and the increased release of these contaminants to the Columbia River.

DOE has spent many millions of dollars trying to characterize and manage groundwater-driven releases of uranium to the Columbia River in the 300 Area. Limiting groundwater flow into and through contaminated substrate is a key element of that effort. Preventing the addition of substances that may act as lixivants (such as fertilizers) is another important aspect. Water application for dust suppression during cleanup of Hanford's 618-7 burial ground caused substantial mobilization of uranium and expansion of the local groundwater uranium plume. There is every reason to assume that runoff infiltration from developed areas within the focused study area (FSA), including water applied for dust suppression during construction and other uses, will similarly exacerbate uranium mobilization. This would be of even larger impact if intentional discharges are allowed.

We urge DOE to fully evaluate the impacts of water and fertilizer management that would result from development in the FSA and, as appropriate, to add deed restrictions that would restrict (dust suppression, cleaning solar panels) or preclude (stormwater, irrigation) water releases and would also preclude use of fertilizers in the lands to be conveyed.

The draft EA ignores the effects of the conveyance and subsequent land development on habitat, plants, and wildlife in the study area. The EA is generally straightforward in identifying the extent of potential loss of habitat, but is dismissive of the extensive adverse impacts of that development, which will amount to effectively complete destruction of vegetation and loss of habitat on more than two square miles of land. Even if this loss is mitigated, recovery would take decades.

We are also concerned with the tenor of the EA on the subject of mitigation. Mitigation is addressed mostly as hypothetical (e.g. "could"), and serious impacts are dismissed with phrases such as:

- For habitat loss - "The FSA makes up less than 1% of lands with similar habitats on the surrounding Hanford Site . . ." (p 5-8)

34. See General Response #12.

35. The Draft EA describes effects to wildlife and vegetation from the Proposed Action in Section 3.4.2.2 and summarizes these effects in Table 3-10. Mitigation measures for effects to wildlife and vegetation are provided in the Final EA. Also see General Response #9.

- For traditional plants used by Native Americans – “The Hanford Site, however, includes large tracts of lands with similar plant communities.” (p 5-9)
- For loss of wildlife habitat - “Most wildlife species with adequate mobility would leave the area and seek replacement habitat.” “Areas in the surrounding Hanford Site, including the (Hanford Reach National Monument), contain habitats of similar ecological value and would potentially allow displaced birds to relocate to these areas.” (p 3-26).

It is ironic that though the draft EA notes severe cumulative net loss of sagebrush/steppe habitat in the Columbia Basin Ecoregion, and notes the importance of habitat at the Hanford Site, it dismisses the significance of losses associated with this planned land conveyance. This is a serious shortcoming of the EA. We recommend that DOE acknowledge the implications of habitat loss that will result from the conveyance - as localized and as cumulative impacts – and include language in the conveyance deed requiring mitigation consistent with guidelines in Hanford’s Biological Resource Management Plan (BRMP).

The EA suggests “enhanced habitat protection in surrounding areas” as possible mitigation for habitat losses. This is not a credible alternative. Based on the Hanford Comprehensive Land Use Plan, adjacent lands are either targeted for development comparable to that slated for the FSA, or are already protected. Accordingly, “enhanced habitat protection” would not afford any meaningful improvement of habitat protection beyond that already in place, and would not in any way mitigate for the extensive losses anticipated as the result of conveyance and development. This suggested approach for mitigation should be dropped.

The EA also notes that mitigation could be undertaken by DOE or by future landowners. While it seems reasonable to assume that fiscal responsibility for mitigation would be borne by future landowners, we believe DOE should take responsibility for mitigation for all lands in the FSA, because:

- If mitigation is left to future landowners, projects are likely to be done piecemeal and would probably replace little of the net habitat loss from development. There is a higher likelihood of a coherent process and of substantive habitat replacement if DOE oversees mitigation. DOE also should facilitate focusing of mitigation work on area(s) of priority habitat to maximize ecological “lift.”
- To the maximum extent possible, mitigation should be done in proximity to the affected area. To mitigate for habitat losses in the FSA, the only way to meet this objective would be for mitigation projects to be situated on lands within the Hanford Site. If this happens, DOE will need to be part of the process. It is probably easier and more efficient for DOE to simply manage the mitigation process from the start.

As a note on mitigation, the EA mis-states the nature of vegetation in the FSA. Section 3.4.1.1 states that “most of the FSA (66%) consists of BRMP *Level 2* (emphasis added) sandberg bluegrass-cheatgrass vegetation community.” Figure 5.4 of the Hanford BRMP (DOE/RL-86-32, Rev 1., 2013), however, delineates virtually all of the FSA as better quality, Level 3 habitat. The difference is significant, as BRMP calls for mitigation for Level 3 habitat at a higher ratio (3:1

} 36. See General Responses #1c and 9a.

} 37. The EA term “surrounding areas” applies to other areas throughout the Hanford Site, not only adjacent land. See General Response #9a.

} 38. See General Responses #2 and #9a.

} 39. See General Response #9b.

compared to 1:1 for Level 2 habitat), which should result in several additional square miles of habitat mitigation when the FSA is developed.

The EA makes no mention of the Natural Resource Damage Assessment and Restoration (NRDAR) process at Hanford, either in its list of activities at the Hanford Site (p 4-1) or more importantly in the context of mitigation for habitat losses resulting from development of the FSA. Development of land in the FSA should not create any NRDAR liability for DOE or future property owners. However, development of the FSA will limit DOE's options for carrying out ecological restoration required under NRDAR for injuries caused by Hanford releases and CERCLA clean-up activities. First, conveyance of this land will preclude consideration of conducting any restoration (habitat enhancement) on lands within the FSA. In addition, development of the area will require extensive habitat mitigation on or near the Hanford Site, which almost certainly will "compete" with restoration for suitable land. Based on a 3:1 area ratio for Level 3 land, full development of the 1,641 acres would need to be offset by 4,900 acres (7.6 square miles) of mitigation.

Finally, we urge DOE to reconsider and soften the assertion (p 5-11) that "These activities have demonstrated that there are no radiological sources within the property." The history of Hanford cleanup has been one of surprises, with almost routine discovery of radioactive contaminants in places believed to be clean. A recent example was discovery of waste in a borrow area near the 618-7 burial ground. It is naïve to assume there are no contaminants within the FSA and within close proximity to the 300 Area. Development plans need to include plans for complete surveys and monitoring during excavation, and for cleaning up wastes when and if they are, in fact, found on the site.

Should you have any questions of concerns with our comments, please contact Paul Shaffer of my staff at 503-378-4456 or [paul.shaffer@odoe.state.or.us](mailto:paul.shaffer@odoe.state.or.us).

Sincerely,



Ken Niles  
Assistant Director

cc: Dennis Faulk, U.S. Environmental Protection Agency  
Jane Hedges, Washington Department of Ecology

- } 40. See General Response #15.
- } 41. See General Response #9a.
- } 42. See General Response #7a.

## City of Richland Community & Development Services

## APPENDIX L - RESPONSES TO PUBLIC COMMENTS

**From:** Moore, Brian [mailto:bmoore@CI.RICHLAND.WA.US]  
**Sent:** Tuesday, August 11, 2015 3:57 PM  
**To:** ^Land Conveyance EA  
**Cc:** Gary Petersen; Diahann Howard; Jensen, Kerwin  
**Subject:** Comments Regarding Hanford Site Land Conveyance EA

NEPA Document Manager,

Please find the following questions regarding the preparation of the EA for the Hanford Site Land Conveyance:

Full indemnification under 10.CFR.770 was part of the original request, why was it not considered or analyzed as an alternative under the EA?

Without mitigation identified for cultural resources, the EA is not complete, and/or a Finding of No Significant Impact cannot be determined, how will this be addressed?

Economic Development benefit of the property is significantly impacted by the excluded properties on the southerly portion known as the "homestead site" and the "landfill site." These sites should be prepared for transfer in the immediate future.

Thank you,

Brian Moore  
Redevelopment Project Supervisor  
City of Richland  
Community & Development Services  
975 George Washington Way MS-18  
Richland, WA 99352  
o: 509-942-7725  
c: 509-460-6466  
[bmoore@ci.richland.wa.us](mailto:bmoore@ci.richland.wa.us)  
<http://www.ci.richland.wa.us/index.aspx?nid=395>  
[www.linkedin.com/in/bmm81](http://www.linkedin.com/in/bmm81)

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43. Indemnification is not an alternative under NEPA. Alternatives (other than the No Action Alternative) are those that meet the purpose and needed for agency action with varying degrees of environmental impact. Dean suggests adding: The Department has authority under 770 to grant indemnification or not based on whether it is "essential" to the transaction, and in this case it has been determined that it is not.
44. See General Response #8.
45. These sites were excluded through the suitability review process described in Chapter 2 and Appendix A of the EA.

## Confederated Tribes of the Umatilla Indian Reservation

## APPENDIX L - RESPONSES TO PUBLIC COMMENTS

Confederated Tribes of the  
Umatilla Indian Reservation  
Department of Science & Engineering



46411 Timine Way • Pendleton, OR 97801  
PHONE / FAX 541-429-7040  
info@ctuir.com • www.umatilla.nsn.us

12 August 2015

NEPA Document Manager  
Land Conveyance EA  
U.S. Department of Energy  
P.O. Box 550, Mailstop A2-15  
Richland, WA 99352

Subject: CTUIR Comments on the Draft Environmental Assessment (EA) for Proposed Land Conveyance at the Hanford Site, July 2015, DOE/RL-1915-D

To Whom It May Concern;

Enclosed are the comments of the technical staff of the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) on the Draft Environmental Assessment (EA) for Proposed Land Conveyance at the Hanford Site (DOE/RL-1915-D). If you have any questions concerning this matter I can be reach by email at [rodskeen@ctuir.org](mailto:rodskeen@ctuir.org) or by phone at (541) 429-7420.

Sincerely,

A handwritten signature in black ink, appearing to read "Rodney S. Skeen", is written over a horizontal line.

Rodney S. Skeen, PhD, PE  
CTUIR-DOSE Interim Director

Enclosure(1)

*Treaty June 9, 1855 – Cayuse, Umatilla and Walla Walla Tribes*

CTUIR Comments to the Draft Environmental Assessment (EA) for Proposed Land Conveyance at the Hanford Site, Richland, WA

**Comment 1:** The Cultural Resources Protection Program (CRPP) of the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) reviewed the Draft Environmental Assessment (EA) for the Proposed Conveyance of Land at the Hanford Site, Richland, Washington, July 2015, and recommends that since this land transfer will have significant adverse impacts to the environment and cultural resources, and the EA does not adequately address indirect or cumulative impacts to cultural resources, this action warrants a full Environmental Impact Statement (EIS) or a change in the proposed action. The following items support this recommendation:

First of all, and perhaps the most frustrating thing about the document, is that after some 800 pages of analysis, DOE did not attempt to draw a conclusion or to make any decisions on a path forward based on the information at hand. In fact, there is very little discussion in this regard and DOE did not conclude a Finding of No Significant Impact.

In terms of cultural resources protection for Traditional Cultural Properties (TCPs) and Historic Properties of Religious and Cultural Significance to Tribes (HPRCSIT), the EA does not provide a path forward. The environmental consequences to these properties are identified but need to be addressed. The impacts to cultural resources need to be objectively assessed, analyzed, interpreted and conclusions drawn before mitigation measures are recommended. In the EA, the type of mitigation measures proposed for these properties is continuing tribal consultation (Table 3-13, page 3-42). How does Tribal consultation continue for land being transferred out of Federal Ownership? This needs explanation.

- Avoidance as a mitigation measure (p.3.41) is not an option since the land is going to be transferred out of Federal ownership and into private hands.
- Mitigation Measures Effectiveness in Table 3-13 needs to be more conclusive other than "to be determined". What does this mean? To be determined by who and when will this happen? Who will fund mitigation?

Secondly, the action involving a change in ownership and potential development of the transferred land will have immediate and subsequent significant adverse impacts to the Hanford landscape.

- Cumulative Effects: Page 4-7: While Washington State Laws may protect archaeological sites after the transfer; there is limited or no protection for Historic Properties of Religious and Cultural Significance to Tribes. The EA needs to at least acknowledge this and ideally provide some discussion. Deed restrictions were mentioned as a way to provide protection for cultural resources but agreement documents need to be written and approved before the transfer occurs.
- Regarding traditional plant species (page 3-39: 1666-1668 and page 4-7, 3611-3612), the EA states that construction activities would include the removal of surface vegetation, including traditional plant species that could be used by the tribes. It dismisses the

} 46. See General Response #1a.

} 47. See response to comment #33.

} 48. See General Response #11.

} 49. See General Response #8, which identifies the consulting parties and indicates the MOA contains the agreed upon mitigation measures. Furthermore, DOE has included deed restrictions, which would limit potential impacts to cultural resources. Not all mitigation requires funding, but DOE will fund mitigation as agreed to and will allow tribes to use cooperative agreement funds as indicated in the MOA. The MOA addresses who is responsible for these mitigation measures and when these measures will be implemented. Also see General Response #5.

} 50. See General Response #8. (comment continued on next page)

impact by stating, however, there is plenty of other land at Hanford that has similar plant communities. This is not an acceptable remedy. Other lands at Hanford are NOT accessible to Tribes and the amount of land that supports traditional plant species is diminishing everywhere. The adverse impacts of development on the transferred land will result in a total loss of cultural and traditional resources.

- The EA dismisses the impacts of the transfer to cultural resources on page 3-39:

*“cultural resources located nearest to Horn Rapids Road and Stevens Drive would be less affected since industrial development already exists on the Hanford Site east of Stevens Drive, and other commercial facilities are present on the south side of Horn Rapids Road in the Horn Rapids Industrial Park. Cultural resources farther from these roads would be more affected by industrial development since the change would be from a more natural setting to an industrial one.”*

This dismissal of resources near developed areas as less affected is unacceptable. The impact to cultural resources remains the same across the entire area of potential effect (APE) regardless of location. The impact as a direct effect has to be considered a total loss since all cultural resources within the APE will be transferred. The cumulative and indirect effects of that total loss must also be addressed because the total loss of those resources affects the connectivity of the cultural landscape.

Third, all Tribal consultation potentially ends with the Land Transfer. The EA does not address consultation with Tribes after September 30<sup>th</sup>. Does consultation continue through the transfer and into future decisions or does it end with the transfer on September 30<sup>th</sup>?

Finally, the Environmental Justice section does not take into account the direct, indirect and cumulative impacts to treaty rights. A land transfer from federal ownership into private property is a direct impact to local Indian tribes. Loss of access to 500 square miles of traditional use areas with the creation of the Hanford Nuclear Reservation is simply the beginning of the impacts to the area’s native populations. During the construction of the nuclear facilities, natural and cultural resources were disregarded and irreparably destroyed. Once the site became operational, natural and cultural resources were contaminated causing further harm to the tribes through loss of future use. Thus far, access has been inhibited for at least 7 decades. With the transfer of lands out of federal ownership, the tribes have no hope of exercising their treaty reserved rights on those lands ever again. Thus the direct, indirect and cumulative impacts to the Native American population as a result of a permanent loss of natural and cultural resources are indeed a disproportionately high and adverse effect on a minority population and need to be addressed as such.

**Comment 2:** The EA addresses cultural resources mostly through NHPA. What about mitigation under NEPA? DOE has been consulting with Tribes and has acquired additional information that needs to be added to the document, particularly in regards to indirect and cumulative impacts.

(continued from previous page)

51. For clarification, the lands being considered for conveyance are comprised entirely of land that was in non-federal ownership prior to acquisition by the federal government for the formation of the Hanford nuclear facility. DOE’s position on treaty rights is explained in its 1999 Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement. Since Hanford was established in the 1940s, access to the site has been restricted based on the governmental interest of safety and security and cleanup of the Hanford Site. The Department, therefore, has consistently maintained that the Hanford Site is not “open and unclaimed” land.” Potential impacts to historic properties and cultural resources are addressed in the EA, Section 3.6, and mitigation measures for those impacts are contained in the MOA. Also see General Response #8.

52. See General Response #8. The MOA addresses the application of state and federal laws to cultural resources. The MOA includes stipulations on data recovery and the deed would provide restrictive language related to heights. (comment continued on next page)

**Comment 3:** Page 3-15 Regarding height restrictions: The EA needs to propose height restrictions without opportunity for variances.

**Comment 4:** The EA does not discuss data recovery. This would include cultural resources documentation and collections made before and after the Land Transfer.

**Comment 5:** The EA does not provide sufficient analysis on the potential impacts of the short-term and long-term use of water on the migration of contaminant from USDOE lands located to the east of the study area. Table 3-30 (Page 3-98) summarizes impacts to surface water resources, but does not discuss how increased surface water will impact groundwater. Activities such as dust suppression during construction (short-term use), retaining runoff (long-term use), and watering of landscaping (long-term use) have the potential to increase the local water table and subsequently the flow of groundwater through contaminated areas as the water moves toward Columbia River. The 300 Area, for example, lies within the potential path for migrating groundwater from the conveyance lands. DOE has invested millions of dollars to minimize groundwater-driven releases of contaminants such as uranium to the Columbia River. Without detailed analysis of potential future water discharge it is uncertain whether development in the proposed area will undermine these previous efforts.

**Comment 6:** This document does not discuss the impacts of the proposed action on the Natural Resource Damage Assessment and Restoration process (NRDAR) currently underway at Hanford. The impacts to the NRDAR should be included since the removal of these lands from USDOE ownership will somewhat limit the USDOE's options for future ecological restoration required under NRDAR. In addition, if habitat mitigation is required for development on these lands then said mitigation activities would require additional lands and further restrict the areas the USDOE could mitigate for injuries caused by past Hanford releases and current CERCLA clean-up actions.

} (continued from previous page)

} 53. See General Response #12.

} 54. See General Response #15.

## Confederated Tribes and Bands of the Yakama Nation

## APPENDIX L - RESPONSES TO PUBLIC COMMENTS



Confederated Tribes and Bands  
of the Yakama Nation

Established by the  
Treaty of June 9, 1855

August 11, 2015

NEPA Document Manager  
Land Conveyance EA  
U.S. Department of Energy  
P.O. Box 550, A2-15  
Richland, WA 99352

To whom it may concern:

The Confederated Tribes and Bands of the Yakama Nation (YN) appreciates the opportunity to review and provide comments on the Draft Environmental Assessment (EA) for *Proposed Conveyance of Land at the Hanford Site*, July 2015, DOE/RL-1915-D. YN recognizes conveyance of this land from USDOE ownership to the Tri-Cities Development Council (aka TRIDEC) is directed by Congress in the National Defense Authorization Act of 2015, limiting the consideration of other alternatives but not relieving USDOE of its obligations under the National Environmental Policy Act (NEPA). However, we remain concerned that the time frame for issuance of the final EA may foreclose any opportunity for full NEPA analysis prior to transfer of lands. Federal agencies must comply with NEPA to the fullest extent possible unless clear and unavoidable conflict in statutory authority exists. *Flint Ridge Dev. Co. v. Scenic Rivers Ass'n of Oklahoma*, 426 U.S. 776, 787-88 (1976). This includes the preparation of an Environmental Impact Statement (EIS) if there will be significant impacts to the environment resulting from a federal agency's conveyance of lands to private parties. See *Western Land Exchange Project v. United States Bureau of Land Management*, 315 F.Supp.2d 1068, 1081 (D. Nev. 2004).

While some environmental assessments have less complexity than others, the failure of this EA to:

1) satisfactorily identify the impacts and significance of all proposed actions; 2) integrate fully the impacts/concerns of ongoing activities of the adjacent Hanford site and its cleanup mission; 3) incorporate non-quantitative elements; and 4) present conclusions based on all information considered in a concise, objective manner, renders it inadequate to support any conclusion other than a finding of significant impact. Any argument that there has been insufficient time to prepare an EIS in the time frame since this NEPA process was initiated is without merit, and therefore DOE's present lack of compliance with the statute "to the fullest extent possible" is not excused under the law. *Western Land Exchange Project*, 315 F.Supp.2d at 1082.

The YN ER/WM Program has reviewed the draft EA, recognizes the lack of information and inherent uncertainties, and questions the validity of application of such analyses to assess impacts to unknown future facility developments based solely on the information provided in this draft document. Together with your own identification of unavoidable adverse impacts and our own analyses of significant impacts (some of which cannot be mitigated), we believe it is necessary for the NEPA process to continue, i.e., the issuance by DOE of an Environmental Impact Statement (EIS) and subsequent Record of Decision (ROD) concerning deed restrictions and mitigation requirements.

YN areas of major concern:

1

## Confederated Tribes and Bands of the Yakama Nation

## APPENDIX L - RESPONSES TO PUBLIC COMMENTS

**Treaty Rights:** Archaeological evidence demonstrates the importance of these lands to the Yakama Nation, whose presence can be traced since time immemorial. There is no mention of, and the EA fails to consider, the potential for the proposed action to impact tribal treaty rights and resources. The only mention of tribal treaty rights in the EA is in Section 6.1 which summarizes scoping comments. One of the scoping comments included under "Tribal Concerns and Cultural Resources" is the "loss of ability to exercise treaty rights", which is not addressed, or even mentioned, in the EA. While DOE has repeatedly stated they do not consider Hanford lands to be "open and unclaimed" these lands are presently federal lands within the YN Ceded Area that have been determined to be no longer essential for Hanford's mission and available for private industrial use.

Conveyance of ownership to TRIDEC will ultimately result in some type of industrial development with acknowledged and/or potential impacts to invaluable shrub-steppe habitat and areas of cultural significance. TRIDEC does not have a formal relationship with the YN. Transferring lands out of federal ownership adversely impacts the YN off-reservation treaty rights by diminishing the locations and access to areas where tribal members may exercise treaty rights. This diminishment of treaty rights was not explicitly stated and the impacts thoroughly described and evaluated. We object to the transfer or lease of any land that affects the ability of the YN to exercise our Treaty rights throughout the Hanford site or that will result in loss or degradation of habitat, natural resources and/or ecosystems. YN tribal members will be disproportionately affected by this action. While the action will benefit the local economy, it will not benefit YN, rather will remove land and resources from use creating a loss for YN. This has not been addressed in the EA and no mitigation has been proposed. Ensuring Treaty compliance is a critical intergovernmental concern. YN request an affirmation by USDOE of Treaty rights across all of Hanford and to subsequently transferred or otherwise conveyed Hanford site lands.

**Cultural Resources/Archeological and Historical Sites:** In several instances, the EA states the potential for destruction of archeological sites and cultural resources. The philosophy underlying the cleanup of Hanford (including transfer of land ownerships) should be guided explicitly by the goal of allowing Native Peoples to safely live the lifestyle to which they are entitled according to their Treaty rights. This way of thinking is particularly important when considering how to incorporate non-quantitative elements as the spiritual or cultural value of site into deed restrictions and/or mitigation actions which guarantee use of the land for specific purposes which are considered inseparable from the Yakama way of life.

Site wide undertakings and decisions, such as transfer of land ownership from DOE to public entities, restoration actions, vegetation management, land use plans, the use of barriers and institutional controls, need to take into consideration the effects on Traditional Cultural Properties (TCPs). It is the obligation of DOE under the National Historic Preservation Act (NHPA), Section 110, to inventory and evaluate properties to determine eligibility under the agency's jurisdiction. This obligation regarding the lands to be conveyed has not been completed. Transfer of ownership to TRIDEC prior to completion would be premature.

Note: On page 3-41, the table of impacts and proposed mitigation measures (Table 3-13), the impacts to tribal cultural resources, with and without mitigation measures, are

2

55. See response to comment #51 and General Response #8. Also in a Notice of Proposed Rulemaking at 65 FR 4283 the AHCP indicated "The Section 106 process is a means of access for minority and low-income populations to participate in Federal decision or actions that may affect resources such as traditional cultural properties. The Council considers environmental justice issues in reviewing analysis of alternative and mitigation options, particularly when Section 106 compliance is coordinated with NEPA compliance." While DOE has not found tribal nations to be disproportionately affected from the Proposed Action, DOE has consulted and obtained the type of information that could be obtained under an Environmental Justice analysis. The MOA defines mitigation to address the potential adverse effects, including the concerns about loss of access, resources and habitat. The Yakama Nation has requested that DOE continue to consult regarding the land conveyance, and DOE will do so under its Native American Indian Policy and Order 144.1.

56. See General Response #8. DOE has met its obligation to inventory and evaluate properties for eligibility. The EA has been revised to reflect the outcome of the NHPA process, and an MOA has been completed. (comment continued on next page)

simply described as "to be determined", which does not provide a basis for evaluating the significance of potential impacts.

Conveyance of lands should include requirements for monitoring for cultural/archeological media discoveries during excavation, and plans for their subsequent protection and curation should they be found on site. State laws do not offer protection to TCPs. It is the obligation of the federal government under federal laws to ensure the protection and/or mitigation of effects to TCPs.

**Habitat, Plants, and Wildlife:** The discussion of impacts in the EA does not provide a sufficiently detailed evaluation of the severity of impacts, and therefore does not provide a basis for determining the significance of the proposed action(s). Due to the lack of an actual construction plan for the industrial park affects are not known making a proposed mitigation action plan speculation. Mitigation should assume and reflect 100 percent loss of habitat.

As stated, in some instances unless mitigation measures are enforced, the impact becomes unavoidable and significant yet this is seemingly dismissed (e.g., "The FSA makes up less than 1% of lands with similar habitats on the surrounding Hanford site..."). The nature of the vegetation in the FSA is misrepresented. Figure 5.4 of the Hanford BRMP (DOE/RL-86-32, Rev 1., 2013) delineates virtually all of the FSA as better quality, Level 3 habitat. The difference is significant, as BRMP calls for mitigation for Level 3 habitat at a higher ratio (3:1 compared to 1:1 for Level 2 habitat), which should result in several additional square miles of habitat mitigation when the FSA is developed (Based on a 3:1 area ratio for Level 3 land, full development of the 1,641 acres would need to be offset by 4,900 acres (7.6 square miles) of mitigation).

Potential injury or mortality to wildlife is expressed but also seemingly dismissed with "Most wildlife species with adequate mobility would leave the area and seek replacement habitat." "Areas in the surrounding Hanford Site, including the (Hanford Reach National Monument), contain habitats of similar ecological value and would potentially allow displaced birds to relocate to these areas." That there may be threatened or endangered bird species using these or adjacent lands that could be adversely affected was not given enough consideration in the EA.

The EA doesn't consider potential chemical or radiological exposures resulting from the use of traditional plants from other areas of the Hanford Site, or the availability of access to other areas. Traditional plant species used or that could be used by the Tribes will be removed and no longer available yet the statement "the Hanford site, however, includes large tracts of lands with similar plant communities" is supposed to reassure/ensure the sustainability of these resources for Tribal uses.

Topography will be altered and roads, buildings, and parking lots constructed affecting not only the habitat, plants, wildlife but traditional cultural access routes in the area as well. Anticipated development will effectively amount to the complete destruction of vegetation and loss of more than two square miles of land. Recovery, even if mitigation is put in place, would take decades.

**Mitigation:** Mitigation measures discussed within the EA fall short of our expectations. There are extensive losses as a result of conveyance and development. Potential mitigation efforts are discussed without specifics as to how these would be enforceable or whether they

} (continued from previous page)

} 57. See General Response #9b.

} 58. There are no federal or Washington State threatened and endangered bird species known to occur on these and adjacent lands with the exception of the state-listed ferruginous hawk. Displacement of birds is not anticipated to adversely impact the ferruginous hawk, because of dissimilarities in nesting habitat and foraging patterns.

} 59. EA Section 3.6, Cultural Resources, has been clarified to state that opportunities for use of traditional plant species by the tribes would be foregone with implementation of the Proposed Action. Also see General Response #8.

would all run with the land in perpetuity. Frequently the statement is made: " Although not obligatory or within the control of DOE, the following section describes potential mitigation measures, which could be undertaken by a future landowner." The EA lacks clear discussion of how any Mitigation Plan will be developed; nothing is presented to indicate consultation with YN in the development of said plan.

Mitigation is described in vague terms and serious impacts dismissed as inconsequential considering the supposedly availability or use of surrounding Hanford site lands. The EA does not discuss the likelihood of these measures being enforceable or specifically how effective they may or may not be. The suggestion of "enhanced habitat protection in surrounding areas" as possible mitigation is not feasible. The adjacent lands are already either considered to be available for similar industrial use or already protected. YN notes and appreciates similar concerns as expressed by the State of Oregon.<sup>1</sup>

**Natural Resource Damages Assessment and Restoration (NRDA):** The EA does not discuss the NRDA process for the Hanford site within the context of mitigation for habitat losses resulting from the development of the FSA. YN is one of the CERCLA trustees of Hanford natural resources, along with two states, two other tribes, and the U.S. government. All trustees are co-equal and have a non-discretionary responsibility to make the public whole for injury to natural resources, through restoration of natural resources and the ecological and human services they provide. The NRDA process is ongoing at Hanford and includes the FSA lands. USDOE does not have sole decision-making authority within the NRDA process – the Natural Resources Trustee Council as a whole does. Any transfer of Hanford land from DOE or development of lands under ownership of land by DOE limits future options for DOE to conduct ecological restoration actions to offset injury caused by Hanford releases and CERCLA cleanup activities, as it will preclude consideration of conducting any restoration (habitat enhancement) within the FSA.

**Environmental Justice; the GSA process versus 10 CFR 770 process; transfer with indemnity:** Regardless of how the FSA lands are conveyed, the YN has to assume total loss of natural and cultural resources on all acres; thus YN bears a disproportionate burden of the loss and none of the benefits. YN restates its position that a FONSI is unacceptable. An EIS is necessary given the uncertainties, significance of acknowledged impacts, and the precedent setting actions. 40 C.F.R. § 1508.27. If there are "substantial questions whether a project may have a significant effect of the environment," an agency should prepare an EIS rather than a FONSI. *Anderson v. Evans*, 350 F.3d 815, 831 (9<sup>th</sup> Cir. 2003). Here those questions certainly are present. All of Hanford's precedents (e.g., the 1100 Area, the PNSO site) point toward significant and continued loss of access and resources, as well as denial of Treaty-reserved rights (despite promises to the contrary).

The GSA process for disposal of real property is to first make lands available to other federal agencies. This should include the Bureau of Indian Affairs (BIA) on behalf of the federally recognized affected Tribes. In contrast, the 10 CFR 770 process bypasses federal agencies, effectively removing the Tribes from any possibility of regaining their land. YN should have first right of refusal for lands deemed by DOE to be no longer needed.

<sup>1</sup> Oregon Department of Energy, July 30, 2015 letter to USDOE; re: Draft Environmental Assessment (EA) for Proposed Conveyance of Land at the Hanford Site, July 2015, DOE/RL-1915-D

- 60. See General Response #8. Mitigation measures were developed through consultation and are included in the Final EA and MOA. A MAP would be prepared based on those mitigation measures. As requested by the Yakama Nation, consultation will continue under DOE's Native American Indian Policy and Order 144.1.
- 61. See response to comment #37.
- 62. See General Response #15.
- 63. See General Responses #1a and #8 and response to comment #51.
- 64. The Proposed Action is being conducted pursuant to Section 3013 of the NDAA, which pertains specifically to the land conveyance action, requiring that two parcels of approximately 1,341 acres and 300 acres be transferred by DOE to TRIDEC by September 30, 2015. (Public Law 113-291). The General Service Administrative process to dispose of property is not applicable to the Proposed Action.

The Environmental Justice Guidance under NEPA (CEQ, 1997) states: "Where environments of Indian tribes may be affected, agencies must consider pertinent treaty, statutory, or executive order rights and consult with tribal governments in a manner consistent with the government-to-government relationship."

TRIDEC has requested the land be transferred in fee simple with indemnity. The National Defense Authorization Act-2015 allows the Secretary of Energy convey the property without consideration or for the consideration below the estimated market value. Local prices advertised by the Port of Benton for lands just south of Horn Rapids are on the order of \$50,000 per acre, a considerable amount of money.

YN disputes both the release from liability for actions by DOE or from the City of Richland, the Port of Benton, future corporate or individual developers or owners and what amounts to land-gift to private entities for commercial development. Additionally, this land conveyance represents a unconstitutional taking of tribal property rights without compensation for the Tribes and for Hanford's Natural Resource Trustees. This is a consultation and environmental justice issue for which the YN request consultation and resolution.

**Cumulative Risk:** The EA fails to address, in any meaningful way, risks to the environmental areas discussed in Chapter 3 from the various stressors in their combination or potential synergy. An example of how Chapter 4 fails to provide a robust cumulative effects analysis is to simply state the stormwater runoff would be minimized by the relatively high porosity of the undisturbed surround sandy soils (section 4.1.2- water resource impacts) while not considering the diverse effects of soil removal, mixing of soil horizons (section 4.1.1 geology impacts) on ecological resources (section 4.1.4).

The EA identifies severe cumulative net loss of sagebrush/steppe habitat in the Columbia Basin Ecoregion and notes the importance of habitat at the Hanford Site, yet dismisses the significance of losses associated with this land conveyance. True, some past, present, and reasonably foreseeable future actions at the Hanford site, Benton County, and the surrounding region of interest (ROI) were included within the discussion of cumulative effects. However, other important considerations were not (e.g., the potential impacts of other types of manufacturing were not identified [e.g., a steel manufacturing plant currently proposed for the area near Battelle and Kingsgate] nor the failure of any DOE action on the Hanford site, or failure of suggested mitigations or the cumulative net loss of sagebrush/steppe habitat in the Columbia Basin Ecoregion).

Cumulative effects of past, present, and future activities in the general vicinity of the property to be conveyed by DOE on the Hanford site (including reasonably foreseeable future Port of Benton or Columbia Basin Agricultural development) are not discussed in the EA. The EA analysis should have included these as well as ongoing and any anticipated DOE efforts for remediation, restoration, and preservation of natural resources of the Hanford site. In any case, if several actions taken together will indeed have a cumulatively significant effect, this must be analyzed in an EIS, not an EA. *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1214 (9<sup>th</sup> Cir. 1998). An EIS must therefore be prepared by DOE.

**Impacts to PAAL lands and Groundwater:** Little discussion is given to the effects of water use on conveyed lands whether during construction, run-off, etc. Neither does the EA sufficiently

65. See General Response #8 and response to comment #51.

66. Chapter 4, Cumulative Effects, refers to Chapter 3, where specific resource impacts are discussed to provide the environmental baseline. From this baseline Chapter 4 discusses the incremental contribution of impacts from the Proposed Action, added to past, present, and reasonably foreseeable future actions.

67. The EA did not conclude that the Proposed Action would result in a "severe cumulative net loss" of shrub-steppe habitat. The Proposed Action would result in the loss of 1,641 acres of shrub-steppe habitat, much of which has been impacted from historic settlement and agricultural activities and more recent wildfire and noxious weed control applications. The acreage represents approximately one-half of one percent of the Hanford Site, including the Hanford Reach National Monument, which contains large areas of shrub-steppe habitat that have been identified for long-term conservation and preservation. Also "failure" of DOE action or mitigations would be speculative, however, the EA did discuss impacts with and without mitigation.

67a. The EA cannot speculate regarding "Future Port of Benton or Columbia Basin Agricultural development." All reasonably foreseeable future actions were included in the Cumulative Effects analysis in Chapter 4 of the EA. Also see General Responses

68. Water use is discussed under Section 3.10, Utilities and Infrastructure.

69. See General Response #12. (comment continued on next page)

consider the impact of this added water movement on contaminant migration through the vadose zone or the groundwater.

} (continued from previous page)

Statements are made that no specific location is more sensitive to water resources impacts from than another and no differences in impacts from among the representative facilities other than larger bioinfiltration swales, and during operations there would be much higher surface water runoff and the need for mitigation measures. Those areas designated as lands not suitable for conveyance or PAAL lands by their very definitions/purposes/locations would be more sensitive to construction (both short-term and long-term) and operational impacts from water use on the conveyed lands.

} 70. PAAL lands would not be developed, and only utility easements would be allowed.

**Inadvertent discovery of contaminants:** Given the location of the FSA and relatively close proximity to adjacent waste sites, the history of the Hanford site, DOE could be considered overly confident in its assertion that "there are no radiological sources within the property." See EPA Guidance, *CERCLA Requirements Associated with Real Property Transfers*, EH-413-9808 (1998). Conveyance of lands should include requirements for complete radiological surveys and monitoring during excavation, and remediation of wastes should they be found on site.

} 71. See General Response #7a.

**Deed Restrictions:** Potential deed restrictions discussed without specifics as to how these would be enforceable or whether they would all run with the land in perpetuity. There is no clear discussion of how these will be developed; nothing to indicate consultation with YN in the development of deed restrictions.

} 72. See General Response #8.

Additional comments are attached. Should you have any questions or concerns with our comments, please contact me at 509-452-2502.

Sincerely,

Russell Jim  
Yakama Nation ERWM Program Manager

cc:  
Jane Hedges, Washington State Department of Ecology  
Dennis Faulk, U. S. Environmental Protection Agency

Administrative Record

Attachment:  
Attachment 1 Comments on Summary  
Attachment 2 Comments on chapter 3  
Attachment 3 Comments on chapter 4

Comments specific to Executive Summary:

1. Summary Section S.6:

- a. As stated, on line 66, portions of the PAAL could only be conveyed for utilities required by other transferred FSA lands which are outside the scope stated purposes of this EA. How this land could be conveyed by a realty instrument other than a deed and remain under the ownership and institutional control of DOE is not clearly defined. If this is a reasonably foreseeable action, it should be discussed in the EA. Potential areas of discussion of current EA findings.
- b. EA conclusions are limited to lands transferred; other land uses [e.g. use of or conveyance of PAAL acreage] will require re- evaluation of cumulative impacts. Potential mitigation/deed restriction issue.
- c. Impacts to cultural resources/Traditional Cultural Properties are not discussed in the EA. As this additional land (PAAL) has been designated for use by the project the effects need to be equally considered whether it is part of the conveyance or will remain under DOE ownership.

2. Summary Section S.7:

- a. Line 109: Important assumptions for the 1635 acre main FSA environmental consequence analysis: Potential mitigation/deed constraint discussion issue:
  - i. NEPA does not require relevant and reasonable mitigation to be adopted; just discussed. To ensure the health and well being of YN Tribal members and our cultural resources and full retention of Treaty Right, the decisions based on these assumptions, must be included as deed restrictions running with the land in perpetuity. This should be in some type of legally enforceable agreement with the YN and DOE, otherwise DOE maybe subject to violation of its treaty trust obligations. Agreement should not be subject to local laws or comprehensive land use plans, zoning and ordinances, etc but should run with the land deeds.
- b. Lines 94-98: An assumption of this EA is full development of representative facilities-target marketing industries. Why would only 10% (stated as 100 acres) of the PAAL (539 acres) be assumed to the acreage required for the utility corridor and why the need for a full 539 acres?
- c. Lines 124-125: Potential mitigation/deed constraint discussion issue: SEPA may or may not be triggered depending upon state exemptions and local zoning/construction thresholds. As the exact land use has yet to be defined, there needs to be something in the mitigation/deed constraints which require SEPA reviews for all future land owner's actions [construction activities, etc].
- d. Lines 127-128: Mitigation/deed requirements which should be captured under some type of legally enforceable agreement.
- e. Lines 129-130: tied to lines 124-125.
- f. Lines 131-145: Only valid assumption is Lines 145-146: Similar to lines 127-128 & 129-130; Mitigation/deed requirement which should be captured under some type of legal agreement. No requirements to be subject to SEPA. Potential mitigation/deed constraint discussion issue. See 'c' above.
- g. Lines 131-150: EA has no assumptions for multi-phased development; what assumption was used and how was this factored into the EA?

73. Section S.6 describes how the acreages for the FSA and PAAL were derived. Impacts for the PAAL were evaluated in the EA. As described in the EA, PAAL acreage would only be conveyed, if necessary, by a realty instrument other than a deed and would stay under the institutional control and ownership of DOE.

74. Reasonably foreseeable environmental effects, including cumulative impacts and mitigation measures, in the FSA and PAAL are analyzed in the EA. Deed restrictions would not be required for the PAAL since this land would not be transferred. Also see response to comment #73.

75. See General Response #8 and response to comment #51.

76. Based on the width of other utility corridors in the area, the EA assumed that ten percent of the PAAL (a conservative estimate) would be used for a utility corridor. The basis for the delineation of the PAAL (539 acres) is described in Chapter 2 and Appendix A.

77. Development within the FSA would require compliance with state and local laws and regulations, including SEPA. See Chapter 5, Table 5-2.

78. Upon conveyance, DOE would prepare a deed. Proposed deed restrictions and covenants are included in Chapter 5, Table 5-2, and are legally enforceable after they are duly recorded.

79. See response to comment #77.

80. See response to comment #77 and #78.

81. As a conservative estimate, development of the entire 300-acre solar farm FSA was assumed to occur at one time. See discussion in Section 2.2.5. If the solar farm is developed in phases, the impacts from this development would be within the bounds of the conservative analysis of impacts included in the EA.

- h. If the 300 acre proposed solar farm is not constructed, and the land is used for another industry type, further evaluation of effects should be done (solar was the only use analyzed in the EA).
- i. Lines 151-160: Line 158: Mitigation/deed requirement which should be captured under some type of legally enforceable agreement. More discussion needed as to the appropriateness of this assumption. Who will own the utilities or be required to maintain any utilities constructed on PAAL? What legal document will capture this assumption and will it run with the land?
- j. Lines 261-267: Any adverse effect to cultural resources require mitigation under the National Historic Preservation Act. This not only includes archeological sites but adverse effects to TCPs either audio or visual.

**3. Construction & Facility operations assumptions:**

Impacts as a result of these assumptions are the subject of this EA. No specific end users or development proposals have been identified or proposed for the lands to be conveyed. All environmental consequences analyses are based on activities associated with the construction and operation of representative facilities (target marketing industry-TMI categories) which might be constructed/operated at this site. The facilities identified and used in this EA are not the only facilities which could be selected and are not inclusive of all possible example types that could have been selected. Environmental consequences/impacts provided are those that might result from the full development of these particularly selected facilities. See YN specific comments.

DOE guidance emphasizes not relying on compliance with applicable requirements (e.g., federal, state, local laws).

- 82. TRIDEC submitted an addendum to their original proposal adding a 300-acre parcel for an energy park. TRIDEC identified this acreage as an initial step toward creation of the Mid-Columbia Energy Initiative Energy Park for uses "specific to solar powered applications." It is reasonable to expect that a solar farm would be developed on this land. See also Section 2.2.2.
- 83. See General Response #2.
- 84. See response to comment #76. If a request for utilities is subsequently made, the requestor would be responsible for ownership and maintenance of the utility, and DOE would most likely provide an easement. Terms of the easement would be determined at that time.
- 84a. DOE and consulting parties have agreed to mitigation actions, which have been formalized in an MOA. That MOA provides for mitigation to historic properties, TCPs and cultural resources. See also General Response #8.
- 85. See General Response #4.

Comments specific to affected environment(s) and the environmental consequences of the proposed actions-Chapter 3:

General comment:

The "No Action" Alternative in all sections (including Section 2.1) should recognize that the lack of development will preserve any cultural and natural resources and the potential for honoring Treaty rights, whereas the conveyance of lands will result in a disproportionate burden of loss of benefits upon the Tribes.

} 86. Section 2.1 describes the alternatives analyzed in the EA. The analyses for each alternative are presented in Chapter 3 for each resource topic, including cultural resources. Also see response to comment #51.

No specific end users or development proposals have been identified or proposed for the lands to be conveyed. All environmental consequences analyses are based on activities associated with the construction and operation of representative facilities (target marketing industry-TMI categories) which might be constructed/operated at this site. The facilities identified and used in this EA are not the only facilities which could be selected and are not inclusive of all possible example types that could have been selected. Environmental consequences/impacts provided are those that might result from the full development of these particularly selected facilities. Due to the lack of a concrete plan it is unknown what the ratio of TMI industry will be – some will have severe impacts while other will have minor impacts. Without a plan in place the TMIs with the most severe impacts should be analyzed for the entire site and mitigation measures based on that.

} 87. See General Response #14.

EA states future land owners will comply with any deed restriction and covenants. EA does not accurately reflect the legalities of suggested deed restrictions and/or mitigation measures and the likelihood of these mitigation measures being both effective and enforceable via permit or deed restrictions.

} 88. See General Response #2.

EA does not satisfactorily address the impacts of noxious weeds and invasive plants. Among the greatest threats to biodiversity is the spread of these types of vegetation, particularly where there is a disturbance in the ecosystem. There should be a detailed strategy for the prevention, early detection of invasion, and control procedures for each species. Early efforts are essential in stopping the spread of these plants and avoiding future widespread use of herbicides, which could correspondingly have adverse impacts on plant biodiversity, wildlife, and water quality (including groundwater and surface waters).

} 89. The local jurisdictions have regulations for controlling noxious weeds and invasive plants (Benton County Noxious Weed Control Board and City of Richland Ordinance). The EA reasonably assumes that future landowners would be required to comply with such regulations.

EA does not accurately reflect the legalities of suggested mitigation measures and the likelihood of these mitigation measures being both effective and enforceable via permit or deed restrictions.

} 90. See General Response #2.

While some EAs need to be more complex than others, inability to satisfactorily consider the impacts of interconnected activities [e.g., DOE's continuing cleanup mission and remediation of contaminated groundwater plumes and vadose zone) or fully characterize an important impact in an EA will render it inadequate to support a finding of no significant impact. Proposed actions with the potential for significant environmental impacts require an Environmental Impact Statement (EIS).

} 91. See General Response #12.

Specific comments:

Section 3.1: Geology (includes mineral resources, soils, topography):

- Statement made that there are unavoidable adverse impacts (Section 3.1.4): These (i.e. impacts) results are applicable over the entire FSA (e.g. no specific location is more sensitive to

construction than another and no differences in impacts from among the representative facilities for operations.) Furthermore, it is noted that construction though having no appreciable differences in the types of impact, they do differ in degree and extent. Larger footprint facilities and multi-phased development would have a greater extent and duration of impact. These impacts result in partial or complete removal, redistribution, mixing of soil horizons, and soil compaction affecting soil permeability and porosity and should be considered as significant.<sup>1</sup>

- Potential mitigation measures are discussed in Section 3.1.3. However, DOE guidance emphasizes not relying on compliance with applicable requirements (e.g., waste disposal permits, water or air emissions permits) as evidence that an analyzed alternative does not have potential for significant impact(s).<sup>2</sup> Statements that effects on geology over the FSA is relatively minor compared to the surrounding areas or that over time vegetation re-establishes itself to more stabilize soils is subjective and potentially erroneous. Relative comparisons without a baseline of absolute magnitude could be considered misleading to the public.

YN request editing of Sections 3.1.3 & 3.1.4 to reflect the likelihood of these mitigation measures being both effective and enforceable via permit or deed restrictions.

- Section 3.1.2.1: No Action Alternative: YN request editing to be more factual (i.e. delete text that "activities" are small in area and of short duration") and include any reasonably foreseeable potential future impacts of current operations on the PA some of the FSA lands per NEPA guidance.

**Section 3.2: Water Resources (including surface water, flooding, groundwater, vadose zone):**

- Statement made that unavoidable adverse impacts are not expected to occur (3.2.4). Potential mitigation measures are discussed in Section 3.2.3. However, DOE guidance emphasizes not relying on compliance with applicable requirements (e.g., waste disposal permits, water or air emissions permits) as evidence that an analyzed alternative does not have potential for significant impact(s).<sup>3</sup>

YN request editing of Sections 3.2.3 to accurately reflect the continuing obligations of DOE to remediate the groundwater plumes (i.e. Nitrate & Uranium plumes) some of which extends under the SE portion of the PA/FSA and any reasonably foreseeable impacts include any reasonably foreseeable impacts to the geology, other environmental resources, etc of the PA/FSA, the Columbia River and the likelihood of these mitigation measures being both effective and enforceable via permit or deed restrictions. Without such mitigations, there would be significant unavoidable adverse impacts.

<sup>1</sup> 40 CFR 1508.27: Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

<sup>2</sup> U.S. Department of Energy Environment, Safety and Health Office of NEPA Policy and Compliance, Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements, Second Edition, December 2004.

<sup>3</sup> Ibid.

92. The CEQ regulations regarding whether an impact is "significant" takes into account the context and intensity of the impact. Within the context of the surrounding area and the availability of BMPs to mitigate potential impacts, the EA did not identify significant impacts to soil. The No Action Alternative represents land that would not be transferred or developed.

93. The EA assumes that future landowners would comply with applicable regulations, and appropriately analyzes potential impacts to the resource area. Additional information has been added to the Final EA related to water resources. See Section 3.2.

94. See General Response #12.

- Statement is made that construction of groundwater wells would be restricted on any transferred or conveyed lands via deed or other realty instrument language (Section 3.2.1.3).

YN request editing of Section 3.2.1.3 to more accurately reflect the current and continuing obligations of DOE to remediate the groundwater plume (e.g., Nitrate plume) which extends under the SE portion of the PA/FSA and include any reasonably foreseeable impacts to the geology, other environmental resources, etc of the PA/FSA and the Columbia River.

- Statements are made that no specific location is more sensitive to water resources impacts from than another and no differences in impacts from among the representative facilities other than larger bioinfiltration swales, and during operations there would be much higher surface water runoff and the need for mitigation measures (e.g. treatment/ NPDES permits/Best Management Practices-WAC 173-204, etc) (see Section 3.2.2.2).

YN disagrees and believes those areas designated as lands not suitable for conveyance or PAAL lands by their very definitions/purposes/locations would be more sensitive to construction (both short-term and long-term) and operational impacts. YN request a more detailed investigation of environmental consequences and reasonably foreseeable impacts for these areas with regards to storm water management and dust suppressant waters. As some of these lands contain areas of sensitive ecological and cultural/historical resources, impacts could be significant if unmitigated and other areas which have wastes left in place (e.g., 618-7 burial ground clean up, Horn Rapids Landfill) which could significantly adversely impact groundwater quality.

YN request potential mitigation measures for these more sensitive lands (as identified by YN) to also be discussed as such in Section 3.2.3. and the likelihood of these mitigation measures and the previously identified mitigation measures being both effective and enforceable via permit or deed restrictions.

- Sections 3.2.2.1: No Action Alternative: YN request editing to include potential impacts of current DOE groundwater monitoring/remediation and the impacts of any reasonably foreseeable future efforts.
- YN requests inclusion of a figure delineating the radiological groundwater plumes underlying the 300 Areas and the EA lands for conveyance for reader clarity in consideration of potential impacts and their significance.

**Section 3.3 Air Quality:**

- Statement made that there are unavoidable adverse impacts (Section 3.3.4). These (i.e. impacts) results are applicable over the entire FSA (e.g. *no specific location is more sensitive to air quality than another, no differences in construction impacts from among the representative facilities, nor would sequencing of activities affect air quality differently. No site locations are more sensitive to air quality impacts from operations.*) Larger buildings would contribute more emissions than smaller buildings simply because of the energy demands of larger facilities. As these impacts related to continuing operational air emissions exceeding or nearly exceeding regulatory thresholds for a major PSD, they should be considered significant.

95. See General Response #12.

96. See General Response #8.

97. See General Response #12.

98. See General Responses #1b and #14.

- Potential mitigation measures are discussed in Section 3.3.3. YN request edits to reflect the likelihood of these mitigation measures being both effective and enforceable via permit or deed restrictions.
- YN request edits to Section 3.3.1 to include activities associated with the remediation of the 324 Building (and sub-soils), the 618-10 & 618-11 Burial Grounds, and the American Rock Products. Furthermore, YN request DOE include information on how it will comply with re-model Hanford site air exposure parameters once the conveyed land is removed from the RCRA permit and what steps/mitigations DOE will take to ensure that no off-site contamination will affect any PA/FSA/PAAL lands.
- YN notes that Benton County Clean Air Agency monitors air quality at two stations-Metaline Ave and S. Clodfelter Rd. in Kennewick. YN does not believe that these stations are sufficiently close to the conveyance lands to effectively monitor air releases.
- Section 3.3.2.1: No Action Alternative: YN request edits to more accurately reflect the current and continuing obligations of DOE to model site air exposure parameters and include any reasonable foreseeable impacts to the Hanford Air Permit or potential restrictions on building site locations within the conveyed lands and or PAAL lands and steps/mitigations DOE will take to ensure that no off-site contamination will affect any PA/FSA/PAAL lands.

**Section 3.4: Ecological Resources: including vegetation, wildlife, birds, mammals, reptiles & amphibians, threatened & endangered species)**

- Statement made that there are unavoidable adverse impacts (Section 3.4.4). The quality and quantity of wildlife habitat over the entire FSA will be greatly reduced for any species and eliminated for others. Operations of multiple development sites will fragment any remaining habitats in the FSA and degrade or eliminate connectivity between adjacent habitats. Loss of habitat may place further pressure on populations of some species that are already experiencing habitat loss in other parts of their range (see Sections 3.4.1 thru 3.4.1.6). Any or all environmentally sensitive areas in the FSA including MBTA bird nesting sites such as curlews would be eliminated; shrub-steppe habitat would be lost, and wildlife would be displaced without effective mitigation. These are very significant adverse impacts.
- Potential mitigation measures are discussed in Section 3.4.3. YN request edits to reflect the likelihood of these mitigation measure being both effective and enforceable via permit or deed restrictions.

Furthermore, as these areas have innate cultural significance, YN request further edits to Section 3.4.3 to include discussion of an MOA with the YN concerning DOE's Mitigation Plan. Due to the lack of an actual construction plan for the industrial park, affects are not known, making a proposed mitigation action plan merely speculative. Mitigation should assume and reflect 100 percent loss of habitat.

- YN notes statements made that many of the rare annual species likely did not have their environmental conditions met during 2013; and thus the lack of their detection does not rule out that they are present, only that conditions were not conducive for them to be growing in 2013. YN believes there should not be construction activities and or utility development on

- 99. See General Response #2.
- 100. See General Response #6. and changes made to Section 3.3.1.
- 101. The No Action Alternative represents the scenario in which lands would not be conveyed and developed, thus there would be no change in air emissions. For health and safety impacts from Hanford operations, see Section 3.14. DOE will continue to work with external regulatory agencies to ensure that emissions from Hanford air pollution sources maintain compliance with regulatory requirements. Also see General Response #6.
- 102. See Comment Response #167 and General Response #9a.
- 103. See General Response #2.
- 104. See General Response #8.
- 105. The EA provides the best available information based on these surveys and historical information about the project area. Vegetation surveys conducted for the EA in 2013 spanned the blooming season for most native species in this area, and specifically looked for occurrences of Washington State species of conservation concern as listed in Table 1 of Appendix I. Of the 33 species listed, 17 have never been reported to occur outside the central Hanford Site, and of these, nine are annual species that are uncommon at Hanford. Each requires a unique set of environmental conditions for growth, and may or may not be seen in any given year. This situation is a limitation on vegetation surveys in general, even if surveys are performed over multiple years. (comment continued on next page)

PA/FSA/PAAL lands for any future, and/or newly identified ecological resources (including vegetation, wildlife, birds, mammals, reptiles & amphibians, threatened & endangered species) found to be present.

} (continued from previous page)

- YN believes there should not be construction activities and or utility development within swale areas and those areas identified to have similar plant species. Particular protection should be given to those area with plant species *Beardless wildrye (Leymus triticoide)*, a state species of potential concern.

} 106. See General Response #9a.

- YN believes the 300 acre land parcel identified for solar energy development to be removed from consideration as a viable industry or redesigned to avoid extensive impacts on bird nesting sites within Bitterbrush/Indian ricegrass vegetation of Levels 3 to 4 vegetation resources (Figure 15- Appendix I & Figure 5.4 of DOE/RL-96-32, Rev 1, 2013).

} 107. EA Section 3.4.2. describes impacts that would occur from the Proposed Action, including loss of shrub steppe and wildlife habitat. Disturbing active nests of birds protected by the Migratory Bird Treaty Act (MBTA) is prohibited under the MBTA. Also see General Response #9a and the prohibition of the CSP in Table 5-2.

- Section 3.4.2.1: No Action Alternative: YN request edits to more accurately reflect the current and continuing obligations of DOE to mitigate impacts identified under BRMP.

} 108. See General Responses #9a and #9b.

**Section 3.5: Wetlands and Floodplains:**

- Statement made that there would be no effects on wetlands or floodplains from construction or operation of the proposed actions as neither is present in the PA or within close enough proximity to the PA to experience effects.

- YN notes that plant species identified during the wetland reconnaissance are found in areas identified as swales (Appendix I). Swales do not meet the federal definition of what constitutes a wetland, however, YN reiterates its concerns and believes there should be no construction activities and or utility development within swale areas and those areas identified to have similar plant species. Particular protection should be given to those area with plant species *Beardless wildrye (Leymus triticoide)*, a state species of potential concern.

} 109. See General Response #9a.

- Section 3.5.2.1: No Action Alternative: YN request edits to more accurately reflect the current and continuing obligations of DOE to mitigate impacts identified under BRMP or track the unusual assemblage of plant species occurring in and around the swales.

**Section 3.6: Cultural Resources:**

- At present the Section 106 process under NHPA is not complete. Not all significant cultural resources have been evaluated as noted in line 1432. Currently an MOA is being developed and mitigation developed.

- NEPA mitigation to pre-contact cultural resources has yet to be addressed (only historic eligible sites are addressed) and there is no mitigation action plan for potential mitigation under NEPA for tribal cultural resources.

- Line 1473 and table 3-13: State laws do not recognize Traditional Cultural Properties (TCPs), therefore such properties would not be protected under state laws. Adverse effects to the TCP will have to be protected and mitigated under federal laws.

} 110. See General Response #8.

Line 1544: twenty meter transects did not provide full survey coverage of the area. YN objected to this level of survey. The action of transferring land from federal ownership to private ownership should have required more robust survey efforts to identify cultural resources. It is the obligation of the federal agency to identify the cultural resources on their lands. The level of identification efforts often depend on the project and what is known about the area historically. Where complete loss must be assumed as with a land transfer a complete survey to ensure maximum identification of cultural resources.

The lack of a construction plan makes adequate mitigation efforts difficult. The type of industry will have varying direct and indirect effects to TCPs and archeological sites.

**Section 3.7: Land Use:**

- YN stated our position on the use of the Comprehensive Land Use Plan (CLUP) in a letter to DOE Manager John Wagoner, dated June 30, 1998. Our position remains unchanged.
- Statement made that change in land use would foreclose opportunities for consideration for other future uses (Section 3.7.4) This is a very significant unavoidable adverse impact.
- Sections 3.7.1.2 & 3.7.1.3 discuss Benton County and City of Richland land use planning. YN notes that very briefly (i.e., one sentence-Appendix E, Section E.7) the EA determines that it is not reasonably foreseeable at this time for development of small modular reactor facilities. If such facilities were to be considered, an EIS would be required. YN does not support development of these types of facilities.
- Section 3.7.3 is for discussion of potential mitigation measures. None are given as this has narrowly been defined by land use term of 'Light Industrial within an urban growth area' per the Benton County Comprehensive Plan and the City of Richland Comprehensive Plan. YN takes issue with this urban sprawl into areas of Hanford ceded lands and further encroachment of YN Treaty right resources.

**Section 3.8: Visual Resources:**

- Statement made that there would be unavoidable adverse impacts (Sections 3.8.4 & 3.8.2.2) such that regardless of the representative facilities, development would result in a change in the Visual Resource Management (VRM) classification system's 2000 classification of the conveyed lands from Class III to Class IV, as the buildings and infrastructure on 2001 the built-out site would become the primary focus for viewers. Visual impacts are adverse effects to TCPs under the NHPA and need to be mitigated to comply with that statute as well as NEPA. It has already been determined there will be permanent adverse visual impacts.
- Potential mitigation measures are discussed in Section 3.8.3. YN request edits to reflect the likelihood of these mitigation measures being both effective and enforceable via permit or deed restrictions.
- As stated in EA, impacts of proposed solar facility were based on a facility of approximate 1/3 size of those evaluated. Solar development is in essence unfeasible due to acreage limits. Should some other type of industrial development be proposed for this acreage, additional NEPA

6

111. DOE follows standard archeological practices such as 20-meter transect intervals. Federal agencies are not required by 36 CFR 800 to identify all historic properties in an area of potential effect (APE). DOE has fulfilled its regulatory requirement to identify historic properties and has made a "reasonable and good faith effort" to identify historic properties within the APE.

112. See General Response #8.

113. See General Response #1b.

113a. See response to comment #51 and the MOA in Appendix K, which was completed subsequent to the issuance of the Draft EA.

114. See General Response #8.

115. See General Response #4. (comment continued on next page)

environmental assessments would need to be performed as the EA only assessed impacts from solar use and not any other type of industry.

- YN requests the assumption that a SEPA environmental review would be completed by the local lead agency when a developer submits an application for construction of the solar farm and a detailed analysis of potential glint and glare issues to be included in Section 3.8.3 and their likelihood of implementation also evaluated.

**Section 3.9: Noise, Vibration, and Electromagnetic Fields:**

- Statement is made that there would be unquantifiable, unavoidable adverse impacts (Section 3.9.4). This is due to the unavailability of necessary information needed to model impacts. Impacts could be very significant depending upon the disturbances to PNNL & LIGO mission capabilities.
  - Discussions in Section 3.9.2.2 include a lot of words indicating lack of information: e.g., "assumed", "likely/not likely", "not anticipated", "may be able to accommodate", "anticipated."
- Potential mitigation measures are discussed in Section 3.9.3: YN request edits to reflect the likelihood of these mitigation measures being both effective and enforceable via permit or deed restrictions.
  - DOE guidance emphasizes not relying on compliance with applicable requirements (e.g., federal, state, and local laws) as evidence that an analyzed alternative does not have potential for significant impact(s).<sup>4</sup>
- These attributes have innate influences on area of cultural significance, YN request further edits to Section 3.9.3 to include discussion of an MOA with the YN concerning DOE's Mitigation Plan
- Section 3.9.2.1: No Action Alternative: YN request edits to more accurately reflect DOE's how current and continuing and any reasonably foreseeable remediation/cleanup activities for the Hanford site and lands excluded from land conveyance could impact Noise, Vibration, and Electromagnetic Fields.

**Section 3.10: Utilities and Infrastructure:**

- Statement made that the Proposed Actions would result in new, long-term demand for utility services from the City of Richland, BPA, and Cascade Natural Gas (Section 3.10.4). Though not necessarily an adverse impact, it could be very significant to the long-term economic feasibility and sustainability of the developments as major upgrades/building of new facilities would be required.
  - YN requests inclusion of reasonably foreseeable financial obligations for the City of Richland residents to support the necessary new, long-term utility demands. (See Sections 3.10.1.1 and 3.10.1.2 of EA).
    - New infrastructure discussed in Section 3.10.2.2; including new landfill, water treatment facility, electrical substations, sewer lines, natural gas lines and facilities, etc.

<sup>4</sup> Ibid.

- } (continued from previous page)
- } 116. A deed restriction has been added, which would prohibit CSP solar technology, see Table 5-2.
- } 117. Deed restriction language would limit noise, vibration, and electromagnetic fields to levels acceptable to PNNL and LIGO, and as stipulated in the MOA.
- } 118. See General Response #8.
- } 119. The No Action Alternative represents the existing environmental baseline and does not address reasonably foreseeable activities. Also see response to comment #117.
- } 120. The financial obligation of the City of Richland is outside the scope of the EA.

- YN notes the assumption that SEPA reviews would be done when Richland City or other local jurisdiction considers a need for additional infrastructure to the area. YN believes this needs additional discussion within the EA.
- Impacts to the Tri-City Railroad line are not fully considered in the EA and should be included.
- Potential Mitigation Measures are discussed in Section 3.10.3: YN does not believe that encouragement by TRIDEC and local jurisdiction reflect mitigation measures. YN requests edits to accurately reflect the legalities of suggested mitigation measures and the likelihood of these mitigation measures being both effective and enforceable via permit or deed restrictions.

**Section 3.11: Transportation:**

- Statement made that industrial development of the FSA lands would result in increased traffic and congestion during both construction and operations (Section 3.11.4). Adverse affects are somewhat more discussed in Sections 3.11.2. and 3.11.2.2. Magnitude of expected changes (Impact significance) is not defined.
  - With noted increases in traffic flow, congestions, etc, YN request traffic death analysis be performed.
  - Descriptions in Appendices B, C, E, and J are helpful in understanding more clearly the needed infrastructures as well as transportation impacts.
  - How impacts from other areas to transportation were considered is unclear; e.g., there is inconsistency in numbers of employees both during construction and operations as identified in the EA and Appendix E.
- Potential Mitigation Measures are discussed in Section 3.11.3. This section is lacking in needed information as to what could be reasonably foreseeable mitigation actions.
  - YN notes the assumption that SEPA reviews would be done when Richland City or other local jurisdiction considers a need for additional access routes to the area. YN believes this needs additional discussion within the EA.
  - YN notes a local agency could require the developer to conduct project- and site-specific traffic impact analysis and identify assess and capacity improvements. YN requests further discussed in the EA.

**Section 3.12: Waste Management:**

- Statement made that amount of Proposed Action waste streams would not expect to exceed the capabilities of current waste management system; i.e., not have unavoidable adverse impact (Section 3.12.4). YN notes analysis of impacts to utilities and infrastructure, the City of Richland identified that its current waste management landfill potentially reaches its capacity in 2018. Without mitigating measures by the City of Richland, waste streams from Propose Action development would result in significant impacts.
- Potential Mitigation Measures are discussed in Section 3.12.3: YN does not believe that encouragement by TRIDEC and local jurisdictions reflect mitigation measures. DOE guidance emphasizes not relying on compliance with applicable requirements (e.g., state requirements for spill prevention, countermeasures plans) as evidence that an analyzed alternative does not have potential for significant impact(s).<sup>5</sup>

<sup>5</sup> Ibid.

- 121. It is not clear from the comment what additional discussion is required. Also see General Responses #2 and #3.
- 122. The railroad is discussed in Section 3.11, Transportation.
- 123. See General Response #2.
- 124. A "traffic death analysis" would be speculative and is outside the scope of the EA.
- 125. The reason for the difference is described in Section 3.13.2.2.
- 126. See response to comment #121.
- 127. As described in EA Section 4.1.12, Waste Management, in 2011 the City of Richland evaluated options for continued sanitary waste services that includes expanding the existing landfill or transporting sanitary waste to other facilities. See General Response #3.
- 128. The analysis is not relying on compliance with applicable requirements to conclude there would not be significant impact to waste management, but rather that the amount of wastes that would be generated is not expected to exceed the capabilities of existing waste management systems (see Section 3.12.4). Also see General Responses #2 and #3.

- YN requests clarification as to how and by what authority Hanford's 300 Area sewer system is connected to the City of Richland's sewage treatment plant and any impacts (current or foreseeable) to this infrastructure.

**Section 3.13: Socioeconomics and Environmental Justice:**

- Statement made that there are no impacts, mitigation measure would not be required for these topics (Section 3.13.3). This EA does not consider YN tribal members and their federally recognized Treaty rights or impact of restrictions to these lands to these rights. YN tribal members will be disproportionately effected by this action. While the action will benefit the local economy, it will not benefit YN – rather it will remove land and resources from potential resource use creating a loss for YN. This has not been addressed in the EA and no mitigation has been proposed.
- Section 3.13.2.1: No Action Alternative: YN request edits to more accurately reflect DOE's current and continuing and any reasonably foreseeable remediation/cleanup activities for the PA lands and potential impacts. Future economic impacts & financial strain on City of Richland residents for development of infrastructures in support of proposed developments and the impact to development of conveyed lands without such infrastructures should also be included.
- YN notes that estimated new job numbers quoted in Section 3.13.2.2 both for constructions and operational phases do not correlated with numbers provided in Appendix E. The economic benefits long-term for local residents/City/State agencies is very subjective at this point and more than likely over-estimated.

**Section 3.14: Human Health and Safety:**

- Statement made that there are no unavoidable adverse impacts expected (Section 3.14.5). YN questions why these impacts were not considered as an acute incident but divided to reflect an annual dose. If frequency is only once, the effects should be viewed as such. In this case, there would be adverse exposure impacts. Clarification is requested.
  - YN notes the scenarios did not include accidents involving worker/public exposures (directly or via inhalation) to 324 Building sub-soils or the 618-10/-11 Burial Ground remediation. YN request that these accident scenarios be evaluated and any risks/impact be identified as well as mitigation measures DOE intends to taken to control the off-site spread of contamination.
  - Wind shifts are known to occur in the Hanford site area. YN request re-analysis of impacts should the 325 Building MEI boundary shift more NW-SW.
- Potential Mitigation Measures are not discussed in Section 3.14.4 as no impacts are expected. YN finds it difficult to believe that without the enforcement of information identified in Section 3.14.3-Emergency Preparedness- regarding integration and coordination agreements between local, state, DOE and DOE contractors there could be no potential adverse impacts .

**Section 3.15: Summary of Environmental Consequences:**

- Table 3-30: YN believes the table to be incomplete and over simplistic. See YN area-specific comments for each area as indicated above. Edit as appropriate.

**Examples of potential areas of significant impact not discussed or incompletely discussed in the EA:**

- 129. Future development of FSA lands would be unrelated to the 300 Area sewer system. The 300 Area sewer system is connected to the City of Richland's sewage treatment plant through a utility service agreement, and includes the City of Richland pretreatment requirements applicable to discharge of the 300 Area effluents to the City of Richland sewer system.
- 130. See General Response #8 and response to comment #55.
- 131. Discussion was added to the EA regarding DOE's compliance with CERCLA. See Section 5.4.
- 132. This comment is outside the scope of the EA.
- 133. The numbers in Appendix E are from the representative facilities where provided in the literature. The construction workforce size was overestimated because the PAAL will be for a utility corridor and not include a public access road or development. The actual operations workforce size is not known since the actual facilities and their size are not known. Also the numbers for operations were reversed (page 3-86 in the Draft EA, lines 2950 to 2951) and have been corrected in the EA to 2,530 for the multi-phased development and from 50 to 1,500 for the single-phased development.
- 134. See General Response #6. The basis for these projected risks in Appendix F is included in the analyzed scenarios as described in this request. Lands within the area of influence due to prevailing winds postulated during accident conditions in the 300 Area will be retained by DOE.
- 135. See General Response #7b.
- 136. The Summary Table is intended to provide a concise comparison of impacts between the No Action and Proposed Action. Details are provided in Chapter 3 for each resource topic.

## Confederated Tribes and Bands of the Yakama Nation

## APPENDIX L - RESPONSES TO PUBLIC COMMENTS

- DOE's responsibility to remediate the Horn Rapids Landfill; an area surrounded on three sides by lands to be conveyed in which hazardous waste (PCBs, etc) has been left in place and the possibility of vapor intrusion into any buildings if they are built on or nearby.
- DOE's continuing responsibility to remediate the groundwater plume under-lying portions of the lands to be conveyed (trichloroethene (TCE) and nitrate plumes).
  - Effects of over-application of dust-suppressant and infiltration during remediation of nearby Hanford contaminated waste site and impacts on groundwater.
  - Effects of fertilizers/pesticides on groundwater.
- DOE's ongoing mission to cleanup Hanford and to prevent contamination from leaving the site and needed changes to its various Hanford site operating procedures as industry is developed in the conveyed lands (examples: reassessment of air model to predict how far contaminants could travel without harming the public given that the land buffer has been reduced by conveyance of FSA lands; restrictions on PAAL lands).
- Reasonable radiological accident scenarios involving workers and the public during the remediation of soil contamination at the 324 Building and the 618-7, 618-10 and 618-11 burial grounds.
- Impacts to the Tri-City Railroad line are not fully considered in the EA and need additional discussion.

137. The Horn Rapids Landfill (located outside FSA) is monitored for releases of hazardous substances. No elevated vapor levels are expected to occur on the transferred land from the landfill. To date, no release or threat of release has been detected; however, should there be a future release of hazardous substances, DOE has right of access to the transferred property if a remedial action, response action or corrective action is necessary after conveyance of lands or on adjoining property.

138. See General Response #12.

139. See General Response #7a. Also activities that could disrupt or lessen the performance of any component of the DOE CERCLA remedies, such as groundwater use, would be prohibited in the deed.

140. See General Response #6.

141. See response to comment #122.

Comments specific to Chapter 4:  
General comment:

YN believes a cumulative effects assessment should answer difficult and formerly unaddressed questions regarding combined risk burdens and disproportionate impacts. It should involve evaluation of collective effects of multiple agents or stressors – as opposed to individual effects of a single stressor. It should be broad enough to include not only any chemical contaminant risks (if any) but incorporate nonconventional stressors (e.g., the concept of vulnerability; differential biological susceptibility and exposure, as well as differential preparedness to withstand stressor effects and ability to recover from stressor effects) into the assessment. Analysis should be conducted on if and how the effects or the risks from the various agents or stressors interact independently, in combination, or in synergy.

Chapter 4-Cumulative Effects-fails to address in any meaningful way, risks to the environmental areas discussed in Chapter 3 from the various stressors in their combination or potential synergy. An example of how Chapter 4 fails to provide a robust cumulative effects analysis is to simply state the stormwater runoff would be minimized by the relatively high porosity of the undisturbed surround sandy soils (section 4.1.2- water resource impacts) while not considering the diverse effects of soil removal, mixing of soil horizons (section 4.1.1 geology impacts) on ecological resources (section 4.1.4). YN request this type of assessment be done for all areas of affected environments for a more holistic understanding of cumulative effects. Additionally, YN request that DOE evaluate each proposed type of industry and its potential effects against the other given types of industries and rank them relative to their impacts on the affected environments identified in Chapter 3.

True, some past, present, and reasonably foreseeable future actions at the Hanford site, Benton County, and the surrounding region of interest (ROI) were included within the discussion of cumulative effects. However, other important considerations were not (e.g., the potential impacts of other types of manufacturing were not identified [e.g., a steel manufacturing plant currently proposed for the area near Battelle and Kingsgate] nor the failure of any DOE action on the Hanford site, failure of suggested mitigations, or the cumulative net loss of sagebrush/steppe habitat in the Columbia Basin Ecoregion.

Agriculture and food processing are possible future uses of this land. If there is any contamination found in the area where agricultural products are grown or if contamination accidentally gets into the processing system from the Hanford Site, this could be devastating to Columbia Basin agricultural and food processing industry. Such information (even if just estimated) is important with regards to evaluations of mitigation efforts and significance of impacts for lands to be conveyed. This potential risk was not considered or incorporated into the EA.

Chapter 4 presents more questions than it resolves mainly because the necessary information needed to make or even guide decisions are lacking or unknown. The statement that 'contemplated actions at Hanford (e.g. closure of facilities) would reduce the overall cumulative impact on surface water and groundwater availability and quality [DOE 2012b] sounds reassuring but irrelevant. Groundwater beneath the Hanford site will not be a viable potable water resource for hundreds if not thousands of years. It simply regurgitates Chapter 3 without any defined uncertainties or explicit assumptions and/or mitigation actions. This is further complicated by the lack knowledge of any defined deed restrictions or other realty instrument language.

142. Based on TRIDEC's TMI (see Figure 2-3), agricultural industry is anticipated to involve processing and warehousing, not farming. The cumulative effects analysis is to identify the incremental contribution of a Proposed Action's environmental effects on the environmental baseline (the existing environment). A "risk analysis" as described in the comment would be speculative and is not required in a NEPA document. Also see General Responses #4 and #7.

2015 DOE Land Transfer Draft Environmental Assessment (EA)

NPT staff comments/questions/concerns.

In the EA, DOE does not attempt to provide a conclusion or to make any decisions on a path forward based on the current information. This Land Transfer will have significant adverse impacts to the environment and cultural resources. The EA does not adequately address indirect or cumulative impacts to cultural resources, this action warrants a full Environmental Impact Statement (EIS).

Cultural resources protection for TCP's, and Historic Properties of Religious and Cultural Significance to tribes, the EA does not provide a designated path forward. Impacts from the transfer to cultural resources need to be accurately assessed, analyzed, interpreted and conclusions drawn before mitigations are sufficiently recommended.

- A type of mitigation measure offered for properties is continuing tribal consultation (page 3-42). Explain how tribal consultation continues for land being transferred out to private ownership?

- Avoid is noted as a type of mitigation measure (page 3-41). How is this an appropriate option being the land is going to be transferred out of federal authority?

- The action of a change in ownership and potential development of the transferred land will have immediate and significant adverse impacts to the Hanford landscape. Cumulative Effects (page 4-7) state cultural laws may add some protection to archaeological sites after the transfer but it does not adequately address protection for Historic Properties of Religious and Cultural Significance. Deed restrictions may provide some protection for cultural resources but agreement documents have not yet been completed and agreed upon. It is not clear if deed restrictions are considered under NHPA or NEPA?

- In dialogue with DOE cultural staff, deed restrictions are under NEPA. In dialogue with DOE NEPA staff deed restrictions are under NHPA, and/or not applicable because the lands will be transferred into private owners. It is confusing to tribal staff, so potential deed restrictions and mitigation concepts are again stated at this time.

- Deed/easements restrictions, people are working on this such as power lines, gas pipelines, ground water use, and excavation depth. Not sure where a Cultural Resource Management Plan would fit in if possible to ensure long-term protection. We are still working on this with PNSO and updating USFWS CRMP. M. Wright mentioned because there will be a private owner NHPA won't apply? City of Richland and Benton County will ensure that the SEPA and NEPA regulations are being carried out?
- New landowners need to be involved with discussions about mitigation (development of CRMP and in concurrence of the site nominations).

143. It is unclear what decision the comment is referring to. If it is regarding the transfer, that decision is made at the end of the NEPA process after consideration of public comments and any necessary revisions or additional analysis in the EA. DOE also takes into consideration other factors prior to making a decision on a proposed action. Also see General Response #8.

144. See General Responses #1a, #1b, and #8.

145. See General Response #8.

146. Some potential adverse effects were avoided and avoidance of effects has been used to the extent possible (see the suitability review in Chapter 2, Appendix A, and the MOA at Appendix K). Other mitigation measures would also be used, including deed restrictions and covenants. Also see General Response #8.

147. See response to comment #51 and General Response #8.

148. See General Response #8. (comment continued on next page)

- Restriction on Concentrating Solar Power (CSP) Farms to eliminate glint and glare that will impact surrounding TCP's.
- Limitations on dust, light, vibration, noise, magnetic interference and electric field should be considered and dialogue continued.
- Limitations on the height and size of buildings can be further discussed.
- Xeriscaping utilizing native plants to lessen impacts to adjacent plant communities and eliminate a need for supplemental watering.
- Use of the latest natural and green building materials to reduce building carbon imprints.
- Use of non-reflective paints and materials to lessen the impacts from surrounding tribal TCP's and viewsheds.
- If federal NHPA protections cannot be complied with then compliance with applicable Washington State cultural resources laws and reporting requirements will be adhered to.
- Avoid all Hanford tribe's prehistoric sites and known TCP's by not transferring these lands with an appropriate buffer zone to protect them.
- Continued tribal access to the Transferred/Conveyed Lands.
- If necessary, tribal easements through the transferred lands for tribes to access all adjacent federal lands.
- The impacts to the surrounding TCP's (Rattlesnake Mountain or Laliik, Gable Butte, and Gable Mountain) viewsheds will be adversely impacted and need to be mitigated for.

- Native and/or culturally/traditionally used plant species are noted within the EA. Construction activities will remove native vegetation, including traditional plant species that are resources used by the tribes. Since construction activities include the removal of surface vegetation, the change in the surface characteristics would also mean that traditional plants species that could be used by the tribes would be removed and no longer available. All the native species are important to the tribe, as near all have cultural and/or traditional uses. If a plant does not have a direct use a native plant still add context to the entire landscape and habitats. Plants have sister plants that are found growing with each other throughout the arid land. Here are merely examples of 2 species that are significant to the tribe; Gray's Lomatium and Carey's Balsamroot that are found in the area. [Line 1665-1667](#)

- The EA's concept that there is other land at Hanford that has similar plant communities is not a satisfactory answer. Many plant areas are not accessible due to ongoing cleanup work and missions. Monument lands are also not readily accessible. The development on the transferred land is adverse and a loss of cultural and traditional resources.

- Will Tribal consultation on transferred lands potentially end with the Land Transfer? How does the EA address consultation with tribes after the lands are transferred?

- Will the tribes have the ability to utilize DOE Cooperative Agreement funding to participate in all future cultural and environmental work on the transferred lands? If not funding should be made available to the tribes to address arising concerns.

(continued from previous page)

149. See General Responses #1a, #1b, and #8.

150. See General Response #8. DOE will continue to consult with tribes following land conveyance as tribes may determine topics for consultation under DOE's Native American Indian Policy and Order 144.1.

151. Use of DOE Cooperative Agreement funding is addressed in the MOA. See Appendix K.

- A land transfer from federal ownership into private property is a direct impact to the Hanford tribes. Since the beginning of the Manhattan Project's mission at Hanford the tribes have been eternally shutout of the area. Natural and cultural resources have been compromised. The transfer of lands out of federal ownership denies tribes the opportunity to utilize recourses on this land. The direct, indirect and cumulative impacts to area tribes and the Indian population will result in a permanent loss of natural and cultural resources. This result will be an unreasonably high and adverse effect on this minority population. How will this be addressed?

} 152. See response to comments #51, #55, and General Response #8.

- Construction of the expected industrial facilities would involve extensive land disturbing activities necessary for buildings, equipment, roads, parking areas, and utilities all of which will increase the amount of infiltration from precipitation events. Once the industrial area is established, buildings and parking lots would create impervious surfaces that would lead to increased storm water runoff during precipitation events, which would result in increased infiltration. This increased infiltration will enhance the migration of the underlying nitrate plume to the Columbia River and migration of the deep vadose zone contamination located in the adjacent 300 Area to groundwater and subsequently to the Columbia River. The use of irrigation to establish and maintain green landscapes surrounding the buildings is another source of additional infiltration.

} 153. See General Response #12.

- The roads, parking lots, with impervious surfaces will also contribute to migration of noxious weed species. Impervious surfaces act as highways for noxious weeds to spread and contaminate the adjoining federal lands containing native plant species. Adjoining and present TCP's, and past restoration areas may be impacted. Placement of roads and parking lots should take this into consideration potentially under deed restrictions that might include adequate buffer zones, and landscaping.

} 154. See response to comment #89 and General Response #8.

Excavation Limitation is listed as 20 feet (page 5-6). Generally 15 feet is used as an excavation limitation. Why is it 20 feet here?

} 155. The purpose for restricting excavation from 20 feet below the surface is to prevent a change in hydrology that might affect contaminated groundwater plumes.

As a deed restriction can DOE impose that the new owners obtain a Hanford excavation permit? This would help preserve and protect properties and if found stop work until DOE and tribes have assessed the find and mitigate for the find.

} 156. See General Responses #3 and #8.

- With the influx of traffic due to the industrial park, how frequent will the road need maintenance to abide by WA State laws? Who funds the road infrastructure for the needed upgrades and ongoing improvements for this area?

} 157. Funding of FSA road infrastructure (upgrades and improvements) would be the responsibility of future land owners.

- How does DOE plan to access wells within or in proximity to the land being transferred? (A-3).

} 158. DOE would reserve the right to access the wells as a requirement in the deed.

- Archaeological isolates were not evaluated for eligibility, as these resources do not have potential to be significant. T. Marceau's report and the extended Archaeological Wooded Island District now are associated geographically with these isolates. Are they now potentially significant enough to evaluate? Line 1554 & 1555

} 159. Section 3.6, Cultural Resources, of the EA has been revised.

- Construction will involve extensive land disturbance. Monitoring should be requested/required that include tribal monitors. Line 1636-1638

} 160. See General Response #8.

- Construction activities on the PAAL would not include buildings, but could include utilities to provide services to the land that is transferred. Where these utilities would be placed in the PAAL and what is already there? What easements already exist and how many more will there be? Line 1646

} 161. The PAAL includes existing utility easements for a fiber optic cable and telecommunications line. The numbers and locations of future utility easements will not be known until they have been proposed. The EA assumed that ten percent of the PAAL would be disturbed from construction of utilities and infrastructure. See also response to comment #76.

- The EA addresses cultural resources mostly through the NHPA process. What about mitigations under NEPA? DOE has been consulting with tribes and has acquired additional information that should be added to this document, particularly in regards to indirect and cumulative impacts.

} 162. See General Response #8 and response to comment #147. Also mitigation developed under the NHPA process is mitigation under NEPA.

- The EA does not discuss data recovery. This would include cultural resources documentation and collections made before and after the Land Transfer. Discussions with the tribes need to continue to decide if prehistoric artifacts should be collected. If so, where will they be curated?

} 163. See General Response #8.

Please list us where and when applicable as the *Nez Perce Tribe*, and not basically *Nez Perce*. Example on page 6-4.

} 164. Text has been revised to Nez Perce Tribe.

WANAPUM

August 11, 2015

Paula Call  
RL NEPA Document Manager  
Dept. of Energy  
Richland Operations Office  
P.O. Box 550  
Richland, WA 99352

RE: Wanapum Comments on the Draft EA – Proposed Land Conveyance

Dear Paula,

Thank you for providing the Wanapum an opportunity to comment on the draft Environmental Assessment (EA) for the Land Conveyance. A number of specific comments pertaining to individual sections are provided below. As a general comment, the Wanapum appreciated the support that allowed us to provide Department of Energy (DOE) information about places important to the Wanapum that will be affected by the Land Conveyance, our assessment of those effects, and our thoughts on mitigation.

We were somewhat confused why none of the information, findings or recommendations were included in the EA. Our desire was for DOE to use this information. For example, we provided a detailed cumulative effects analysis in our Appendix G assessment, yet none of that information is included in Section 4.6 of the Draft EA. It is important to the Wanapum that the information included in Appendix G be incorporated into DOE's cumulative effects analysis. If DOE reaches a different conclusion than the Wanapum regarding the level of significance of the effects, then we can continue consultation, but it is important to the Wanapum that we begin the discussion in a formal NEPA setting. The cumulative effects of the never ending stream of government projects continue to have cumulative effects that are increasingly putting the Wanapum at risk of extinction; these cumulative effects have to start being addressed.

For organizational ease, we have provided our comments in the order that they appear in the EA. We will be available to clarify our comments as necessary.

**Wanapum # 1.** S-1. 1<sup>st</sup> Par. The purpose of the document should be included in this first paragraph so that the reader knows what is the goal of the EA is. One option would be to include the definition of a NEPA environmental assessment. As stated in 40 CFR 1508.9, an environmental assessment:

"Means a concise public document for which a Federal agency is responsible that serves to: (1) Briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact

165. The methodology for conducting cumulative effects is described at the beginning of Chapter 4. The CEQ regulations require the identification of the incremental effect of a Proposed Action on past, present, and foreseeable effects in the ROI. As described in Chapter 4, the affected environment sections of the EA represent the environmental baseline of past and present effects. While there is an incremental impact from a Proposed Action, mitigation under NEPA is commensurate with the incremental effect of the Proposed Action. The incremental effect of a Proposed Action does not require mitigation for past or present effects not caused by the Proposed Action. Also see General Response #8.

166. The statement has been added to the EA in Section S-2. (comment continued on next page)

statement or a finding of no significant impact...

} (continued from previous page)

By including this statement, the reader will know that DOE will be making a decision as to whether or not an EIS will be required. As it stands now, no where in the document is it stated that this decision will be forthcoming.

**Wanapum # 2.** S-1. 1<sup>st</sup> Par. As a follow-up to #1 above, the Wanapum would like to know what will happen if DOE determines that an EIS is required. Will the Land Conveyance be delayed until the EIS is completed? Will the Land Conveyance go through by September 30 anyway, but development will wait for the EIS?

} 167. See General Response #1a and #1b.

**Wanapum # 3.** P. S-5. Section S.7. Environmental Consequences. As we indicated in our Executive Summary (Appendix G), our understanding is that the Mid-Columbia Energy Initiative is among the facilities planned for the Land Conveyance. This information is found on the website (<http://midcolumbiaenergyinitiative.org/index.php>). And yet, only the solar part of the MCEI is mentioned. If in fact the remainder of the MCEI is not planned for the Land Conveyance parcel, this should be explained in the EA as a matter of transparency.

} 168. See General Response #4.

**Wanapum # 4.** P. S-6. Section S.7. The 5<sup>th</sup> bullet states that an important assumption is that future landowners would construct and operate their facilities in compliance with federal, state, and local laws, regulations, and other legal requirements. It is important to the Wanapum that this assumption be true. What can DOE do to ensure that future developers comply? We commonly see project proponents circumvent such laws by claiming that consultations and assessments have already been done, and we can envision claims that "all that was done by DOE in the EA." We request that DOE turn this assumption into a requirement of the Land Transfer.

} 169. See General Response #2.

**Wanapum # 5.** P. S-9. Section S.7. Paragraph beginning "Land Disturbance." As stated, traditional plant species that could be used by the Wanapum will be destroyed during construction. However, it is inappropriate, and in some case wrong, to state that "The Hanford Site, however, includes large tracts of lands with similar plant communities." The Wanapum suggest removing this statement.

} 170. EA Section 3.6, Cultural Resources, has been clarified to state that opportunities for use of traditional plant species by the tribes would be foregone with implementation of the Proposed Action. Also see General Response #8.

**Wanapum # 6.** P. 1-1. Section 1.0. Second sentence. Please add that the Hanford Reach National Monument is managed by the U.S. Fish and Wildlife Service. This may seem a minor point since the land is still owned by DOE, however, it is extremely important to the Wanapum for reasons that relate to availability of resources that will be irrevocably lost to the Wanapum by the Land Conveyance. Transfer of management of these DOE-RL lands changed access to these lands for the Wanapum. Whereas previously, the Wanapum could access these lands and resources with a DOE badge, now, the Wanapum can only do so by applying for a special use permit for each and every activity, a requirement that is in conflict with Wanapum need to live a subsistence lifestyle as mandated by their covenant with the Creator.

} 171. The statement that the Monument is managed by the USFWS has been included in the EA. Also see General Responses #8, Appendix K, and Table 5-2.

**Wanapum # 7.** P. 1-5. Section 1.1. Top paragraph. Clarify relationship of MCEI to the

} 172. See General Response #4. (comment continued on next page)

# Wanapum

# APPENDIX L - RESPONSES TO PUBLIC COMMENTS

Land Conveyance.

} (continued from previous page)

**Wanapum # 8.** P. 1-5. Section 1.3. "DOE Decisions to be Made." See #1 above.

} 173. See response to comment #166.

**Wanapum # 9.** P. 1-6. Section 1.5. Last sentence on page. "The NEPA process associated with this EA is being coordinated with NHPA Section 106 requirements to the greatest extent possible and ..." This is not quite accurate. The NEPA and NHPA processes could have been integrated into one process (36CFR800.8 (c)) but were not. It is important to rephrase this sentence to say DOE addressed effects within the PA, under NHPA, while other effects outside of the PA and resources that have not been determined eligible for the National Register, were addressed under NEPA.

} 174. See General Response #8. Also DOE has coordinated the NEPA process with NHPA Section 106 requirements to the greatest extent possible in accordance with the March 2013 CEQ and ACHP, NEPA and NHPA: *A Handbook for Integrating NEPA and Section 106.*

**Wanapum # 10.** P. 2-1. Section 2.0. What happens if the land is not transferred by September 30, 2015? What if an EIS is needed? Or if the requested lands are not suitable for transfer?

} 175. See General Response #1. Also if the requested lands were found to not be suitable for transfer, they would not be transferred.

**Wanapum # 11.** P. 2-6. Section 2.2. Fig. 2-3. What happens if projects are proposed that are not on Fig. 2-3? For example, the more substantial and complex MCEI initiative that will take advantage of the Land Conveyance lands may want to deploy other energy projects beyond solar and biofuels manufacturing (e.g., the advanced modular reactor under study by TRIDEC (TRIDEC.com)).

} 176. See General Response #4.

**Wanapum #12.** P 3-1. Section 3.0. General Comments. This section and many of the topical areas specifically suffer from a failure to put the Land Conveyance area into local context. The Project area is across the street from the Hanford 300 Area, a CERCLA Superfund site. This has implications for more resource areas than the EA includes. Similarly, the Land Conveyance is located one-half miles from the downstream end of the Hanford Reach, the last somewhat free-flowing stretch of the Columbia River. This has important implications for the cultural resources, as explained in the Wanapum materials provided in Appendix G, and for other resource areas, more than the EA includes.

} 177. The EA has been revised to include additional discussion related to cultural resources, including the MOA. Also the comment does not specify what additional resources should have been addressed in the EA.

**Wanapum #13.** P 3-8. Section 3.0. Water Resources. It is not clear to us why the potential water demands for the planned facilities are not included in the assessment. Water is a precious resource, and the new facilities will further strain the acquisition and distribution of water network. It is important to know how severely the system will be strained and whether it can sustain the expected water demands.

} 178. The use of water is addressed in the EA under Utilities and Infrastructure, Section 3.10.

**Wanapum #14.** P 3-9. Section 3.2.1.3. Groundwater. Much of the discussion concerns the nitrate plume beneath the Land Conveyance area. Shouldn't the uranium plume in the adjacent 300 Area be described as well?

} 179. See General Response #12. Also discussion was added to the EA in Section 3.2.1.3.

**Wanapum #15.** P 3-20. Section 3.4. Figure 3-4. Ecological Resources. The BRMP levels of resource concern in the BRMP for the Land Conveyance Area are not consistent with Figure 3-4. If a new analysis of significance was conducted based upon the 2013 surveys, that analysis should be described. Until peer reviewed, the BRMP levels should be used to define the levels of resource concern in the Land Conveyance area. (Figure 5.8 in BRMPA (p.5.19).

180. EA Figure 3-4 is correct and depicts the most current ecological resource data available. Also see General Response #9b.

**Wanapum #16.** P 3-8. Section 3.4.3. Potential Mitigation Measures... The Wanapum concur and support the statement, "Mitigation measures that could be taken by DOE could involve compensating for the loss of habitat within the FSA by making improvements or enhancing habitat protection in surrounding areas." The Wanapum request that improvements be made within Shu Wipa and that the Wanapum be involved in such efforts.

181. See General Response #8 and the MOA.

**Wanapum #17.** P 3-31. Section 3.6. . Cultural Resources.

As a general comment, this section spends a lot of time explaining Section 106 and very little time explaining how cultural resources will be assessed and mitigated under NEPA. As the first sentence of the second paragraph states, "Cultural resources...must be evaluated for federal actions through NEPA and NHPA." As explained in the Wanapum assessment (Appendix G), there are many direct, indirect, and cumulative effects that will result from the Land Conveyance.. The EA Section 3.6, however, only addresses the effects under Section 106, which, because of DOE's definition of the Area of Potential effect, are limited to within the Land Conveyance Boundaries. The EA Section 3.6 also needs to discuss the off-site impacts. Currently this is only done in the Visual Effect Section 3.9. While there are effects that should be considered in 3.7, the majority should be discussed in Section 3.6. The following summarizes the Wanapum onsite and offsite effects of the Land Conveyance:

182. See General Response #8 and MOA. Also Section 3.6, Cultural Resources, in the EA has been revised.

- Within the Land Conveyance boundaries, over 1000 acres of the Wanapum TCP *Shu Wipa* will be destroyed during construction, removing forever the ability of the Wanapum to obtain plant and animal resources for their subsistence lifestyle. This is a significance loss, as every year, less and less land is available to the Wanapum to support their lifestyle, which is based on their religion. It is incorrect to state, as the EA does, that plenty of resources exist at Hanford. It is the plants at this location that are important. There will need to be specific compensation in the form of land made available to the Wanapum, preferably in the *Shu Wipa* area. For example, there can be lands set aside for the perpetual use of the Wanapum, there can be habitat enhancement efforts conducted by DOE, there can be funding made available to the Wanapum to complete a baseline habitat plan for the *Shu Wipa* area that will identify places where enhancement is needed, where high value habitats are located, and where protection is needed. It is important that the Wanapum take a leadership role in the future of *Shu Wipa* and that support be provided by DOE to allow for their involvement. Alternatives for setting

183. See General Response #8 and the MOA.

up a way to involve the Wanapum through the Wanapum Interface Office is being assembled and will be provided to DOE shortly.

- There are impacts that will occur outside the Land Conveyance boundaries and NEPA requires that off-site effects that are associated with the action (i.e., the Land Conveyance) be considered. Many of these effects are indirect, later in time, or cumulative, as explained in the Appendix G write-up. For example, as development of the land conveyance lands progress, it will stimulate growth in the surrounding area, what might be called industrial sprawl. This will result in additional effects to *Shu Wipa*. The cumulative effects of these actions are significant and measures must be put in place now in order to mitigate those effects. Specific recommendations to DOE for mitigation so that the Wanapum can protect and enhance *Shu Wipa* are the following:

- A baseline habitat survey needs to be completed, similar in methodology to the one the Wanapum are conducting for Grant County PUD.
- Specific restoration efforts need to commence immediately and be put on a sustainable path.
- Funding for Wanapum involvement to allow for participation in meetings, consultation, monitoring, and other development activities (estimated to be 1 FTE annually).

Alternatives for setting up a way to involve the Wanapum through the Wanapum Interface Office is being assembled and will be provided to DOE shortly.

**Wanapum #18.** P 3-48. Section 3.8. Visual Resources. There are concerns about the visual effects of the future development on important Wanapum resources and activities. It will be important that the Wanapum be involved in future planning, especially when variances to local planning guidelines are requested.

**Wanapum #19.** P 3-56. Section 3.9. Noise, Vibration, and Electromagnetic Fields. There are concerns about the noise and vibration effects of the future development on important Wanapum resources and activities. It will be important that the Wanapum be involved in future planning, especially when variances to local planning guidelines are requested.

**Wanapum #20.** P 3-69. Section 3.11. Transportation. The Wanapum think there should be discussion about the Horn Rapids Road, which runs from the Land Conveyance Area to Horn Rapids at Highway 240. The addition of 2300 jobs will create additional traffic in an area where traffic is increasingly becoming a problem. One solution will likely be opening the road again. While this will help alleviate traffic at the Kingsgate/240 intersection, it will increase activity at the Horn Rapids Road/240 intersection, leading to new efforts on the Wanapum TCP Wanawish.

184. See General Response #8. Effects to Shu Wipa have been mitigated in the MOA. See Appendix K.

185. See General Response #8. The MOA addresses the adoption of deed restrictions related to height, building color, noise, vibration and EMFs. See Table 5-2 and Appendix K.

186. See General Response #4.

# Wanapum

# APPENDIX L - RESPONSES TO PUBLIC COMMENTS

**Wanapum #21.** P 3-76. Section 3.13. Socioeconomics and Environmental Justice. The Wanapum believe the Region of Interest for socioeconomics and environmental justice should include the Wanapum community at Priest Rapids. This traditional community is located approximately 2 miles from the northwest corner of Benton County. As documented in the Wanapum assessment included in Appendix G of the EA, the Land Conveyance lands and resources are important to the Wanapum. In addition, the Wanapum obtain a significant number of fish at the Horn Rapids (*Wanawish*) fishery each year. The Wanapum are regularly in the Tri-Cities to work, to meet with federal and state agencies, to shop, and to recreate. As discussed, the Wanapum are concerned about the effects on *Wanawish* resulting from the growth of the Land Conveyance area. The Wanapum are part of the Tri-Cities, the Wanapum community will be affected by the Land Conveyance, and the Wanapum believe an assessment should be included in the Socioeconomic and Environmental Justice section (3.13). Yes, some of the impacts are addressed in the cultural resources section (3.7), but many are not, and Section 3.13 appears to be one section where the Wanapum should be included.

**Wanapum #22.** P 3-87. Section 3.14. Health and Safety. Based on the proximity of the Land Conveyance area to the Hanford 300 Area, health and safety is a major Wanapum concern. Given that mitigation of the loss of habitat is suggested in adjoin areas, some within the 300 Area itself, an ongoing health and safety program that will protect the Wanapum and others is needed.

**Wanapum #23.** P 4-1. Section 4.0. Cumulative Effects. The Wanapum provided a detailed assessment of the cumulative effects of the Land Conveyance on the Wanapum. None of this information was included in Section 4.0, Cumulative effects. The Wanapum request that a cumulative effects assessment on the Wanapum be conducted, either using the data and conclusion used in Appendix G or using other information.

Again, thank you for the opportunity to provide comments. Please do not hesitate to call or email me to address any questions or concerns you may have.

Sincerely,



Rex Buck, Jr.  
Wanapum

- 187. See General Response #8, response to comment #55, and the MOA in Appendix K. The MOA provides mitigation measures for TCPs.
- 188. Mitigation measures would be implemented in coordination with the Wanapum and DOE would adhere to DOE health and safety requirements. See also General Response #7b.
- 189. The Cumulative Effects analysis was completed pursuant to CEQ guidance and regulations. The methodology for conducting cumulative effects is described at the beginning of Chapter 4. The CEQ regulations require the identification of the incremental effect of a proposed action on past, present, and foreseeable effects in the region of interest. As described in Chapter 4, the affected environment sections of the EA represent the environmental baseline of past and present effects. The Wanapum requested that DOE: (1) consult with the Wanapum; (2) provide protective measures for Shu Wipa; and (3) provide protective measures for Wanawish. DOE has consulted with the Wanapum on these issues and has provided such measures through adoption of the MOA. Also see General Response #8.

## Lower Columbia Basin Audubon Society

## APPENDIX L - RESPONSES TO PUBLIC COMMENTS

Comments on the  
Environmental Assessment  
For  
Transfer 1641 of acres to TRIDEC

- The EA uses outdated bird observation data. It would be appropriate for DOE under its interagency agreements with Department of Interior to support the Migratory Bird Treaty Act to be as current as possible especially with respect to Swainson's Hawk and Burrowing Owl which nest and forage in this parcel of land and are state sensitive species. Will updated information be gathered?
- DOE needs to address the recent Executive Order on Pollinator Protection. Has this been done in relation to the parcel being transferred?
- The EA states that a 300 acre solar panel installation may be constructed. Audubon is concerned about solar mirrors that focus a strong beam of energy to a collector. These types of installations kill birds when birds fly through the beam. Audubon would like to see deed restrictions placed on the transfer that would require a bird safe solar facility.
- President Clinton by Presidential Proclamation under the Antiquities Act set aside the Hanford Reach National Monument, June 9, 2000. At the same time a Memorandum of Direction from the President to the Secretary of Energy directing that central Hanford lands be managed for eventual inclusion into the Hanford Reach National Monument. Central Hanford includes all lands central to the monument including those designated "Industrial" and "Research & Development". The parcel of land to be transferred contains, "...the same shrub-steppe habitat and other objects of scientific and historic interest (President Clinton) am today permanently protecting in the monument." Will the EA address the Memorandum of Direction?
- Deed restrictions must be placed into the land transfer instrument to require TRIDEC to protect native biota (plants and animals) and to use and manage native plants in restoration and open areas. Deed restrictions should require TRIDEC and subsequent land owners to fund a vigorous noxious weed control program to prevent degradation of adjacent DOE managed lands. Will deed restrictions be used to protect the ecological resources of the 1641 acres?
- What limitations will be placed on using groundwater which is contaminated within the acreage being transferred? Audubon is concerned that contaminated groundwater could get into the active environment and be detrimental to the ecology of Hanford and the Hanford Reach National Monument. Who and how will monitoring be conducted to assure compliance if deed restrictions are part of the transfer? Will deep rooted plants and other indicator species be monitored by DOE for contamination in the parcel after transfer?
- Burrowing owls were not seen or recorded during the brief bird survey. They were listed as uncommon in the report. Burrowing owls traditionally use this area and considerable numbers are located less than a mile away near the Hammer Facility. Burrowing Owls are a sensitive species in Washington State and are disappearing in the Tri-Cities. Audubon recommends to DOE that additional surveys be conducted prior to land transfer. Please respond to this concern.
- A Swainson's Hawk nest was located on the parcel to be transferred. But it was listed as uncommon in the report. A nest would indicate that Swainson's Hawks are intensely using the

- 190. See General Response #9.
- 191. Text has been added to EA Section 3.4, Ecological Resources to address the 2014 Presidential Memorandum, Creating a Federal Strategy To Promote the Health of Honey Bees and Other Pollinators. Also see General Response #9a.
- 192. See response to comment #116.
- 193. DOE and the Department of Interior (DOI) address the June 9, 2000 Memorandum in their August 8, 2014 Memorandum of Understanding related to the long-term protection of portions of the Hanford Site outside the current boundaries of the Hanford Reach National Monument. The 2014 MOU stipulates that DOE will consult with DOI on proposed encumbrances on, or disposal of, lands designated as conservation or preservation in the Hanford Site Comprehensive Land Use Plan (CLUP) until a planning process for the subject lands is complete. The lands identified for transfer are designated for Industrial in the CLUP. The EA narrative on Land Use at Section 3.7.4 acknowledges that transfer and development of the lands would foreclose opportunities for these lands to be considered for other future uses.
- 194. See response to comment #89 and Table 5-2.
- 195. See General Responses #12, #2, and Table 5-2.
- 196. See General Response #9. Prior to 2008, three active burrows were documented in the southeast portion of the FSA (BRMP Figure 5.12, DOE/RL-96-32, Rev. 1). Subsequent surveys have documented no signs of burrowing owls in this area. The nearest active burrows are located in artificial burrows placed to the west of the HAMMER facility, more than 1000 meters from the FSA. With burrowing owl foraging habitats generally located within 600 meters of burrows, it is not anticipated that these colonies would be impacted by the Proposed Action.

## Lower Columbia Basin Audubon Society

## APPENDIX L - RESPONSES TO PUBLIC COMMENTS

parcel to be transferred. The Swainson's Hawk is a sensitive species and their numbers are declining nationally. Audubon request that DOE put deed restrictions around the nest site to protect that area since these hawks traditionally return to the same location. Please address this concern.

- Google Earth indicates that a large cotton wood tree and some willows grow in a patch within the parcel to be transferred. The willows indicate that a wetland is located on the parcel. Audubon request that additional investigations be conducted to determine if this site is a wetland and addressed in the EA.
- Coyotes were listed as uncommon, but the report states that two coyote burrows were located on the parcel. The coyote probably should be listed as common in this area. Coyote burrows as well as badger burrows are nesting locations for the state sensitive Burrowing Owl. Audubon request that DOE conducts additional owl surveys to see if these birds will be impacted by the land transfer.
- The loss of habitat is addressed in the EA but Audubon believes the significance of habitat loss is not fully addressed. Preliminary data on a five year study the Lower Columbia Basin Audubon Society is participating in shows that shrub-steppe nesting song bird species are vanishing due to loss of habitat. Remaining shrub-steppe habitat in the region is now more critical than ever before. The 1641 acres is more valuable to shrub-steppe obligate bird species than is addressed in the EA. Audubon would like to see this more fully addressed in the EA. DOE should consider directing TRIDEC to the 300 Area where little habitat remains.
- Carbon sequestration. The EA does not address carbon sequestration. The current property is a sequestration sink. It should be noted that up to 85 percent of shrub-steppe plant's biomass is located below ground; the carbon contained there would never reach the atmosphere if the parcel remains untouched. What will be the consequences when this land is disturbed and removed from the carbon bank? Should this land and all of the Hanford Site remain as a carbon sink?
- Audubon would like to see a one to one mitigation for loss of public land. That is, for every acre of shrub-steppe transferred, DOE will need to purchase an acre of offsite land for preservation. Audubon would be willing to assist in specifics on where this land could be purchased.
- Audubon strongly recommends that this parcel remain under DOE control since there are so many unanswered questions as how development could impact DOE operations particularly the Vitrification Plant.
- Audubon feels that an EA is not sufficient to address the concerns for land transfer. Audubon respectfully requests that DOE do a full EIS. Several references in the Draft EA refer to the CLUP which in itself is now outdated. The outdated CLUP would in itself be a good reason to do a full EIS.

Comments submitted by:

Mr. Dana C. Ward  
 Conservation Chair  
 Lower Columbia Basin Audubon Society

197. During the 2015 nesting season, two Swainson's Hawk nests were active within the project area, outside the FSA. EA Section 3.4 addresses anticipated disturbance and habitat loss for nesting birds. Destruction of active nests of species protected under the Migratory Bird Treaty Act is prohibited regardless of land ownership. Also see General Response #9a.
198. See EA Section 3.5.1.1 for a description of the survey conducted for wetlands. Although willows may be present, all wetland criteria must be met to be considered a wetland. As stated in the EA, the survey did not find wetlands.
199. The wildlife observation tables in the EA used the terms Common, Fairly Common, Uncommon, and Rare to denote how often a particular species was observed during the 2013 surveys. Coyotes were not routinely observed.
200. Burrowing owls do use abandoned coyote and badger burrows. A check of Burrowing Owl activity at known burrows occurred in 2012 and there was no activity at identified burrows within the study area. The wildlife survey performed in 2013 indicated no presence of burrowing owls in the project area, and have not been documented to occur in the project area since 2012.
201. The EA describes the importance of shrub-steppe habitat and acknowledges that the Proposed Action would result in loss of habitat in the FSA. See General Responses #1c and #9a.
202. The degree to which the FSA lands function as a carbon sink is believed to be minimal. While intact shrub-steppe vegetation communities are known to store carbon in wood and roots, less than three percent of the FSA contains a shrub component with the remainder dominated by native grass/cheatgrass communities that do not provide a substantial carbon sequestration function.
203. The BRMP provides guidance for determining the appropriate type and amount of mitigation actions for impacts to vegetation and wildlife habitat. Also see General Response #9a.
204. The potential impact to DOE activities was considered by examining the bounding conditions from public use of FSA lands to DOE missions on the Hanford Site. See e.g., Section S-7, Chapter 3, Chapter 4, and Table 5-2.
205. See General Responses #1a and #1b.

Date: Aug. 11, 2015  
To: NEPA Document Manager, Land Conveyance EA  
From: Debbie Berkowitz (no organization)/ 544 Franklin St./Richland, WA 99354/ [cyberkowitz@charter.net](mailto:cyberkowitz@charter.net)

Re: Hanford Site Land Conveyance EA – Comments

1. The EA discusses potential mitigation as an abstract concept. What mitigation measures would actually be required to be taken by DOE? What mitigation measures would be required to be taken by the future landowners? Who makes that decision? Why are mitigation requirements not included in the EA? As far as environmental consequences are concerned, the Hanford CLUP EIS points out that shrub steppe is an endangered habitat. As discussed in the current EA, this habitat is shrinking drastically and what is left is becoming even more fragmented. This degradation has worsened since the CLUP of 1999 was written and the preferred alternative was adopted. Mitigation is even more important now.
2. It appears that part of the area designated by TRIDEC for solar power is in one of the more sensitive areas of the FSA, containing both BRMP Level 4 (2% of the FSA) and Level 3 (21% of the FSA) vegetation communities. I urge DOE to avoid conveying these more sensitive locations, consistent with the CLUP policy that "previously disturbed areas should be developed first, followed by the acreage with the least sensitive biological and cultural resources...the acreage with the most sensitive biological and cultural resources should be worked into natural open space for landscaping buffers, natural drainage areas, etc.". If these sensitive areas are conveyed, mitigation requirements should be significantly more stringent, both for DOE and for the eventual developer. An alternative location outside of the FSA should be considered, viz. the 300 Area since this is already devoid of habitat.
3. I am especially concerned about the possibility of a 'concentrating solar power (CSP) solar facility.' This type of facility has the potential for killing birds flying in their path. So, there would be a double whammy – birds living in this area would be displaced (and likely not survive) because of the destruction of their habitat and birds flying by could be killed by the concentrated heat or by colliding with the mirrors. Ferruginous hawks, burrowing owls, curlews, Swainson's hawk, grasshopper sparrow, not to mention a number of more common migratory birds and possibly bats, have been observed foraging in this area (and curlews and Swainson's hawk nest in the FSA). A CSP facility could be harmful to these birds, at least a couple of which are species of national conservation concern and are listed or being considered for state listing as threatened. In addition, the EA points out the potential for glare of these CSP dishes. I urge DOE to include a deed restriction prohibiting CSP solar facilities in this area.
4. Other structures built in the FSA should be required to follow bird-friendly design principles as much as possible (e.g., [http://abcbirds.org/wp-content/uploads/2015/05/Bird-friendly\\_Building\\_Guide\\_WEB.pdf](http://abcbirds.org/wp-content/uploads/2015/05/Bird-friendly_Building_Guide_WEB.pdf)).
5. How will water resources required for the proposed industries be managed? Given the long-term drought conditions that we are experiencing, the EA should include requirements for conservation and recycling of water, especially in the more water-intensive industries proposed.

- 206. See General Responses #5 and #9a. Also the EA has been modified to include additional information concerning mitigation measures that would be applied if the land is conveyed. See MOA in Appendix K and Table 5-2.
- 207. See General Responses #1c and #9a.
- 208. The Solar Farm FSA contains about 33 acres of Bitterbrush/Indian ricegrass vegetation community. This represents a small percentage of approximately 26,000 acres of similar vegetation communities that are located on the Hanford Site within areas identified by the CLUP for Conservation or Preservation. Also see General Response #9a.
- 209. See General Response #1c.
- 210. See response to comment #116.
- 211. See General Responses #2 and #9a.
- 212. See General Response #2.

6. How is the impact on climate change considered in the EA? According to the EA, CO<sub>2</sub> emissions from operational activities could potentially exceed the regulatory threshold (given the assumptions made for the calculation). This is significant, especially since regulated emission standards are likely to decrease with time.

} 213. See General Response #14. Also climate change has been added to the EA Summary and Sections 3.3.5 and 4.1.3.2.

7. What dangers would biofuels pose in the event of a spill or a release as they are transported in fairly close proximity to residential neighborhoods? I didn't see this discussed in the EA.

} 214. See General Response #4. Also because no specific end users or development proposals were identified or proposed, DOE's analysis of environmental consequences focused largely on the general site characteristics for the representative facilities including total land area, building footprint, building height, construction duration, number of construction and operations workers, and hours of operation. See Appendix E and Chapters 2.

I also didn't see a discussion of train noise issues related to the proximity of the tracks to residential neighborhoods.

} 215. The incremental increase in noise associated with an additional 2 trains per week would be minimal with regard to the existing condition. The Tri-City Railroad has provided common carrier railroad services for the Union Pacific Railroad in the Richland WA area for over 15 years where they originate and terminate rail freight daily.

8. What is the emergency planning zone required for the WTP? Is this known at this time? Does it include some of the acreage in the FSA? If the required emergency planning zone is unknown at this time, is it premature to be releasing these lands for development? Please address this in the EA.

} 216. The Waste Treatment Plant (WTP) Emergency Planning Zone (EPZ) is not yet established, but is expected to be more than one mile away from the FSA. The future EPZ determination will flow from the other EP documents such as the Hazards Survey and the Emergency Preparedness Hazards Analysis. These documents will be published before the WTP starts operating. At that time, DOE will determine recommendations for protective actions to offsite agencies, including consideration of public use of FSA lands as appropriate. Also see General Response 7b.

9. In the Hanford CLUP EIS, the Industrial land-use designation is defined as: "An area suitable and desirable for activities, such as reactor operations, rail, barge transport facilities, mining, manufacturing, food processing, assembly, warehouse, and distribution operations. Includes related activities consistent with Industrial uses." How are the proposed 'Back Office' uses (e.g., national call center, automatic data processing center) consistent with this definition? Why would an industrial zone be used for office space that is not associated with an industrial use when office space could be accommodated in many other areas of the Tri-Cities, including existing empty office buildings that are present in our communities?

} 217. Regarding the CLUP, "such as" means the list is not all inclusive. The use of office space is compatible with the industrial zone, which is consistent with the City of Richland's zoning ordinance. The city's zoning for industrial use districts permit office space for financial institutes, consulting services, corporate, general, and research and development.

Thank you for addressing these concerns.

## Monica Billings

## APPENDIX L - RESPONSES TO PUBLIC COMMENTS

1520 N Laventure Rd Apt 22  
Mount Vernon, WA 98273-2772

U.S. Department of Energy  
Draft Land Conveyance EA,  
P.O. Box 550, A7-75  
Richland, WA 99352,

### Comments on EA 1915D

1. This EA's boundaries around pit 6 do not match the boundaries for the borrow pit EA. This leads to the assumption that cleanup in the 300 area will be constrained due to lack of borrow materials. This was not examined in the conveyance EA. Either analyze in the conveyance EA or amend the conveyance EA boundaries to allow the full borrow pit 6 expansion.
2. The conveyance EA seems to assume a companion EA that will address effects of placing the public closer to the 300 area cleanup (not operations) activities. For example, the EA does not address removal of the 324 building to address the waste site 300-296. The data on the administrative record for the 300-296 waste site indicates that this waste is deadly.  
  
Additionally, the 300 area final record of decision lists 300-296 waste as a principle threat waste. The conveyance EA needs to address public being placed closer to this future activity. Also, the conveyance EA needs to address the removal of the 325 building, as described in the EE/CA for the 300 area. The EE/CAs do not address public access to the area directly across from the 300 area; are EE/CA #2 and EE/CA #3 for the 300 area to be reissued to address this update.
3. Will Tridec be responsible to fund their impact on taxpayer facilities as discussed in items 1 and 2 above.
4. Page S-11: The 5<sup>th</sup> bullet should discuss effects on lab activities.
5. Page S-11, The 6<sup>th</sup> bullet needs to address effects of removing the 324 and 325 facilities (as required by EE/CAs #2 and #3 for the 300 area), not just operate them. This EA is technically inadequate for these activities. This should also be discussed in section 1.5 of this EA.
6. Maps in this EA, except in the very back, is not clear regarding access to Stevens Dr. This should be made clearer throughout that the road will remain DOE property, with DOE not allowing driveway access. This will ensure that the actions of EE/CA #2 and #3 for the 300 area can be completed. Based upon the size of blocks being brought down the road for other 300 area activities (see Youtube), I would expect that similar, if not larger blocks will come down the road in the future. The taxpayer should not have to fund shutdown business costs of businesses that will rely on Stevens Dr access as a result of this EA.
7. Pg 2-12-the 300 area is defined in the Final ROD for the 300 area, what does this second note mean?
8. Pg 2-19 Comment 2 should be addressed on this page.

Sincerely,  
  
Monica Billings

RECEIVED  
AUG 13 2015  
DOE-RLCC

218. Borrow pit 6, including the expansion area addressed in DOE Final EA-1934, is outside the boundary of the FSA.
219. See General Response #6 and Appendix F. Removal of the 324 building will be completed in accordance with the Removal Action Work Plan (RAWP) for 300 Area Facilities (DOE/RL-2004-77 Rev. 2), developed under the CERCLA. Prior to removal of the 324 building, the RAWP will be amended as necessary to reflect current conditions, including location of the public, to provide for human health and safety. Removal of the 325 building was covered in the Engineering Evaluation/Cost Analysis (EE/CA) #3 for the 300 Area (DOE-RL 2005a) but was not been included in an Action Memorandum because DOE has identified a long-term use for the facility. The EE/CA will be amended as necessary to reflect current conditions to support 325 building removal when it is no longer needed for mission purposes.
220. It is not clear what impact the comment is referring to regarding items 1 & 2. Regarding lab activities, see response to comment #117.
221. See General Response #6.
222. Stevens Dr. becomes Rt. 4 S. north of Horn Rapids Rd. where it will stay under federal control and ownership. Occasional shut down of the road for reactor hauls to the Central Plateau and transuranic waste shipments normally occur over weekends or after business hours. As noted in Section 2.2.1 of the EA, TRIDEC may extend Kingsgate Way into the conveyed land providing alternative routes from Kingsgate and Horn Rapids Rd. The assumption that occasional closure of Rt. 4 S. will cause businesses to shut down is speculative.
223. It is referencing the TRIDEC request for 300 acres for a solar development.
224. See response to comment #219.



COLUMBIA RIVERKEEPER  
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August 11, 2015

NEPA Document Manager  
Land Conveyance EA  
U.S. Department of Energy  
P.O. Box 550, Mailstop A2-15  
Richland, WA 99352  
[landconveyanceEA@rl.doe.gov](mailto:landconveyanceEA@rl.doe.gov)

*Via Email*

**RE: Draft Environmental Assessment for Proposed Land Conveyance at the Hanford Site, Richland, Washington.**

Dear U.S. Department of Energy,

Columbia Riverkeeper (Riverkeeper) submits these comments on the U.S. Department of Energy's (Energy) Draft Environmental Assessment for Proposed Land Conveyance at the Hanford Site, Richland, Washington (EA). The EA assesses the potential environmental effects of conveying approximately 1,641 acres of Hanford Site land to the Tri-City Development Council (TRIDEC), the Energy-recognized Community Reuse Organization. Riverkeeper urges Energy to prepare an Environmental Impact Statement (EIS) that analyzes the significant environmental impacts of transferring over two square miles of land at the Hanford Nuclear Reservation for industrial development.

The Columbia River's Hanford Reach contains some of the most productive salmon spawning habitat in the Northwest, and approximately 80 percent of Upper-Columbia River Fall Chinook spawn in the Reach.<sup>1</sup> The Hanford Reach is the last free flowing, non-tidal stretch of the Columbia River. Endangered Upper-Columbia River Spring-run Chinook and threatened Upper-Columbia River Steelhead inhabit the Hanford Reach adjacent to the proposed land

<sup>1</sup> *Presidential Proclamation establishing the Hanford Reach National Monument*, Proc. 7319 (June 9, 2000).

} 225. See General Responses #1a and #1b.

conveyance.<sup>2</sup> The Hanford Reach is designated critical habitat for these listed species.<sup>3</sup> The potential impacts of more than a thousand acres of new industrial development near the Hanford Reach range from nuclear contamination to increased polluted stormwater discharges into the Columbia. Such impacts would disrupt the unique ecological qualities of the Hanford Reach and harm endangered salmonids and their critical habitat.

Riverkeeper files these comments based on significant concerns about the quality and comprehensiveness of the EA and, in turn, the undocumented and unconsidered environmental consequences to the Columbia River, Columbia River communities, and species that depend on habitat impacted by the land conveyance. Riverkeeper is deeply invested in clean water, strong salmon runs, and healthy communities. Riverkeeper represents over 8,000 members and supporters in Oregon and Washington and regularly comments on decisions impacting Hanford and the Columbia River.

Many of the issues identified below were discussed in Riverkeeper's 2012 scoping comments, yet not addressed by Energy in the EA. Riverkeeper opposes the proposed land conveyance based on the environmental impacts that would result, and because the conveyance is essentially a give-away of public lands to private corporations. Public lands at the Hanford Site are the focus of intense, publicly-funded clean-up efforts that will continue for the foreseeable future. Conveying these lands to private industry below fair market value is not an appropriate use of lands that the public is paying dearly to restore.

More broadly, Riverkeeper supports a 'clean-up first' approach at Hanford to protect the Columbia River and the economic and ecological health of downstream communities. Hanford is widely recognized as the most contaminated site in the Western Hemisphere, and radioactive pollution is already reaching the Columbia River. Cleaning up Hanford's radioactive legacy is a monumental task, and only about one-third complete. Until the entire Hanford Site is clean and safe, the U.S. government should not engage in side-projects that detract from Energy's conservation and restoration mandate.

<sup>2</sup> NMFS Decision maintaining Upper Columbia River Spring-run Chinook Endangered status, 70 Fed. Reg. 37,160, 37,163 (June 28, 2005); NMFS Decision Listing Upper Columbia River Steelhead as Threatened, 71 Fed. Reg. 834 (Jan. 5, 2006).

<sup>3</sup> NMFS Critical Habitat Designation for 12 Evolutionarily Significant Units of West Coast Salmon and Steelhead, 70 Fed. Reg. 52,630, 52,733, 52,760 (Sept. 2, 2005).

- 226. Nuclear reactor operations are prohibited in the proposed deed. Section 3.2, Water Resources, was modified to address stormwater discharges.
- 227. An EA does not provide specific responses to scoping comments, but considers them in the EA's development.
- 228. See General Response #10.
- 228a. As described in Chapter 1, Introduction, a proposal under 10 CFR 770 was submitted to DOE requesting the transfer of approximately 1,641 acres of Hanford Site land for economic development. The transfer of this land was also required by United States Congress (NDAA).

**Public Comments Incorporated by Reference**

Riverkeeper incorporates by this reference comments filed on behalf of the State of Oregon Department of Energy and the Yakama Nation. In addition to comments incorporated by reference, Riverkeeper highlights specific deficiencies in the EA in the following section.

**Specific Comments**

1. **Purpose & Need.** Energy improperly defines the EA’s purpose and need. Specifically, Energy states summarily: “This EA has been prepared to evaluate potential environmental impacts regarding TRIDEC’s land request under 10 CFR 770 and a mandate established by the National Defense Authorization Act of 2015 (NDAA; Public Law 113-291), Section 3013” to transfer property to TRIDEC by September 15, 2015. Energy fails to acknowledge and address the agency’s *discretion* to include “additional terms and conditions in connection with the conveyance under subsection (a) as the Secretary deems necessary to protect the interests of the United States.” By framing the purpose and need as a simple Congressional mandate to convey the land by September 15, 2015, Energy fails to acknowledge and address the agency’s discretionary role in shaping the terms and conditions connected to the land conveyance. This fundamental flaw in the EA’s purpose and need undercuts the agency’s analysis of the probable environmental impacts and recommendations for mitigation.
2. **Utility Services.** Energy concludes that the proposed action would result in “new, long-term demand for utility services,” EA at 3-100, but fails to account for the direct and indirect impacts of increasing demand on the Pacific Northwest power grid.
3. **Reasonably Foreseeable Future Energy Development.** The EA fails to analyze reasonably foreseeable future energy sector development at the conveyed property. In particular, the EA contains no analysis of reasonably foreseeable future nuclear natural gas development at the conveyed property. Instead, Energy restricts consideration of future energy development to biofuel manufacturing, photovoltaic energy production, and thermal electric dish energy production. The EA must address reasonably foreseeable future energy sector development in light of market conditions and regional trends in energy development. For example, in the last decade alone, technological advances prompted a steep decline in natural gas prices and substantial new development of natural gas plants throughout the U.S., in general, and along the Columbia River, in particular. Energy’s Draft EA must evaluate the reasonably foreseeable future development of natural gas plants at the conveyed

- 229. See General Responses #11 and #2.
- 230. Section 3.10. of the EA discusses utilities and infrastructure, including providers and respective capacities relative to the estimated demands from the development of the FSA. Additionally, cumulative discussion can be found in Section 4.1.10. It is the responsibility of the electrical utility transmission service providers to determine the direct and indirect impacts of demand on the Pacific Northwest power grid. The service providers use utility customer-provided annual ten-year load and resource forecasts along with interconnection requests to perform regional impact studies.
- 231. See General Response #4. (comment continued on next page)

Public Comments, Hanford Land Conveyance Draft EA  
 August 11, 2015  
 Page 3

property. In addition, Energy must analyze the reasonably foreseeable future development of nuclear energy facilities at the conveyed property. Riverkeeper’s 2012 scoping comments, which are incorporated by this reference, address in detail why Energy’s NEPA review must account for the reasonable likelihood of future nuclear development at the conveyed property. See Exhibit 1.

(continued from previous page)

4. **Contaminated Groundwater Plumes.** The EA contains minimal analysis of contaminated groundwater. Existing groundwater plumes and future projected contamination may impact the action area. In turn, Energy may need to conduct future remediation in the area to address the groundwater contamination. The attached Appendix U from Energy Tank Closure/Waste Management EIS shows that toxic and radioactive pollution may impact the project area. See Exhibit 2. The EA does not fully assess how current and future groundwater cleanup may be impacted by the land conveyance. Instead, the EA states, “For the Proposed Action, groundwater wells would not be permitted on any transferred or conveyed lands, and would be restricted through deed or other realty instrument language.” EA at 3-11. This approach fails to square with Energy’s duties to remediate the Hanford Site. Energy must prepare an EIS that addresses Energy’s obligations to clean up groundwater plumes that impact or may impact the project area.

232. See General Response #12. The information from TC&WM EIS Appendix U shows a hypothetical scenario in which all existing controls fail simultaneously and all wastes are released to the environment at some time in the past. For example, the uranium plume shown in Figure U-8 as groundwater uranium concentrations in 2010 is orders of magnitude larger than any site-observed groundwater uranium plume. While the TC&WM EIS information is useful and illustrates what-if scenarios, the information is not intended to show existing contamination. The best available source for existing groundwater contamination is the Hanford Site groundwater annual report, which provides information that is current and based on actual measurements, not a modeling scenario. Existing groundwater contamination under the land transfer area is all related to sources outside the Hanford Site (old agricultural activities to the south and west and an old discharge pond used by AREVA that has long been abandoned).

5. **Uranium Mobilization in Groundwater.** Riverkeeper concurs with the Oregon Department of Energy’s (ODOE) comments highlighting Energy’s failure to address the effects of the land conveyance on uranium mobilization in groundwater. The impact of future industrial development on existing groundwater pollution, particularly the likelihood of increasing uranium mobilization, is a significant environmental impact that warrants analysis in an EIS.

233. See General Response #12. Also uranium mobilization is evaluated in detail in the 300 Area RI/FS document (DOE/RL-2010-99).

6. **Environmental Justice.** Energy’s conclusion that the proposed action would not result in any “potential human health or environmental effects or minority or low-income populations” is not supported by the record. For example, Energy fails to address significant impacts to tribal members described in comments filed on behalf of the Yakama Nation. Energy also fails to account for the proposed action’s impacts on Columbia River water quality and quantity and associated impacts to tribal members and nations, as well as minorities that rely on the Columbia River as a food source.

234. See response to comment #51, #55, and General Response #8 regarding the MOA with the tribes. For clarification, the EA did not find that the Proposed Action would result in impacts to Columbia River water quality and quantity, see EA Section 3.2, Water Resources.

7. **Endangered Species Act Consultation.** Energy must consult with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service (collectively “the Services”) pursuant to Section 7(a)(2) of the Endangered Species Act (ESA)

235. As discussed in Section 3.4.2.2 of the EA, no species are known to occur on the PA that are listed under the Endangered Species Act (ESA). The EA did not identify potential impacts to ESA species or to critical habitat, including the Hanford Reach of the Columbia River, from the Proposed Action. (comment continued on next page)

regarding impacts to threatened and endangered species and designated critical habitat present in the action area. 50 C.F.R. §§ 402.12(c) & (d). The action area for ESA purposes is not limited to the proposed land conveyance, the action area includes "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." 50 C.F.R. § 402.02 (emphasis added). The Hanford Reach, adjacent to the proposed land transfer contains ESA-listed salmonids and designated critical habitat.<sup>4</sup> The Hanford Reach is within the ESA action area because industrial development on over 1,500 of former Hanford Site property would impact the Columbia River and adjacent property containing ESA-listed species and critical habitat. Accordingly, Energy should initiate the ESA Section 7(a)(2) consultation process. 50 C.F.R. §§ 402.12(c) & (d).

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**Conclusion**

Riverkeeper appreciates Energy's consideration of public input on the National Environmental Policy Act review process for the proposed Hanford Site land conveyance. Please direct any questions or correspondence to the undersigned at (541) 965 - 0985 or lauren@columbiariverkeeper.org.

Sincerely,



Lauren Goldberg  
Staff Attorney, Columbia Riverkeeper

*Enclosures*

<sup>4</sup> 70 Fed. Reg. 37,160, 37,163; 71 Fed. Reg. 834; 70 Fed. Reg. 52,630, 52,733, 52,760.

## J. Dunford

## APPENDIX L - RESPONSES TO PUBLIC COMMENTS

**From:** J. Dunford [mailto:ceramic809@gmail.com]  
**Sent:** Monday, July 13, 2015 4:12 PM  
**To:** ^Land Conveyance EA  
**Subject:** Bogged down in details?

I realize that, without a mandate from highest government authorities, it is hard to accomplish anything substantial regarding the type of toxic mess you are charged with cleaning.  
At the same time, you could not be going about it any more slowly.  
Are you bogged down in details?  
As I sit here in Portland, in the middle of the Columbis River watershed, endangered by the potential for escape of Hanford toxins, I wonder where to flee.  
Medford, Oregon?  
Yours, J. D.

} 236. The comments do not appear to be about the EA.

Comments at RL's public hearing on Hanford and conveyance (1641 Acres)

Thank you for this opportunity

- 1) Suggest reconsideration be given regarding whether an EA or an EIS is the proper tool for such a significant Federal action, especially considering Section 5.5.1, "Uncertainties and Limitations" and the enormous impact this action would have on TriCities. It is difficult to believe this EA will support a FONSI recognizing these uncertainties and the magnitude of costs to the taxpayer that conveyance to TRIDEC will perpetrate. My concern is politics surrounding the Sept 30 date may prevail over reason. I continue to believe that the NDAA, Section 3013 law that forces the Sept 30 date is a result political hypocrisy and complicity between RL and TRIDEC and is therefore not in the public interest as it pertains to this land conveyance. For this reason the law should be either repealed or ignored, just the way TRIDEC and local governments ignore their environmental responsibility, laws and ordinances.
- 2) The eventual costs associated with infrastructure improvements described in the EA represent an extreme burden that, I fear, will eventually be borne by the taxpayer. In order to alleviate those taxpayer costs, land conveyance to TRIDEC should not be "fee simple" as requested by TRIDEC. The EA needs to include words that conveyance will be on a lease or sale basis to TRIDEC as permitted in the Atomic Energy Act of 1954. Funds accumulated as a result of sale or lease to TRIDEC should be allocated to a special account for use only to help pay for infrastructure improvements. Sale or lease to developers should be based on fair market value. Free or discounted land prices designed to attract new industry should be prohibited by the EA and not left up to arbitrary decision making by TRIDEC, Richland or the county. The fees collected as a result of the sale or lease should be reserved for the necessary infrastructure costs to minimize taxpayer expense.
- 3) Some specificity for mitigation measures resulting from unavoidable adverse impacts to the environment needs to be addressed in the EA as a requirement for conveyance. This is necessary because TRIDEC, Richland

} 237. See General Responses #1a and #1b.

} 238. The Proposed Action is to convey lands to TRIDEC as required by the NDAA. While DOE is not authorized to use proceeds from sale of the land to fund non-government infrastructure improvements, in accordance with the NDAA, the land transfer deed includes a requirement that for a period of seven years all net proceeds from sale or lease of the land will be used by the future land owner to support economic development of, or related to, the Hanford Site.

} 239. See General Responses #2 and #5.

City and Benton County (The Locals) have historically ignored environmental concerns and cannot be expected to establish responsible mitigation measures to compensate for the loss of Shrub Steppe habitat recognizing their first priority is to bring in new business regardless of environmental costs. It is recommended that deed restrictions be established as part of the conveyance agreement to assure mitigation measures are established by TRIDEC or Richland or Benton County as the land is transformed from Shrub Steppe to industrial/commercial use. Deed restrictions requiring mitigation fees to compensate for habitat destruction by the new industries should be incorporated into the EA as a requirement for conveyance.

- 4) The EA does not consider the effects of climate change or drought both of which are forecasted to continue in our area for the foreseeable future. Adding more acreage of new industrial/commercial activity to our community will no doubt exacerbate an already desperate drought situation recognizing the wars over water are just beginning. Seems reasonable that priority for the valuable commodity of water should be given to the people and institutions currently in the Tri-Cities before adding new people/institutions to an already over-stressed resource. In fact a recent State Supreme Court decision requires the counties to assure that adequate water supplies will be available to new industries before the industry is allowed to be developed. It is unlikely Benton County has done any such water planning, may not even know about this Supreme Court decision involving Kittitas County, and likely would not abide by the courts decision if they did know about it. This argument supports a “no action” position at least until the water thing can be resolved (if that’s possible).
- 5) Right now, the way things are written in the EA it represents significant “baggage” to the TriCity taxpayer and assumes that baggage will be properly managed by TRIDEC/Richland/Benton County after conveyance. It is unfair for RL to just dump this baggage on the Locals with the misguided belief that the Locals can manage things. Unfortunately, the Locals lack a track record for managing growth properly as evidence by the chaotic period the TriCities is currently experiencing (ex. traffic congestion,

240. The Supreme Court decision is not relevant to the proposed transfer of land, which does not confer a new water right to TRIDEC. Conflicts over water rights have existed since development began in the Columbia Basin. Continued development and climate change will likely make management of water more difficult in the future. The City of Richland will retain the authority to prioritize use of its water right. Also climate change has been added to the EA Summary and Sections 3.3.5 and 4.1.3.2.

increased crime, air pollution, water right issues and increased taxes, etc). As a general comment, the EA should not make the assumption that existing policies and practices will be adjusted by the Locals to deal with the issues stated in the EA (ex. recycle program, waste management, environmental issues, etc) but rather should impose requirements on the Locals to assure those policies/practices are implemented as a condition of conveyance. And if the Locals are confident they can properly manage the new growth then they should not object to changing EA assumptions into EA conditions for conveyance.

6) Noticeably absent from the discussions on alternatives is the possibility of returning the 1641 acres, or portions of it, to the Tribes. I view this as an important alternative considering the Tribes had this land stolen from them some 160 years ago, under the guise of a Treaty. Also consider that historically the Tribes have demonstrated a much better reputation for environmental care and sensitivity than their successors (us white men). Also consider that if TRIDEC feels compelled to honor the politically backed legislation for the Sept 30 date then the EA (EIS) could be changed to require TRIDEC to turn the land, or portions of it, over to the Tribes.



241. See General Response #2.



242. Alternatives under NEPA must meet the purpose and need of agency action and comply with the requirements of the NDAA as explained in Chapter 1 of the EA.

ARMY 1001 W 4th Ave  
Kennewick, WA 99336-7500  
FOUNDING SPONSOR 15

To the manager,

I've read your about your comment period with some interest (for needed Hanford land).

1. Talk to Tony Bendages about having west Richland get some of it.
2. Lay a rail spur that ties into the Tri City Railroad.
3. Use Cap and Trade (if necessary) for a bridge across Columbia to Franklin County.
4. Protect Prisoner of War Camp area as a historic area by Horn Rapids Park.
5. Leave room for a beltway highway through west Richland.

243. The comments are outside the scope of the EA as they do not relate to the Proposed Action.

RECEIVED  
JUL 21 2015  
DDE-RLCC

Michael Luzzo  
1001 W. 4th Apt H201  
Kennewick WA

## John McDonald

## APPENDIX L - RESPONSES TO PUBLIC COMMENTS

**From:** [scott\\_te99352@yahoo.com](mailto:scott_te99352@yahoo.com) [[mailto:scott\\_te99352@yahoo.com](mailto:scott_te99352@yahoo.com)]

**Sent:** Monday, August 10, 2015 9:09 AM

**To:** "Land Conveyance EA"

**Subject:** Draft Land Conveyance EA comments

Dear Sirs;

Please find attached in MS Word format my comments on the Environmental Assessment for the proposed land conveyance near the 300 Area. I would also like to add that it appears that, with the short time between the end of the comment period and the September 30 deadline for turning the land over, that there will be no way for the DOE to address concerns and that the final EA will be issued with the FONSI with no chance to read and comment on either.

Sincerely,

John McDonald

Cell: 509-308-6254

E-mail: [scott\\_te99352@yahoo.com](mailto:scott_te99352@yahoo.com)

Sent from Windows Mail

} 244. See General Response #13. There is no requirement for DOE to provide a public review and comment period for the Final EA or FONSI.

**Proposed Conveyance of Land at Hanford Site Draft Environmental Assessment Comments from John McDonald**

Comment No.	Page/Line No	Comment(s). Provide technical justification for the comment and detailed recommendation of the actions required to resolve the discrepancy/problem indicated.
1	Pg S-1/Line 20	This EA was put out for comment on July 13, 79 days before the deadline for conveyance. Given a 30-day comment period, that leaves a month and a half to resolve issues brought up in response to this EA.
2	Pg 3-80/Line 2850	No reference to Executive Order 13045, "Protection of Children from Environmental Health Risks and Safety Risks". There are three early childhood care facilities near the PA (Kindercare, Children's Garden Montessori, Imagination Station Academy), plus housing.
3	Pg 3-85/Line 2898	No mention of childcare facilities or Montessori schools. Also, the 12 or so private elementary, middle, and high schools are not discussed.
4	Pg 3-91/Line 3105	Operation of the WTP is not discussed as one of the primary sources for potential future airborne radioactivity. This project completion and operation is in the reasonably foreseeable future.
5	Pg 3-93/Line 3157	EA ignores other potentially contributing sources in North Richland such as Iso-Ray, Moravek Biochemical, Westinghouse, and Test America Laboratories.

- 245. The order applies to economically significant rules under EO12866 that concern an environmental health or safety risk that EPA has reason to believe may disproportionately affect children. Environmental health risks or safety risks refer to risks to health or to safety that are attributable to products or substances that the child is likely to come in contact with or ingest (such as the air we breathe, the food we eat, the water we drink or use for recreation, the soil we live on, and the products we use or are exposed to). When promulgating a rule of this description, EPA must evaluate the effects of the planned regulation on children and explain why the regulation is preferable to potentially effective and reasonably feasible alternatives.
- 246. This section of the EA discusses public schools that are available to adequately accommodate families that may relocate to the area for jobs created by the Proposed Action. It is not intended to be an all-inclusive list. See EA Section 3.14 for the discussion on human health and safety.
- 247. EA Chapter 4 addresses cleanup of Hanford Site waste. An air operating permit is required for all Hanford Site facilities with potential for air emissions. Prior to WTP startup, the state and county air permit authorities will require DOE to demonstrate its ability to meet the permitting requirements. The permitting process includes an evaluation of the cumulative effects of Hanford operations to ensure that members of the public would not be exposed to more than 10 mrem per year from all potential Hanford sources. Also see General Response #7b.

Proposed Conveyance of Land at Hanford Site Draft Environmental Assessment Comments from John McDonald

6	Pg 3-96/ Line 3237	EA does not discuss Energy Northwest emergency plan for Columbia Generating Station. The PA is entirely within the 10-mile Emergency Planning Zone for Columbia Generating Station (CGS). CGS should be disclosed separately from DOE since in the case of an emergency, they would be suggesting protective actions to Benton County and DOE would be a supporting agency.
7	Pg 3-96/ Line 3237	No reason is given as to why accident at 324/325 is the only accident scenario analyzed. There was at least one incident of pyrophoric uranium catching fire in a barrel at the 618-10 burial ground. 618-10 has also had 7 notifications of loss of control of radioactive material. CGS is about 5 miles from the northern section of the PA in a upwind direction, so a possible accident there should be analyzed.
8	Pg 3-96/ Line 3266	Integration of DOE emergency plan and CGS emergency plan should be discussed here.
9	Pg 3-102/ Line 3311	Table does not discuss the operation of CGS or WTP, nor accidents at those facilities, 618-10, 618-11, or tank farms.
10	Pg 4-1/ Line 3320	Operation of WTP is not considered in cumulative effects. It should be considered as a reasonably foreseeable future action.
11	Pg 4-3/ Line 3425	The effects to groundwater plumes by covering a large area of the PA with an impervious surface and the runoff from it is not discussed at all in the EA.

- 248. See response to comment #247.
- 249. See General Responses #6 and #7b.
- 250. See General Response #7b.
- 251. Narrative was added to Table 3-29. The impact of DOE activities on public use of FSA lands was addressed by examining bounding conditions for current and future DOE activities on the Hanford Site, and locating the FSA such that current and future Hanford Site activities would not present a risk to human health and safety to future economic development activities. Due to the proximity of Hanford Site buildings 324 and 325 (~600 meters away), current and future activities at these buildings represent the bounding condition, or greatest relative risk to the public on FSA lands. The dose consequences to the public within the FSA would not require any additional mitigation measures beyond safety measures normally provided at the facilities to ensure the adequate protection of the public health, safety, and environment. See also Appendix F.
- 252. See response to comment #247.
- 253. See General Response #12.

Proposed Conveyance of Land at Hanford Site Draft Environmental Assessment Comments from John McDonald

12	Pg 4-4/ Line 3449	Radioactive air emissions in area are not discussed. 618-10 and 618-11 remediation work is not analyzed, both for fugitive dust or radioactive air emissions. Both AREVA and Perma-Fix Northwest are licensed for radioactive air emissions by the Washington Department of Health. Also, there is Iso-ray, Moravek Biochemical, Test America Laboratories, and Westinghouse to the east that are also licensed to emit radionuclides through their stacks. In addition, none of the potential emissions, both radiological and non-radiological, are considered from Tank Farms yet fugitive dust from PFP remediation is discussed.
13	Pg 4-6/ Line 3537	PA is in disturbed shrub-steppe area with a history of wildfire. Analysis should be done on whether proposed action increases the chances of wildfire.
14	Pg 4-9/ Line 3699	Columbia Generating Station would be a large contributor of EMF as it has a 1150 mw generator and transformer yard.
15	Pg 4-13/ Line 3841	Text references Table 3-22, which shows Minority Population, not sources of radiation.
16	Pg 4-13/ Line 3852	Cumulative doses from air emissions of Areva, Perma-Fix, Moravek, Iso-Ray, Test America, Westinghouse are not considered.
17	General	There seems to be minimal consideration of any radiological dose from air emissions although many sources exist both on Hanford Site and off. There also seems to be minimal consideration for Columbia Generating Station in any analyses. No analysis is done and little mention is made of WTP operation. Is WTP considered an Action in the reasonably foreseeable future? If not, needs to be stated. If it is, analysis needs to be done.
18	General	By extending the developed part of Richland to this area, it effectively eliminates some of the security buffer zone around Hanford facilities. EA should analyze effects of this and any action done in response.

- 254. See response to comment #247. Also changes were made to Section 3.14.5 and Section 4.1.3.
- 255. A discussion on wildfire has been added to the EA in Section 3.4. A deed covenant would address reducing the risk of wildfire on the FSA. See Table 5-2.
- 256. EMF from Columbia Generating Station (CGS) operations has not been identified as an issue to PNNL. CGS is located almost 10 miles from PNNL, and EMF is not anticipated to reach PNNL at measureable amounts due to the effect of vegetation (absorption) and ground (dissipation/dispersion) (see Appendix D).
- 257. Correction made; reference should have been to Table 3-25 in the Draft EA, which is now Table 3-24 in the Final EA.
- 258. See response to comment #247 and General Response #7b.
- 259. The FSA lands do not currently serve as a security buffer zone for the Hanford Site.

Comments on DOE/EA-1915D

Proposed Conveyance of Land at the Hanford Site, Richland, Washington

July 12, 2015

Laurie Ness  
2253 Davison Ave.  
Richland WA. 99354

I request that the Dept. of Energy take the next step and complete an Environmental Impact Study (EIS). Clarifying the intent of businesses and their purpose for the land conveyance should be required and will greatly improve the best use of the land because new information would be attained.

I see the DOE/EA-1915D as a snapshot of the general conditions of the defined study area and only the first step in our public process. It is not the best available science, but is adequate for raising public awareness. To fully address conditions within the study area an EIS must be required. The EIS would ensure a more complete inventory of local communities of plants, animals and areas that are existing and areas that may need restoration to help ensure continuing presence and health of these shrub steppe communities.

One of your challenges is to get the public involved, which takes a while. If this land conveyance is rushed, with only this comment period and an EA, it is the developers that get the final say, the influence, and the land--on their own terms. That deal would be lose-lose for the majority of us who live with the nuclear legacy of this area, and also for our neighbors living up and downstream. I found the applicants' (Tri-Decs) proposal was too vague on the type of business development. I am very concerned about the businesses we might attract... because of the obvious lack of enforceable regulations in the scope of the EA.

Some specific comments and suggestions re; the text. These items should be considered for the EIS.

- Disclose to the public and mitigate for **all** the land that will taken out of wildlife habitat and repurposed once. Show specific business purposes so impacts can be assessed accurately especially cumulative impacts. Require ROI's proposals specify what and why they want the land and how they will steward it.
- (1104-1106) Repurposing of land out of the present study area for conveyance whether suitable or not should not fragment wildlife habitat further. Don't create a new mitigation issue and not one of the existing conditions. This should be recognized and avoided. If land is repurposed it should be contiguous for industry reducing edge effects deleterious to wildlife.
- (1198-1106) Giving this land to business does not meet the criteria of permanently protecting shrub steppe habitat. With 50% of this habitat destroyed conveying and fragmenting this habitat further is in direct opposition to the original purpose.
- (1237-1243) Being a field biologist with field experience searching for species and being a native of the area . I believe the WDFW's candidate species, black-tailed jackrabbit's absence does not make sense. If the further surveys indicate an absence of this common species of shrub steppe, then it is very important to show that. It may trigger a higher level of study and

260. See General Responses #1a and #1b.

261. See General Responses #1a and #1b. Although the comments are about a future EIS that the commenter suggests DOE prepare, many of the issues have been addressed in the EA. Also see General Response #9a. (comment continued on next page)

may indicate something important that is going on an ecosystem level. The parts of the study area that I could see looked great for this species.

- (291-296) Who would enforce the regulatory rules of a rail-based system? I.e. contents of rail cars of coal and oil is a big concern of mine.
- Building new roads for industry, even for fire safety, creates a huge impacts or halts some wildlife movements, what will that mitigation look like?
- Bird species that occur and require this land for migration activity. Species that breed were surveyed present in May and June. The Northern Shrike is an example off a wintering bird that uses our shrub steppe. It is critical habitat and should accounted for in the EIS.

(continued from previous page)

**Section 2.1 Methods**

**S.5.1 General Directives and Practices:**

The Ecological Compliance Review does point out that there will be adverse impacts at any level of development in all areas to be conveyed. So mitigation is required.

With any reuse any of Hanford's lands, with its known contaminants and many others still undiscovered, there are layers of complexity that can only be addressed at the federal level. The best available science needs to be employed and that knowledge needs to be conveyed through the openness to the general public with NEPA process. NEPA with an EIS is the only way to do this well and I think is the federal gov'ts job. From the OPM I attended in July on this draft EA the concerns raised by those commenters much more informed show me that a FONSI cannot be issued until the publics' concerns are adequately addressed. All of the above are reasons why retaining the NEPA process of environmental regulation will create the most stable, stringent regulations that are needed. The highest level of community input will result and will include all affected. It will result in the best science available and the most careful and thoughtful decisions. Hanford's past shows that the risks can be high and the potential great for a rediscovery of one of our secrets from the 40's. To me, all of Hanford was and is still a potential Superfund Site until proved otherwise. NEPA offers the highest protection with the most stringent regulations accompanied with the highest penalties for violators. With the challenges we have faced in the continuing to clean up and money, time and lives. We cannot now afford to lower the standard. I think if we pass this conveyance on with an EA the lack of regulation will attract unscrupulous businesses looking for a lack of regulations that do not have good environmental BMP's. We will find ourselves cleaning up the land once again. A lot has to gone into clean up Hanford. The NEPA process provides the public with the greatest enforcement powers, penalties, protection and a continuity of the governing regulations in our country. It needs to be continued.

**S.5.3 Noxious Weed Management**

Specific mitigation requirements should be required and detailed and include timelines.

**3.2 Mammals**

I could not locate a list of mammals that should occur. No mention of Ord's Kangaroo Rat and I think it's likely if surveyed for.

262. See response to comment #89.

263. EA Table 3.8 provides a list of mammals observed during the wildlife survey conducted for the EA. Ord's Kangaroo Rat was not observed, nor has it been documented to occur on the Hanford Site in previous surveys.

5.1.1 General Directives and Practices

DO NOT ALLOW hunting or fishing, the only exception to this rule should be to Native Americans.

5.1.3.1

An inexpensive and active wildfire prevention action would be to post signs along roads cautioning/educating drivers about vehicle grassfires.

7.4.3 Mitigation Away from a Project

As a biologist I *might* be qualified to make some suggestions on what and where a mitigation should be, but because these areas are pretty inaccessible there is no way I could contribute to this. Also I would be concerned my suggestion might be part of a future conveyance?

If adverse impacts cannot be avoided and other areas are chosen:

- 1) Highly degraded habitat should not be replaced-in-kind but 3:1 as a rule to create a larger functioning ecosystem.
- 2) If the habitat to be replaced has been previously degraded, this includes the effects of fire. That mitigation on a new site should require a habitat improvement and function at a higher level for our native shrub steppe plants and animals.
- 3) Require timelines on ALL mitigation plans and on the actual mitigation! Accompanied by enforcement powers and penalties that have direct consequences to the lead agencies and the developer.
- 4) Do not fragment the land further.
- 5) Do not allow any landscaped and irrigated non-native grass lawns or non-native landscape plants due to the adverse effects of exotic plants and their pests on our native plants communities.
- 6) Cheat grass spread near industrial sites should be inventoried, monitored and activities that contribute to its spread should be mitigated. Control should not be done with herbicides.
- 7) Mitigation elsewhere should not be done in-kind but should be required to be 3:1 and based mitigation based on peer reviewed science for the success rate of mitigating the type of plant/animal community.
- 8) Mitigation should be planned, planted and monitored by licensed professionals that specialize in habitat restoration of shrub steppe.
- 9) This type of mitigation should place a high priority on restoring wildlife corridors.

Items I don't think were addressed, my thoughts and some questions.

- DOE/EA-1915D does not address what specific mitigation will be for taking this land out of shrub steppe habitat and repurposing to high human disturbance. The paving that accompanies industry.
- It is important to me for DOE to put a higher effort in with an EIS. The confidence of the public and business community will increase.

} 264. There are no water bodies on the FSA, thus fishing is unlikely. As the proposed land uses are for industrial development, hunting is also unlikely to be a compatible use. Also see General Response #3.

} 265. See response to comment #255.

} 266. Additional discussion of mitigation measures has been included in the Final EA.

} 267. See General Response #9a.

} 268. See General Response #1a.

- Dept. of Ecology's air monitoring program for tank farm vapors currently done at the Hanford perimeter will be affected and should be addressed in the EIS. The public will now be in closer proximity to vapors.
- How will that closer proximity of unprotected workers effect the current clean-up schedule? Common sense tells me there will be even more restrictions to protect the public as they will be closer to the Tank Farms.
- It is not possible or constructive for us to recommend areas of mitigation using the EA. It is not feasible for me to suggest any areas to restore because;
  - a. Public access and views of much of the study area was so limited and restrictive. It was challenging for me to see what was out there to mitigate and I believe the EA's "snapshot" falls short of the natural, cultural and historical resources that are necessary for meaningful public input on mitigation.
- Mitigation must benefit the shrub steppe ecosystems inhabitants and not people, we tend to confuse these two things.
- Clean-up levels of contaminated areas have reflected the lands reuse as wildlife habitat. During the OPM in August 2015 I attended I was made aware that the clean-up of some areas were different. A public commenter asked about "attenuations" which I had not heard of. I learned at that meeting of the presence of an acceptable level of contamination for the land-use.
- An EIS should show how that land use was reevaluated. Since the land has been changed to include humans with industrial activity.
- DOE/EA-1915D does not contain enough information of the conditions, wildlife, contaminants and other unknown hazards on and in the ground.
- Maintain DOE control of and title to the conveyed lands and continue with NEPA process. Why?
  - 1) Local government's present and historical record of environmental abuse. (Appendix A, ERTS #650413, SEPA 201403718-segmenting & City no public disclosure to Ecology a historic EIS and addendum showing adverse impacts.
  - 2) Lack of enforcement powers currently shown at the state level or the required personnel to carry out those duties. (See Authorization Order #10664-Wetland Mitigation Plan the City of Richland's planned mitigation for wetland filling that has not been been enforced. To date; no created wetland or visible pressure to enforce. A.O 10664 (see email string w/ city and picture of a mitigated "created wetland")
  - 3) Richland city government's history of environmental abuse, degradation of public parklands without restoration. Weak environmental city ordinances and no consequences. (see example Richland Municipal Code RMC 22.10.120 Wetland alteration and mitigation.)
  - 4) The instability at the state level, due to the frequent changing of the political environment affecting how state employees regulate environmental laws.

**Conclusion:** Of all my comments on a land conveyance that I feel should never have been considered, the one thing I lose sleep over is this. The lowering of environmental compliance to state and local levels. Listen to what I and others say about Richland's track record on the environment. Richland has earned the bad press. Hanford began as a federal mission should remain so under NEPA. Please continue with NEPA no matter what the outcome is.

- } 269. Reported vapor events are localized to certain 200 Area tank farm locations on the Central Plateau and have no effect on the FSA.
- } 270. See General Response #9a.
- } 271. See EA Sections 3.4, Ecological Resources, and 3.14, Human Health and Safety.
- } 272. See General Responses #1a, #2, and #5.

## Comments on EA-1915: PROPOSED CONVEYANCE OF LAND AT THE HANFORD SITE, RICHLAND, WASHINGTON (DOE Richland, 2015)

Patrick Paulson  
2253 Davison Avenue  
Richland WA

### 1 Overall comments

It is my view that the Draft EA does not meet the requirements of NEPA and that the proposed conveyance will have detrimental effects on wildlife, vegetation, our community, and public safety. The National Defense Authorization Act of 2015 (NDAA; Public Law 113-291), Section 3013, paragraph (d-1) grants the Secretary of Energy the ability to alter terms of the conveyance to protect the interests of the United States. The Secretary should use this discretion to postpone any conveyance until

- The detrimental effects of such conveyance on wildlife habitat, local health and safety, and quality of life have been determined
- Such effects minimized, with mitigations specified where they can't be eliminated, and
- An enforcement mechanism is in place to ensure that mitigations are completed and maintained.

If and when land is conveyed, I request that DOE ensure that

- habitat fragmentation be avoided
- any conveyed land be contained to ensure that invasive species/plants/fires don't cross into remaining area
- Make fire management and other practices required by (DOE, Richland, 2013) be required for conveyed land
- Maintain DOE control of and title to the conveyed lands

Because of administrative considerations, the last point is important for the preservation of ecological function. The regulatory framework of the local governments and of the state of Washington provide no guarantee of preservation of habitat; Washington's State Environmental Policy Act (SEPA) only requires local

273. Impacts were evaluated in the EA and mitigation measures were discussed, including potential deed restrictions. The mitigation measures have been further refined through the Draft EA's public review process and are included in the Final EA. Also see General Responses #9, #6, #2, and #5.

274. See General Responses #2, #3, and response to comment #89.

agencies to be transparent about habitat destruction. Our local agencies have a track record of not even meeting the low bar set by SEPA.

**1.1 Need for Environmental Impact Study**

Under the *Hanford Site Biological Resources Management* the proposed conveyance clearly requires an Ecological Compliance Review or ECR (DOE, Richland, 2013, pp. vi, Section S.5.1). It is not clear that the current Environmental Assessment meets the requirements of an ECR as described in (PNNL, 2006).

The Department of Energy (DOE) has classified the land to be conveyed as "Important Habitat" (Level 3) (DOE, Richland, 2013, p. 5.6), which is to be mitigated at a 3-1 ratio. However, the first step in mitigation is to *avoid* using habitat areas for development (DOE, Richland, 2013, p. x (Section S.7)). Since there is no current need for the land until TRIDEC determines what will be done with it and who will be using the land, the need for the land is not known.

I believe a complete environmental impact study needs to be done on any land before DOE conveys to local interests. Such a study cannot be completed until the local interests have specified who will be using the land and what the land will be used for.

**2 Detailed Comments**

(DOE Richland, 2015, pp. 1-4)

The proposed uses given by TRIDEC are not specific enough to determine environmental impacts of the conveyance.

(DOE Richland, 2015, pp. 1-5)

*Need for Agency Action:* this paragraph does not mention that Public Law 113-291 allows for the Secretary of Energy to modify the conveyance to protect the interests of the United States.

(DOE Richland, 2015, pp. 2-1)

*Alternatives Considered.* This section only considers 'no action' and complete conveyance; the legislation allows the Secretary and DOE to place alter and limit the conveyance as required by the interests of the United States. A much more comprehensive list of alternatives is required.

(DOE Richland, 2015, pp. 3-2)

The text indicates that the proposed solar farm is much smaller than examples that were used for comparison. This seems to indicate that the proposed farm will need to be expanded; the cumulative impacts of such an expansion should be considered.

(DOE Richland, 2015, pp. 3-30)

275. See General Responses #1b, #1c, and #4.

276. See General Response #4.

277. See General Response #11.

278. See General Response #11.

279. There is no indication that the solar farm would have to be expanded, and such an assumption would be speculative and is not required in NEPA documents. The assumptions for the representative solar farm were based on relevant characteristics of the available land and size of the facility.

There would be no effects on wetlands or floodplains from construction or operation of the Proposed Action because neither is present in the PA nor within close enough proximity to the PA to experience effects. Therefore, there are no specific site locations that are more sensitive to wetland and floodplain impacts from construction or operations than any others on the FSA.

However, given the surrounding shrub steppe environment, an area does not need to meet the criteria of 'wetland' in order to be a haven for wildlife. Any area that supports trees or other vegetation not usually found on shrub steppe serves important ecological functions. There are several such areas in the PA.

(DOE Richland, 2015, pp. 3-96)

*Emergency Preparedness.* This section does not consider the effects of an incident at Energy Northwest's nearby nuclear-powered Columbia Generating Station. The area to be conveyed is within the area to be evacuated in the event of a site-level incident; evacuation plans have to be considered for all workers during construction and operations (Appendix A. Furthermore, the escape of vapors from ongoing work at tank farms is not considered.

(DOE Richland, 2015), Appendix H, Wildlife Survey.

The document (DOE, Richland, 2013) contains a much more extensive list of potential species on and near the area considered for conveyance. The species include Townsend's ground squirrels, "ferruginous hawk and burrowing owl buffer zones, and known populations/occurrences of plant species of concern".

**3 Works Cited**

DOE Richland. (2015). *Draft Environmental Assessment*. Department of Energy, Richland Operations Office. Richland, WA: DOE.  
 DOE, Richland. (2013). *Hanford Site Biological Resources Management Plan*. Department of Energy, Richland Operations Office. Richland, WA: Department of Energy.  
 PNNL. (2006). *Ecological Compliance Assessment Management Plan*. Department Of Energy. Richland, WA: DOE.

- 280. Remnant trees and other non-native vegetation from pre-Manhattan Project homesteads and agricultural uses are not uncommon on the Hanford Site. These trees can provide perching and nesting habitat for several avian species. There are very few trees in the Project Area, and most of these are outside the FSA. Removing trees with active nests or removing active nests of birds protected by the Migratory Bird Treaty Act (MBTA) is prohibited under the MBTA.
- 281. See response to comment #269 and General Response #7b.
- 282. The BRMP provides a list of 46 mammalian species that have been historically observed across the diverse habitats of the Hanford Site. The project area makes up approximately one-half of one percent of the Hanford Site and does not include the diverse habitats found in other areas of the site. Many of the mammals listed in the BRMP would not be expected to occur in the project area.

Draft Environmental Assessment for Proposed Land Conveyance

Land Transfer Concerns

Dana C. Ward  
Citizen

- Thank you for giving me the opportunity to comment on the Draft Environmental Assessment for Proposed Land Conveyance at the Hanford Site, Richland, WA
- First, I believe TRIDEC is generally a positive force in the Tri-Cities.
- I believe TRIDEC's actions to have language placed in the National Defense Authorization Act which requires DOE to transfer 1,641 acres by September 30, 2015 are premature and have caused hardships for DOE and may compromise the health and safety of the citizens of the Tri-Cities. Does DOE have the authority under Atomic Energy Act to not transfer this land if reasonable doubt remains that radiological contamination may be present? And a larger question; can land be transferred under the Atomic Energy Act if the underlying groundwater is knowingly radiologically contaminated?
- This is a prime example where politics and reality collide with unintended consequences.
- DOE at its own cost must divert funds from critical cleanup actions to transfer land to TRIDEC for general development.
  - Development that could reasonably have been done elsewhere in Richland area at this time. Should the EA address alternative land locations?
  - What is the cost of this action both in funds and diversion of the work force to complete this task on time?
  - In DOE's hast to comply with the law, what radiological and chemical contaminants could have been missed? (From personal experience gamma surveys are not 100% accurate.)
  - And why is September 30, 2015 so critical? The Comprehensive Land Use Plan clearly shows that this area is designated "Industrial" and will be cleared and open to that use when meeting all environmental standards, rules and regulations for release.
  - In the least, more time should have been allocated to DOE to do the proper land clearing actions necessary to release this property. (To properly clear radiologically and chemically contaminated land it takes about two years to do this properly for 1600 acres. Personal experience using 10 CFR Part 20 and Part 40 and appropriate NUREGs and Guidance. Buried contamination may be missed by current survey methodologies that are not vigorous enough.) Can DOE request or document that more time is needed to properly transfer this land?
  - And why should DOE "give" this property to TRIDEC? It should be sold to TRIDEC and the funds used to counter the cost in preparing the land for transfer.
  - In my years working with the Nuclear Regulatory Commission decommissioning uranium mills when cleanup was complete the land was transferred to DOE for long term stewardship. The 586 square miles of the Hanford Site should remain in Federal

- } 283. See General Response #7a.
- } 284. See General Response #12.
- } 285. Considering alternative land locations would not meet the stated purpose and need in EA Section 1.2, which is to consider the TRIDEC request made under 10 CFR 770 and Congressional direction in the National Defense Authorization Act of FY 2015.
- } 286. The comment is outside the scope of the EA.
- } 287. See General Response #7a.
- } 288. Date established by Congress in the NDAA.
- } 289. DOE initiated the required surveys and processes in 2012. Section 5.4 addresses CERCLA and radiological clearance, which have been completed.
- } 290. See General Response #10.
- } 291. See General Response #11. Also NDAA requires transfer of land to TRIDEC. (comment continued on next page)

ownership and only appropriate areas should be leased for compatible industries and not transferred away.

- I believe the EA stated that agriculture and food processing are possible future uses of this land. If there is any contamination found in the area where agricultural products are grown or if contamination accidentally gets into the processing system from the Hanford Site it could be devastating to Columbia Basin agricultural and food processing industry. DOE should lease this land and not transfer it to control future uses. What radiological protections will be required by DOE on business established in the land transferred? Will DOE continue to do environmental monitoring on the land to be transferred? Baseline monitoring should be conducted on this property prior to transfer.
- The land being transferred out of federal ownership could create problems for completing a proper Natural Resource Damage Assessment and appropriate compensation under this requirement. Has an NRDA assessment been conducted?
- What are the consequences to the Hanford Site Air Operating Permit with the changing boundary? This could be a complex problem depending on what industries moves in. What is the cost to DOE for applying for a new permit?
- What consequences will moving this land to private ownership have on the Emergency Planning Zone for the Vitrification Operation? Would new design be necessary for the Vitrification Plant? Will new operating procedures be necessary with industry moving closer to the plant?
- President Clinton by Presidential Proclamation set aside the Hanford Reach National Monument June 9, 2000. At the same time a Memorandum of Direction from the President to the Secretary of Energy directing that central Hanford lands be managed for eventual inclusion into the Hanford Reach National Monument was issued. Has the EA addressed the MOD? Central Hanford includes all lands central to the monument including those designated "Industrial" and "Research & Development. The parcel of land to be transferred contains, "...the same shrub-steppe habitat and other objects of scientific and historic interest I (President Clinton) am today permanently protecting in the monument."
- DOE needs to address the recent Executive Order on Pollinator Protection. Has this been done in relation to the parcel being transferred?
- The EA uses outdated bird observation data. It would be appropriate for DOE under its interagency agreements to support the Migratory Bird Treaty Act to be as current as possible especially with respect to Swainson's Hawks and Burrowing Owls which nest and forage in this parcel of land and are state sensitive species. Will updated information be gathered?
- What limitations will be placed on using groundwater which is contaminated within the acreage being transferred? Will site visits and groundwater monitoring be conducted to assure compliance if deed restrictions are used as part of the transfer?
- I noticed some flaws within the EA.
  - Burrowing owls were not seen or recorded during the brief bird survey. They were listed as uncommon in the report. Burrowing owls traditionally use this area and considerable numbers are located less than a mile away near the Hammer Facility. Burrowing Owls are a sensitive species in Washington State and are disappearing in the Tri-Cities.

(continued from previous page)

- 292. Based on TRIDEC's TMI (see Figure 2-3), agricultural industry is anticipated to involve processing and warehousing, not farming.
- 293. See General Response #15.
- 294. The land conveyance would not require changes to the Hanford Site Air Operating Permit. If site operations change in the future, they will be evaluated to determine if any updates to permits or licenses will be necessary .
- 295. See response to comment #216.
- 296. See response to comment #193.
- 297. The Presidential Memorandum, Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators, is addressed in the revised EA Section 3.4.1. See General Response #9a for mitigation measures for pollinators.
- 298. See response to comments #197 and #196.
- 299. See General Response #12.
- 300. See response to comment #196.

- A Swainson's Hawk nest was located on the parcel to be transferred. But it was listed as uncommon in the report. A nest would tend to make you think they are using the parcel to be transferred. The Swainson's Hawk is a sensitive species and their numbers are declining nationally.
- Coyotes were listed as uncommon, but the report states that two coyote burrows were located on the parcel. The coyote probably should be listed as common in this area.
- Table 3-30 states, Ecological Resources: "Existing shrub-steppe habitat in one of the largest remaining shrub-steppe areas in the ecoregion would remain. Wildlife species would continue to use the area, and new species may move into the area if native vegetation communities continue to recover from past disturbance. Impacts to ecological resources from the Proposed Action would not occur." Using the words "new species" would make you think of new species to science. Rewrite might be necessary here.
- The loss of habitat is addressed well in the EA but I don't believe the significance of habitat loss is addressed fully. Preliminary data on a survey I am participating in shows that nesting song bird species only found in shrub-steppe environments, particularly sagebrush are vanishing. Remaining shrub-steppe environment are now more critical than ever before.
- The EA does not address carbon sequestration. The 1641 acres is a sequestration sink. It should be noted that up to 85 percent of shrub-steppe plant's biomass is located below ground; the carbon contained there would never reach the atmosphere. What will be the consequences when this land is disturbed and removed from the carbon bank? Should this land and all of the Hanford Site remain as a carbon sink?
- In land transfer actions, it has been customary for other federal agencies to be asked if they have an interest in the land. One agency, the Department of Interior, should have been solicited. The Department of Interior is the parent organization for the National Park Service, US Fish and Wildlife Service and the Bureau of Indian Affairs. One of these agencies may have had an interest or need for the land. Using the National Defense Authorization Act to circumvent the usual process is a travesty. Did DOE invite other federal agencies to see if they had an interest in this property prior to carving out the 1641 acres from the approximate 4000 acres initially studied?
  - The Wanapum People lost all their land in this region because they were not signatory to the 1855 Treaty. Would it not be morally correct to transfer some of these lands to the First Americans?
- If DOE determines that the land must be transferred, appropriate mitigation for loss of sagebrush habitat must be considered.
  - Mitigation ratio of two to one. 3282 acres should be remediated on the Hanford Site and set aside for eventual public use or possibly inclusion into the Hanford Reach National Monument.
  - Mitigation ratio of one to one. Land (1641 acres) could be acquired off site for public use.

- 301. See response to comment #197.
- 302. See response to comment #199.
- 303. The EA has been modified to reflect the intended point: if vegetation communities continue to recover from past disturbance, wildlife species not currently present within the Project Area could move into the area in the future.
- 304. EA Section 3.4.2 details impacts that would occur from the Proposed Action, including loss of shrub-steppe habitat. Also see General Response #9a.
- 305. See response to comment #202.
- 306. Chapter 2 of the EA describes the Proposed Action, and explains the request by TRIDEC under 10 CFR Section 770 and the requirement by NDAA to convey land to TRIDEC. Soliciting other agencies or the tribes does not meet the purpose and need for the agency action under NEPA. Also see General Response #11.
- 307. See General Response #9a. (comment continued on next page)

## Dana Ward

## APPENDIX L - RESPONSES TO PUBLIC COMMENTS

- A mitigation action due to loss of habitat could be the funding of an organization such as The Nature Conservancy to conduct biodiversity inventories to update the data base since the current information is becoming outdated.
- With all the concerns above and the uniqueness of transferring a large parcel of land that was so close to a production area (300 Area) an EIS should be considered.

Thank you for the opportunity to comment.

Dana C. Ward  
10112 Maple Drive  
Pasco, WA 99301  
Telephone: 509-545-0627

} (continued from previous page)

} 308. See General Responses #1a, #1b, and #7.

## Public Meeting

## APPENDIX L - RESPONSES TO PUBLIC COMMENTS

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6	PUBLIC MEETING
7	ON THE DRAFT ENVIRONMENTAL ASSESSMENT
8	FOR THE PROPOSED CONVEYANCE OF LAND
9	AT THE HANFORD SITE
10	
11	
12	
13	JULY 30, 2015
14	5:54 P.M.
15	486 BRADLEY BOULEVARD
16	RICHLAND, WASHINGTON
17	
18	
19	
20	BRIDGES REPORTING & LEGAL VIDEO
21	Certified Shorthand Reporters
22	1030 North Center Parkway
23	Kennewick, Washington 99336
24	(509) 735-2400 - (800) 358-2345
25	

1



**Public Meeting**

**APPENDIX L - RESPONSES TO PUBLIC COMMENTS**

1 by locals I mean TRIDEC, Richland City, Benton County,  
2 would be based on a fair market value for sale or for lease  
3 for free or discounted land prices designed to attract new  
4 industry should be prohibited in the EA and not left up to  
5 the arbitrary decisions of locals. They have an incentive  
6 to develop this property. My fear is they're going to give  
7 it away and we as taxpayers are going to have to pay for  
8 it. The fees collected as a result of the sale or lease  
9 should be reserved for the necessary infrastructure cost to  
10 minimize taxpayer expense.

310. See General Response #10.

11 Some specificity for mitigation measures  
12 resulting from unavoidable adverse impacts to the  
13 environment need to be addressed in the EA as a requirement  
14 for conveyance.

311. See General Response #5.

15 Typically the locals have unfortunately  
16 historically ignored environmental concerns and cannot be  
17 expected to establish reasonable mitigation measures to  
18 compensate for the loss of shrub steppe habitat recognizing  
19 that their first priority is to bring in new business  
20 regardless of environmental costs. It is recommended that  
21 these restrictions be established as part of the conveyance  
22 agreement to assure mitigation measures are established by  
23 the locals when we transformed from shrub steppe to  
24 industrial. Deed restrictions requiring mitigation fees to  
25 compensate for habitat description by new industry should

312. See General Responses #2, #3, #5, and #9a. (comment continued on next page)

3

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1 be incorporated into the EA as a requirement.  
2 I don't see any consideration for climate change  
3 or drought and both are expected to continue in the  
4 foreseeable future. The impact obviously will be to  
5 exacerbate the already desperate drought situation  
6 recognizing the wars over water are just starting. It  
7 seems reasonable that the people here and the institutions  
8 here should have first choice to the water rather than  
9 bring in new people that don't have water. There's a  
10 supreme court decision that also suggests that.  
11 Let's see. I'll just skip down to the last one.  
12 As a general comment the EA should not make the assumption  
13 that existing policies and practices will be adjusted by  
14 the locals to deal with the issues stated in the EA. For  
15 example, recycle, waste, maintenance, environmental issues,  
16 but rather should impose requirements on the locals to  
17 assure those policies and practices are implemented as a  
18 condition for conveyance. And if the locals are confident  
19 that they can properly manage new growth then they should  
20 not object to changing the EA assumptions to EA conditions  
21 for conveyance.

22 MR. ZENN: Keep in mind you can always send  
23 in written comments as well.

24 MS. NESS: Thank you for the time and thank  
25 you, Paula, for mentioning that the congressional act is not

} (continued from previous page)

} 313. A discussion on climate change has been added to the EA Summary and Sections 3.3.5 and 4.1.3.2.

} 314. See General Responses #2 and #3.

**Public Meeting**

**APPENDIX L - RESPONSES TO PUBLIC COMMENTS**

1 higher than the National Environmental Policy Act for the  
2 DOE.

3           So we drove out to wrap our brain around what we  
4 were looking at, we drove out to try to look at the land  
5 and it was tough, we couldn't really see much of it, but it  
6 did give us a bearing and it gave us a starting point to  
7 try to figure out this EA a little bit. And there were  
8 some things that, you know, we thought looked pretty  
9 decent, wouldn't probably qualify as wetland but would end  
10 up right next to the industrial life and would be wildlife  
11 magnets basically, which are a concern and they'd have  
12 noise and activities and so on. So I think that there are  
13 other things that we would like to know more about out  
14 there, including things we couldn't see or couldn't get  
15 access to.

16           So my background's wildlife. And I just saw  
17 things that I'd like to know more about, things like jack  
18 rabbits. I'm a little worried that there was no sign of  
19 jack rabbits in the six square miles of the study area,  
20 that's hard to biodegrade. But in any case, it compelled  
21 me to come. And I wanted to make sure that the EA may just  
22 be the first step and the second step might be an EIS. And  
23 I would like to see that and I would like to go on record  
24 to request DOE does an EIS. These are really -- this area  
25 out here is complex. EA's are for things that are pretty

5

} 315. See General Responses #1a and #1b.

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**Public Meeting**

**APPENDIX L - RESPONSES TO PUBLIC COMMENTS**

1 straightforward. This is -- we have never had  
2 straightforward out there. So I want to make sure that the  
3 request is out there. I think we have a right as a public  
4 to ask for that because it is -- it is part of the process  
5 now. And I don't think we should get hung up on the  
6 September 30th thing.

7 I also want to mention I'm worried if this land  
8 gets conveyed as is with very few regulations and very  
9 broad assumptions about whose going to use it that we're  
10 going to be hanging out -- the city, the county and Port is  
11 going to be hanging out a shingle saying hey, this land is  
12 up for grabs and there really aren't any restrictions. I  
13 don't think we want to attract that into our community. We  
14 have already had, you know, we have messes we're dealing  
15 with now and we're going to be dealing with for a long  
16 time. And we want a scrupulous industry and we want  
17 industries with regulation.

18 One last thing or a couple last things, I did a  
19 little research and I wanted to if I can find it talk about  
20 the tank vapors. You're changing the perimeter with this  
21 land conveyance. The tank vapors are monitored air quality  
22 by the state and you're changing the perimeter of Hanford.  
23 People with dual industry are going to be working much  
24 closer to the tank vapors, these are strictly regulated.  
25 This is an issue of public health and safety issue. And I

6

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} 316. See General Responses #2, #3, and #5.

} 317. See response to comment #269.

## Public Meeting

## APPENDIX L - RESPONSES TO PUBLIC COMMENTS

1 don't -- well, I don't believe that that's been addressed  
2 in an EA and I don't think it can be addressed. It's not  
3 the EA's job to do that. So I also pardon off on that, I  
4 want to make sure that the restrictions don't change for  
5 the cleanup processes already happening out there with the  
6 tank farms because if there are people close by that may  
7 change what their schedules look like. That is something  
8 we don't really need to have happen. Thank you.

9 MR. WARD: Thank you for this opportunity to  
10 comment. First, I believe TRIDEC is a positive force for  
11 the Tri-Cities, but I believe their action to have language  
12 placed in a National Defense Authorization Act, which  
13 requires DOE to transfer the 1,641 acres by September 30,  
14 2015, are premature and have caused hardships for DOE and  
15 may compromise the health and safety of the citizens of the  
16 Tri-Cities. This is a prime example where politics and  
17 reality collide with unintended consequences. DOE at its  
18 own costs must divert funds from critical cleanup actions  
19 for general development. Development that could reasonably  
20 have been conducted elsewhere in Richland area at this  
21 time. What is the cost of this action both in funds and  
22 diversion of workforce to complete this task on time? The  
23 DOE's haste to comply with the law, what radiological and  
24 chemical contaminants could have been missed? And why  
25 September 30, 2015? Why is that so critical? The

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} 318. See General Response #7a. Also EA Section 5.4 describes CERCLA requirements for federal land transfer involving identification of any hazardous substances on the property. DOE has completed the CERCLA requirements with EPA concurrence.

**Public Meeting**

**APPENDIX L - RESPONSES TO PUBLIC COMMENTS**

1 Comprehensive Land Use Plan clearly shows this area is  
2 designated industrial and will be cleared and open to what  
3 -- open to that use when meeting all environmental  
4 standards, rules and regulations. In the least, more time  
5 should have been allocated to DOE to do the proper land  
6 clearing actions necessary to release of this property.  
7 And why should DOE give this property to TRIDEC? It should  
8 be sold to TRIDEC and the funds used to counter the cost in  
9 preparing the land for transfer.

} 319. See General Response #10.

10 In my years working with the Nuclear Regulatory  
11 Commission decommissioning Uranium mills, when cleanup was  
12 completed the land was transferred to DOE for long term  
13 stewardship. The 586 square miles areas of the Hanford  
14 Site should remain in federal ownership and only  
15 appropriate areas should be leased for compatible  
16 industries and not transferred away.

17 I believe the EA stated that agricultural and  
18 food processing are possible future uses of this land. If  
19 there is any contamination found in the area where  
20 agricultural products are grown or if contamination  
21 accidentally gets into the processing system from the  
22 Hanford Site, it could be devastating to the Columbia Basin  
23 agricultural and food processing industry. DOE should  
24 lease this land and not transfer it to control future  
25 users.

} 320. See response to comment #292.

**Public Meeting**

**APPENDIX L - RESPONSES TO PUBLIC COMMENTS**

1           The land being transferred out of federal  
2 ownership could create problems for completing a proper  
3 Natural Resource Damage Assessment and appropriate  
4 compensation under this requirement.

5           Has an NRDA assessment been conducted?

6           What are the consequences to the Hanford Site Air  
7 Operating Permit with the changing boundary? This could be  
8 a complex problem depending on what industries moves in.

9           What is the cost to DOE for applying for a new  
10 permit?

11           What consequences moving this land to private  
12 ownership could have on the Emergency Planning Zone for the  
13 vitrification operation? Would new design be necessary for  
14 the vitrification plant? Will new operating products be  
15 necessary with industry moving closer to the plant?

16           What limitations will be placed on using  
17 groundwater which is contaminated within the acreage being  
18 transferred? Who and how will monitoring be conducted to  
19 assure compliance if needed restrictions are part of the  
20 transfer?

21           Carbon sequestration. The EA does not address  
22 carbon sequestration. The current property is a  
23 sequestration sink. What will be the consequences when  
24 this land is disturbed and removed from the carbon bank?  
25 Should this land and all of the Hanford Site remain as a

9

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} 321. See General Response #15.

} 322. See response to comment #294.

} 323. See response to comment #216.

} 324. See General Responses #12 and #5.

} 325. See response to comment #202.

**Public Meeting**

**APPENDIX L - RESPONSES TO PUBLIC COMMENTS**

1 carbon sink?

2 In land transfer actions it has been customary  
3 for other federal agencies to be asked if they have an  
4 interest in the land. One agency, the Department of  
5 Interior, should have been solicited. The Department of  
6 Interior is the parent organization for the National Park  
7 Service, U.S. Fish and Wildlife Service and the Bureau of  
8 Indian Affairs. One of these agencies may have had an  
9 interest or need for the land. Using the National Defense  
10 Authorization Act to circumvent the usual process is a  
11 travesty.

12 And finally, the Wanapum People lost all their  
13 land in this region because they were not signatory to the  
14 1855 Treaty. Would it not be morally correct to transfer  
15 some of these lands to the first Americans? Thank you.

16 MR. POLLET: Gerry Pollet for Heart of  
17 America Northwest, 16,000 regional citizens group working  
18 for the cleanup of Hanford. It is important to remember  
19 that NEPA was not waived and this document has numerous  
20 illustrations of why an Environmental Assessment is not  
21 legally adequate. U.S. DOE had lots of time to prepare an  
22 EIS. It has been repeatedly warned that it would need to  
23 prepare an EIS. And it's inexplicable why the Energy  
24 Department failed to prepare a full EIS.

25 So what are the consequences of not preparing and

10

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} 326. See response to comment #228a.

} 327. See General Response #1a.

**Public Meeting**

**APPENDIX L - RESPONSES TO PUBLIC COMMENTS**

1 EIS? Significant probable environmental impacts are  
2 documented. The document itself acknowledges they cannot  
3 be mitigated to prevent them from reaching the level of  
4 being significant. And that's the trigger for doing an  
5 EIS. So what's missing? This document fails to consider  
6 reasonable alternatives and cumulative impacts. Reasonable  
7 alternatives and impact analysis are necessary for each  
8 type of proposed use. For example, whether warehousing as  
9 reasonable alternatives in this region and whether it is  
10 reasonable to use land that is rare shrub steppe habitat  
11 for warehousing activities rather than some other critical  
12 activity when there is plenty of warehousing land available  
13 in this region.

14 Page S8 illustrates significant impacts with the  
15 loss of 1,641 acres of rare shrub steppe habitat and it  
16 tries to justify it by saying it is less than one percent  
17 of remaining habitat. That fails the test for doing an  
18 accumulative impact analysis. It fails the test for  
19 whether or not it is still a significant environmental  
20 impact.

21 And on page S9 the document repeats that Hanford  
22 has lots of other habitat so there's no impact. However,  
23 this fails to consider the fact while acknowledging that  
24 there are cultural resources for the tribes that are going  
25 to be impacted, it fails to even attempt to analyze whether

11

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} 328. See General Response #1b.

} 329. See General Response #11. Also see Chapter 4 of the EA for the cumulative impacts analysis.

} 330. See General Response #1c and #9a.

1 or not those areas are currently available today on the  
2 same timeline as this land. This land is going to be made  
3 available for other uses. Where's the analysis of whether  
4 or not it should be available for tribal use for cultural  
5 resources? It is inadequate to say there's other land  
6 available, it might be available to the tribes 50 years  
7 from now or a thousand years from now. This land is going  
8 to be available now. The same is true for the  
9 environmental and habitat impacts.

10 I'd like to point out that areas that have been  
11 carved out from the transfer area include hazardous waste  
12 sites, and there's been no analysis and I think that was  
13 well documented in the question and answer period, there's  
14 been no analysis here as is required under NEPA of whether  
15 or not the proposed activities including impervious  
16 surfaces including such activities such as watering and  
17 landscaping. And if you look at contractor facilities  
18 right south of the Hanford Site, you see there's a  
19 proclivity to have ponds in the desert in front of your  
20 buildings, those things have significant potential impacts  
21 on wastes left in place right across the street in the 300  
22 Area or in the areas that were carved out, including areas  
23 where we left volatile organic chemicals for attenuation,  
24 and there's no analysis of the potential impact on that.

25 The claim that deed restrictions will be

12

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} 331. See response to comment #228a and General Response #8.

} 332. See General Response #12.

**Public Meeting**

**APPENDIX L - RESPONSES TO PUBLIC COMMENTS**

1 effective is a joke. Deed restrictions for groundwater  
2 when you have no requirement to obtain a permit before  
3 installing a well means that it is totally ineffective.

} 333. See General Response #5.

4 I point out as well that the proposed deed  
5 restrictions on excavation fails to even require that EPA  
6 or Washington Ecology be consulted.

7 And finally, let me just point out in this last  
8 element that there are alternative solar development  
9 discussions and those have not been considered here whether  
10 or not 300 acres is even adequate size, whether the Energy  
11 Department should be considering a reasonable alternative  
12 using its land for a major solar installation is something  
13 that there have been a lot of discussions with at DOE  
14 headquarters and with other entities and it is not analyzed  
15 at all as to whether it is appropriate for this site and  
16 basically constrained at 300 acres or whether or not there  
17 are better alternatives at this point in time. Thank you.

} 334. The EA analyzed the reasonably foreseeable future uses of FSA land, based on industry targets described in TRIDEC's proposal (TRIDEC 2011a) and target marketing industries (TMI) (TRIDEC 2014a).

18 MR. ZENN: Thank you.

19 MS. VANNI: I'm Jean Vanni and I'm  
20 speaking independent of the agency I work for, which is the  
21 Yakama Nation. I will tell you that the Yakama Nation will  
22 be commenting on this because in every instance we have  
23 found nothing but significant impact acknowledged and no  
24 mitigation efforts. I want to say for all those who spoke  
25 before me, I support everything that you have said as an

} 335. See General Responses #1a, #2, #5, and #8.

## Public Meeting

## APPENDIX L - RESPONSES TO PUBLIC COMMENTS

1 individual. I can't speak for our tribe at this moment  
2 until we make official comment but I would not be surprised  
3 that they would not also support what you've all said.

4 My concern tonight that I wanted to talk about  
5 during this comment period was that the infrastructure  
6 requirements in order for this development to go forth that  
7 the City of Richland is going to have to pay for are huge.  
8 There has not been enough clarity or discussion within this  
9 EA as to the actual impacts on the City of Richland  
10 taxpayers for these projects. We will have to have a new  
11 landfill because our landfill is going to be full in 2018.  
12 We will have to have new wastewater treatment systems even  
13 though they say that we have, you know, enough for only  
14 half of the waste stream that's coming there, it is only  
15 half of what our current waste stream is but we have to  
16 remember the waste stream that is coming from industries  
17 are going to be different than the waste streams that are  
18 coming from residential areas. The energy supply is going  
19 to have to be developed. So the EPA is going to have to  
20 come in and so is natural gas and those are going to take  
21 SEPA reviews.

22 And I don't know if you're familiar with this or  
23 not, but there was an attempt by natural gas to cross the  
24 Columbia River and they were having to do an EIS and that  
25 is dead in the water because of the impacts. So you cannot

14

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336. See General Response #3 and response to comment #127. Also see Section 3.10.1.2.

**Public Meeting**

**APPENDIX L - RESPONSES TO PUBLIC COMMENTS**

1 as citizens rely on statements that TRIDEC, DOE and local  
2 government is going to encourage the residents to support  
3 paying for this. So that is my big concern. And I would  
4 like to -- I would like to see that information and the  
5 direct costs put into this EA put to public review because  
6 not all development while it may seem as progress is  
7 feasible. That's my concern.

8 MR. ZENN: Thank you. Is there anybody else  
9 who hasn't had that opportunity yet? Okay. There are some  
10 questions that people wanted to talk with staff about.  
11 Would you like to just use the remaining 20 minutes or 15  
12 minutes as additional open house so people could talk with  
13 staff?

14 MS. CALL: Sure. If that's what people  
15 want.

16 MR. ZENN: We started out with a open house  
17 back at the boards. So we'll go to that. So we're all --  
18 you're free to go if you want to or continue to talk to  
19 staff. Thank you very much. It was very good.

20 MS. CALL: Thank you very much for coming  
21 and for giving your comments. We appreciate it.

22 (6:40 p.m.)  
23  
24  
25

} 337. This comment is outside the scope of the EA.





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