Department of Veterans Affairs
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DRAFT ENVIRONMENTAL ASSESSMENT

American Lake Veterans Hospital Ground-Based Heat Pump System and Parking Lot Improvements

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1.0 EXECUTIVE SUMMARY

The VA Puget Sound Health Care System – American Lake Division (hereafter referred to as the American Lake VA) is located on the western shore of American Lake in Pierce County, Washington. The Department of Veterans Affairs (VA) operates the hospital campus under a lease from the U.S. Department of Defense. The hospital offers a variety of medical services for military veterans, including primary care, surgical services, substance abuse treatment, and mental health treatment. As part of an ongoing effort to promote environmentally sustainable design while continuing to offer high-quality medical services, the VA is proposing the construction of a ground-source heat pump system to provide energy-efficient heating and cooling for several existing buildings on the campus, as well as proposed future development.

The Preferred Alternative would include installation of heat pump systems at two locations on the ALVA campus, including construction of associated well fields and all system components. The north well field would be installed under the overflow parking lot, a graveled lot on the north side of Veterans Drive, adjacent to the primary parking area. The south well field would be installed in a lawn area adjacent to Building 17, which is located at the corner of Engle Way and Musser Avenue. The Building 17 Ground Source Field would provide heating and cooling for Buildings 17, 2, and 3. The North Ground Source Field would provide heating and cooling for the primary hospital building (Building 81) and a future hospital building (Building 201) to be constructed immediately southwest of Building 81. In addition to installation of the geothermal wells, the Preferred Alternative would include construction of a 95-space parking lot, including 5 handicapped-accessible stalls, on top of the Building 17 Ground Source Field. This parking lot would use a pervious asphalt system that will allow stormwater runoff from the parking lot to be filtered and infiltrated on-site, resulting in a marginal increase in flows to the campus drainage system.

Under the Preferred Alternative, the VA would be able to provide energy-efficient heating and cooling to multiple existing and future buildings on the ALVA campus using a system of centralized geothermal wells while partially satisfying future campus parking needs. Under the No Action Alternative, existing buildings would continue to use conventional, less energy-efficient systems for heating and cooling, and future development would likely install similar systems. Additionally, the No Action Alternative would not contribute to satisfying the campus' needs for parking.

2.0 INTRODUCTION

2.1 BACKGROUND

The American Lake VA (ALVA), part of the Veteran's Administration Puget Sound Health Care System (VAPSHCS), is located in Pierce County, Washington, just south of the city of Lakewood. The hospital occupies a site on the western shore of American Lake, consisting of 351 acres in the northwestern corner of Joint Base Lewis-McChord (JBLM), as shown on Figure 1. The Department of Veterans Affairs has leased the site from the U.S. Department of Defense since 1923 and has operated a hospital on the campus since that time. The current ALVA facility offers primary care services, ambulatory surgical services, blindness rehabilitation, treatment for substance abuse, and post-traumatic stress treatment. The hospital also includes a 76-bed nursing home, a neuro-psychiatric treatment center, a 60-bed domiciliary for the homeless, and a women's health clinic. The hospital provides medical services to over 30,000 patients per year.

The VA is currently planning several expansions to the ALVA campus, including the construction of a new primary hospital facility (Building 201). In order to promote energy efficiency and environmental sustainability, Building 201 is being designed to meet Leadership in Energy and Environmental Design (LEED) standards. A major component of the building's design is the use of an energy-efficient heating and cooling system in the form of a ground-source heat pump. This heat pump system would be capable of serving multiple buildings, including both existing and future structures.

The National Environmental Policy Act (NEPA) requires Federal agencies to evaluate their proposed actions and determine the potential for environmental impacts. This draft Environmental Assessment (EA) has been prepared per the requirements of the National Environmental Policy Act of 1969, the President's Council on Environmental Quality regulation for implementation of NEPA (40 CFR 1500-1508), and the Department of Veteran Affairs NEPA Interim Guidance for Projects (September 2010). The VA will use the findings of this EA to determine whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI). If the EA concludes that the project would not result in any significant unavoidable adverse effects on the natural or physical environment, a FONSI will be prepared. If the EA concludes that the proposed action would result in significant environmental impacts, NEPA requires the preparation of an EIS.

2.2 PURPOSE AND NEED

The purpose and need of the project is to provide an energy-efficient heating and cooling system capable of serving several existing buildings (Buildings 2, 3, 17, and 81), as well as anticipated future buildings on the ALVA campus. Connection of existing buildings to the new heat pump system would allow the VA to maintain existing historic buildings on the campus while increasing energy-efficiency. Construction of the ground source heat pump system would also provide the infrastructure necessary to heat and cool future buildings on the ALVA campus in an energy-efficient manner and allow the VA to satisfy its commitment to sustainable design.

The proposed project would also construct a 95-space parking lot on top of the Building 17 Ground Source Field once installation of the heat pump system is complete. A transportation

study conducted in 2009 indicated that the campus would require an additional 225 parking spaces by 2017 (PBS, 2011). Use of the Building 17 Ground Source Field site for parking would satisfy a portion of the campus's future parking needs and provide greater vehicular access to Buildings 2, 3, 17, 81, and the future Building 201. Construction of the parking lot using pervious asphalt would also provide additional stormwater management and reduce water quality impacts from surface runoff.

3.0 ALTERNATIVES

3.1 ALTERNATIVE 1 – NO ACTION ALTERNATIVE

Consideration of an alternative which involves taking no action is required under NEPA; the effects of all other alternatives are compared to this No Action Alternative. Under the No Action Alternative, no geothermal wells would be installed, and no ground-source heat pump system would be available to provide heating and cooling to buildings on the ALVA campus. Heating and cooling operations would continue to be conducted using conventional Heating, Ventilating, and Air Conditioning (HVAC) technologies, which would not be as energy-efficient or environmentally sustainable as a ground-source heat pump system.

3.2 ALTERNATIVE 2 – GROUND SOURCE HEAT PUMP SYSTEM (PREFERRED ALTERNATIVE)

The VA has identified Alternative 2 – Ground Source Heat Pump System as the Preferred Alternative for meeting the goals of increasing energy efficiency for existing buildings and providing a sustainable heating and cooling method for planned future buildings. The Preferred Alternative would consist of the installation of heat pump systems at two locations on the ALVA campus, including construction of associated well fields and all system components. The project would also include the construction of a parking lot with 95 parking stalls on the site of the Building 17 Ground Source Field, as well as restoration of the ground surface at the North Ground Source Field for continued use as overflow parking. Specific components of the proposal are discussed below.

3.2.1 Subsurface Heat Pump Components

The Preferred Alternative would entail the construction of a ground-based heat system for the heating and cooling of buildings on the ALVA site. The North Ground Source Field, located in an existing overflow parking area northwest of the main hospital building would serve the future remodel of the existing primary hospital (Building 81) and a future ambulatory hospital facility (Building 201). The Building 17 Ground Source Field, located at the site of a recently demolished building on the west side of Musser Avenue, would serve the adjacent Building 17, as well as Buildings 2 and 3 on the east side of Musser Avenue. The locations of the ground source fields and associated buildings, as well as their positions relative to American Lake, are shown on Figure 2.

Ground source based heat systems provide heating and cooling by pumping a thermally conductive brine, composed of a mixture of propylene glycol and water, between a heat source, where heat is absorbed, and a heat sink, where the heat is released. In winter, the system would

transfer heat from the ground, which remains warmer than surface air, to the interior of a building. In summer, the function can be reversed, transferring heat from the building to the ground, which remains cooler than surface air. While the ground is gradually heated over the summer, it cools again in winter, and ground temperatures remain relatively constant compared to air temperatures.

The proposed ground source based heat systems at the ALVA site would entail installation of approximately 456 heat exchangers in wells drilled at two locations on the ALVA campus. 300 wells would be drilled at the North Ground Source Field site, and 156 wells would be drilled at the Building 17 Ground Source Field site. Installation of the heat exchangers would require clearing of the sites and excavation to a depth of approximately 4-5 feet. Clearing and excavation at the North Ground Source Field would disturb the existing gravel parking area, as well as remove a small area of grass growing between parking lanes. Several trees and a fenced tennis court are also located at the north end of the ground source field, and construction of the system would require removal of approximately 5 mature fir trees and the partial demolition of the tennis court and fence. Construction of the Building 17 Ground Source Field would disturb the existing grass lawn area and require demolition of existing sidewalks and two concrete canopy pads. Total area of surface disturbance at the north site would be approximately 110,000 square feet; disturbance at the south site would be approximately 44,000 square feet.

Each ground source well would consist of a 5.25-inch diameter vertical bore hole approximately 225 feet deep, within which would be placed a U-shaped loop of 1-inch diameter high-density polyethylene (HDPE) pipe, as illustrated in Figure 3. A propylene glycol solution would be pumped through the pipes to allow for heat exchange. The empty space in each well would be filled with a high-conductivity grout to aid in heat transfer between the ground and the brine in the pipes, and the top of each well would be capped with a bentonite plug.

Wells would be clustered in "pods" of approximately a dozen wells each; each pod would be linked to a valve manifold in an underground vault by a pair of 2-inch diameter HDPE pipes, one for outflow of brine, one for return. These connector pipes would be covered with bedding material, as well as 4-5 feet of fill material. The North Ground Source Field would require the construction of two vaults, one with 12 valve trees, and a second with 13 valve trees. The Building 17 Ground Source Field would require a single manifold vault.

3.3.2 Source Field Resurfacing

Final surface treatment for the North Ground Source Field would consist of gravel, similar to existing conditions, and the area would continue to be used for overflow parking. The Building 17 Ground Source Field site would be converted to a 40,000-square foot parking lot, designed to contain 95 parking stalls. The new parking lot would use a system of pervious asphalt underlain by a choker course of open-graded, crushed rock for stormwater collection and treatment. Porous asphalt consists of standard hot-mix asphalt with a reduced percentage of sand and fines to create stable, interconnected air pockets that allow water to drain through the asphalt. Water flowing through the asphalt enters the lower layer of crushed stone aggregate, which structurally supports the asphalt above while providing water storage. A layer of geo-textile material would be placed beneath the aggregate to prevent the migration of fines into the subgrade while allowing water to pass through.

Several funnel drains, each consisting of a narrow trench under the choker course, would cut through the native topsoil and fill material to allow water to infiltrate into the clean sand and gravel soils beneath. The pervious asphalt surface would require regular cleaning by vacuum to dispose of pollutants filtered from stormwater by the asphalt.

3.3 ALTERNATIVES CONSIDERED BUT ELIMINATED AFTER INITIAL REVIEW

In-Lake Geothermal Heat Pump System

Due to the proximity of the ALVA campus to American Lake, an initially considered alternative was the construction of a geothermal heat pump system using the lake as a heat source/heat sink. Under this alternative, a series of geothermal wells would be installed in the lakebed just offshore from the ALVA campus. Brine pipes laid on the lake bottom would connect the wells to on-shore pumps and heat exchange equipment.

While initial review indicated that this option was feasible from a technical standpoint, the VA decided not to proceed with this option due to the fact that their current land use agreement with the Department of Defense (DOD) for the ALVA campus does not specifically allow construction in the lake. Regulatory coordination with other federal agencies and negotiation with DOD to allow this use could potentially delay construction of the system, and this option was removed from further consideration.

4.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

In the following sections, the project alternatives are evaluated for the potential to significantly impact the physical, cultural, biological, and human environment. While impacts can be either beneficial or harmful, NEPA is primarily concerned with adverse effects. This EA analyzes the potential for adverse environmental impacts with respect to the following topics: geology and soils, water resources, vegetation, wildlife and habitat, cultural resources, hazardous materials, transportation and parking, noise, and cumulative impacts. Due to the nature of the proposed project and the extremely low probability of adverse impacts, the following environmental topics are not analyzed in this EA: land use, aesthetics, and socioeconomic/environmental justice.

4.1 GEOLOGY AND SOILS

Geology and soils refer to the potential for loss of soil or changes in geologic conditions due to project activities, such as excavation, soil erosion, soil compaction, grading, cutting, or filling.

4.1.1 Affected Environment

Topography of the ALVA site is relatively flat with elevations generally between 248 and 258 feet above sea level. Each of the source field sites is likewise relatively level, with approximately 2 feet of relief. (PBS, 2011)

The geology of the ALVA site and the immediate vicinity is dominated by glacial deposits, similar to many areas within Puget Sound. The soils and geologic features of the site originated with the retreat of the Vashon Stade of the Fraser Glaciation, approximately 13,500 years ago. Recessional washing by glacial meltwater resulted in deposits of cobbly sand and gravel with very low silt and clay content. The American Lake region is within one of these broad outwash

plains, which was later vegetated with conifer forests. Topsoil conditions developed from a mixture of weathering of the outwash deposits and accumulated organic debris. (PBS, 2011)

Subsurface conditions at the source field locations were established by a geotechnical study conducted at the ALVA site in 2009 (Shannon & Wilson, 2009). Field explorations included three test pits at the location of the North Source Field and four test pits at the location of the Building 17 Ground Source Field.

North Source Field

Soil sampling at the location of the North Source Field revealed sod and topsoil less than one foot thick over variable-depth fill material down to a maximum of about 2.6 feet deep. Weathered and unweathered recessional outwash material lies under the fill material, consisting of gravelly, fine sandy silt mixed with organic material at shallow depths, transitioning to sandy gravel and slightly silty sandy gravel at greater depths. Though dense at lower depths, the outwash soils at this location consist primarily of clean gravels with very little silt, which may collapse when excavated.

Building 17 Ground Source Field

Soil sampling at the location of the Building 17 Ground Source Field revealed sod and topsoil less than one foot thick over a shallow layer of fill material. Weathered and unweathered recessional outwash materials lie under the fill, starting at approximately 1.6 feet. Outwash materials consist of gravelly, fine sandy silt mixed with organic material at shallow depths, transitioning to sandy gravel and slightly silty sandy gravel at greater depths. Though dense at lower depths, the outwash soils at this location consist primarily of clean gravels with very little silt, which may collapse when excavated.

4.1.2 Environmental Impacts and Mitigation Measures

Preferred Alternative

The Preferred Alternative would require extensive excavation and exposure of soils over an area of approximately 154,000 square feet (3.5 acres) to accommodate installation of the geo-well fields. Exposed soils at the construction sites would have increased vulnerability to water and wind erosion. Due to the relatively flat topography of the site, no landslide risks are anticipated, and erosion potential is generally limited by the shallow grades present in the project area. However, stormwater runoff from areas disturbed by construction has the potential to carry sediment into the local drainage system or into American Lake.

Mitigation measures incorporated into the Preferred Alternative include the use of a Temporary Erosion and Sedimentation Control (TESC) Plan and a Stormwater Pollution Prevention Plan (SWPPP), which implement Best Management Practices (BMP) to prevent erosion and control transport of sediment outside the limits of the construction area. These BMP's consist of the following:

- Installation of silt fences and hay bales to capture silt-laden runoff;
- Covering and stabilization of soil stockpiles using plastic covering, mulching, and temporary hydroseed application;

- Application of temporary erosion control seed mix to disturbed areas that have reached final grade or that will remain unworked for more than 30 days; and
- Application of mulch to disturbed areas to protect hydroseed applications and prevent seed and sediment loss due to runoff.
- Installation of catch basin sediment protection to prevent sediment-laden runoff from entering existing drainage conveyance system.

With mitigation measures incorporated, the Preferred Alternative is not anticipated to result in any significant unavoidable adverse impacts to geology or soils.

No Action Alternative

Under the No Action Alternative, no geo-well field construction or associated soil disturbance would occur. As a result, the No Action Alternative would have no impacts to geology or soils.

4.2 WATER RESOURCES

4.2.1 Affected Environment

Water resources include a variety of topics, such as surface waters, floodplain areas, groundwater, wetlands, and water quality. Additionally, projects undertaken by federal agencies must comply with state Coastal Zone Management programs to the greatest extent practical.

Surface Waters

American Lake, which borders the eastern side of the ALVA campus, is the only surface water feature in the vicinity of the project area; no other lakes or streams occur on the campus. American Lake is approximately 825 feet southeast of the North Ground Source Field site and approximately 460 feet east of the Building 17 Ground Source Field site. American Lake is located within the Chambers Creek-Clover Creek Drainage Basin. Hydrologic inputs come from Murray Creek, across the lake from the ALVA campus, as well as from surface runoff and direct precipitation. (PBS, 2011) However, the primary hydrologic source for American Lake is groundwater flow, and the lake drains an area of approximately 25.4 square miles. (Pierce County, 2001)

Floodplains

According to FEMA Flood Insurance Rate Maps for the area, most of the ALVA campus is designated as Flood Zone C, which is an area of minimal flood hazard. American Lake's 100-year floodplain consists of a narrow strip of land along the lakeshore extending approximately 50-100 feet inland. The portions of the campus affected by the proposed project do not lie within the 100-year floodplain, as illustrated on Figure 4.

Wetlands

The National Wetlands Inventory has documented three wetlands within 0.5 mile of the project area (PBS, 2011), but none are located within the proposed limits of disturbance, as illustrated on Figure 5. Field reconnaissance on May 18, 2011 confirmed that no wetlands are present in the project area.

Water Quality

The Department of Ecology currently includes American Lake on the Washington State Section 303(d) list of impaired waterbodies due to excess total phosphorus, polychlorinated biphenyls, dieldrin, and 2,3,7,8-Tetrachlorodibenzo-p-Dioxin.. Excess phosphorus has triggered toxic blooms of blue-green algae that have resulted in animal poisonings and public health advisories. (Department of Ecology, 2008) High phosphorus levels in the lake are likely caused by upland gardening and lawn care practices that use fertilizers. Water quality in American Lake is also degraded from residential stormwater runoff containing sediment, heavy metals, petroleum products, and herbicides/pesticides. Residences surrounding American Lake in the Tillicum area currently use on-site septic systems, and water quality may be impacted by substandard or failing septic systems on these properties.

Groundwater

Soil borings conducted on the ALVA campus indicate that the local water table is located approximately 15-18 feet below the surface, though this is subject to seasonal fluctuation. American Lake receives recharge from surrounding groundwater, and the direction of groundwater flow is toward the lake. (PBS, 2011) The ALVA campus is located within mapped recharge zone for the Clover/Chambers Creek Aquifer. (Pierce County, 2003) Recharge zones are areas where surface water infiltrates and replenishes the local groundwater supply. Recharge zones are typically characterized by relatively permeable soils, which create a high potential for groundwater contamination.

Wellhead protection zones are areas surrounding a groundwater well for a public water system. Wellhead protection zones are divided into sub-zones based on the time necessary for a contaminant entering the aquifer to reach the wellhead, typically 6 months, 1 year, 5 years, and 10 years. The Washington State Department of Health has established several wellhead protection areas in Pierce County, including most of American Lake and large portions of JBLM. The outer boundary of a 10-year wellhead protection area lies to the southwest of ALVA campus, but neither of the proposed construction sites is located within a defined wellhead protection zone. (Department of Health, 2011)

Groundwater also serves as the primary source of drinking water for many residents of western Pierce County. The Lakewood Water District, which serves the nearby city of Lakewood and serves as a wholesale water purveyor to the Town of Steilacoom (Lakewood Water District 2009), and the City of DuPont both draw their water supply from underground aquifers. (City of DuPont, 2011)

Coastal Zone Management Consistency

The Coastal Zone Management Act (CZMA) requires all federal activities to be consistent with approved state coastal zone management programs to maximum degree possible. Pierce County is one of fifteen coastal counties included in the Washington State Coastal Zone Management Program and subject to the CZMA. However, the CZMA specifically excludes lands that are owned, leased, or held in trust by the federal government from regulation, and Washington's state program specifically excludes Fort Lewis, which includes the ALVA campus. In addition, all proposed construction work would occur outside the 200-foot shoreline management area associated with American Lake.

4.2.2 Environmental Impacts and Mitigation Measures

Preferred Alternative

Surface Waters
The Preferred Alternative would not directly impact any surface waters. As described under Section 4.1.2, soil erosion BMP's will be implemented to prevent sediment-laden runoff from entering the existing stormwater system, which discharges to American Lake. Following installation of the geo-wells, the North Ground Source Field site will be restored to a gravel surface treatment, similar to current conditions. The Building 17 Ground Source Field site will be covered with pervious pavement, which will allow for infiltration of stormwater and will not substantially increase the amount of surface runoff entering the drainage system; runoff from interior sidewalks will drain into the parking lot. The pervious paving system will also provide all necessary treatment for stormwater infiltrating through, requiring only regular cleaning by vacuum.

As a result of the Preferred Alternative, no additional stormwater flows or pollutant loads are anticipated to enter any surface waters.

Floodplains
The Preferred Alternative would involve no construction within designated floodplains, and no impacts to frequently flooded areas would occur.

Wetlands
No wetlands are located within the project area, and the Preferred Alternative would not result in disturbance, fill, or discharge to any wetlands outside the project area. Therefore, the Preferred Alternative is anticipated to result in no adverse impact to wetlands.

Water Quality
The Preferred Alternative would not directly impact any surface waters. However, construction would require the disturbance of approximately 154,000 square feet of surface area, which has the potential to result in erosion and sediment transport into the drainage system, which discharges to American Lake. Increased sedimentation or pollutant load could further degrade the water quality in American Lake.

As described in Geology & Soils, mitigation measures incorporated into the Preferred Alternative would include implementation of a TESC Plan and SWPPP to limit erosion and transport of sediment from disturbed areas, including implementation of BMP's such a mulching and hydroseeding to stabilize disturbed soils, as well as covering and hydroseeding of any soil stockpiles used for fill.

Construction of the Building 17 Ground Source Field parking lot would result in a marginal net increase in impervious surface due to the use of pervious pavement and infiltration trenches. The Building 17 Ground Source Field site is currently occupied by a mixture of lawn area, concrete sidewalks, and an abandoned concrete tennis court. These surfaces would be removed and replaced with pervious paving, allowing stormwater runoff from the Building 17 Ground Source Field to be treated by drainage through the pervious asphalt to infiltrate on-site; only non-pervious surfaces, such as new perimeter sidewalks, would contribute to increased stormwater drainage flows from the site. With mitigation measures incorporated, the Preferred Alternative is not anticipated to result in any significant unavoidable adverse impacts to water quality.

Groundwater

The heat exchange system that would be installed under the Preferred Alternative would circulate a brine through a series of underground pipes to facilitate heat transfer. The geothermal wells would be drilled to a depth of approximately 225 feet, well below the level of the local water table. As such, if any of the circulation pipes were to develop leaks, brine from the system could potentially enter the water table and make its way into the local aquifer.

The proposed system uses a thermally conductive brine composed of a propylene glycol/water solution. Propylene glycol is used commercially for a variety of applications, including coolants, aircraft deicing fluids, solvents, cosmetics, food additives, and pharmaceuticals. It is recognized as safe by the U.S. Food and Drug Administration, and it is often used in antifreeze solutions as a less toxic alternative to ethylene glycol. Propylene glycol can cause gastrointestinal discomfort and nausea if the pure product is ingested in quantities larger than several mouthfuls, but it is not acutely toxic to humans. The compound may cause irritation if introduced to the eyes or lungs, and inhalation of propylene glycol fumes should be avoided. While propylene glycol is readily soluble in water, it biodegrades quickly via both aerobic and anaerobic processes and is non-toxic to aquatic life except in very high concentrations. (Dow Chemical, 2006) Were brine leakage to occur, any propylene glycol that entered the water table would be extremely diluted, and the health risks would be relatively minor.

Brine piping within the geothermal wells would be surrounded by a high-conductivity grout to facilitate heat transfer. This grout would also act to protect the brine pipes and impede transfer of brine to the surrounding groundwater in the event of a leak. The greatest potential for leakage would occur where brine piping was outside the wells. Pipes connecting wells would be installed parallel to the ground surface, approximately 4-5 feet below grade. While these pipes would be more susceptible to damage than in-well pipes, they would be located above the level of ground water, and any leaked brine would have to penetrate over 10 feet of soil before entering the water table.

Because the brine system is a closed-loop, any leaks in the system can be detected by monitoring the usage of make-up water. Make-up water refers to water drawn from the potable water system to mix with the propylene glycol and create the thermal conduction brine. Make-up water is used to initially pressurize the system, but no further inputs are necessary for daily operations. Excessive use of make-up water during system operation would indicate the presence of a leak. A water meter will be installed to monitor the usage of make-up water, and an alarm will alert maintenance staff if a leak is detected. Maintenance staff will then isolate the leak and shut down that portion of the system. Based on the design of the brine system, including the leak detection systems, as well as the low toxicity of the brine solution, no significant unavoidable adverse impacts to groundwater are anticipated to occur.

Coastal Zone Management Consistency

As described in Section 4.2.1, the Coastal Zone Management Act excludes federally-owned, leased, or trust lands from regulation under the Act (16 U.S.C § 1453), and Washington's state program exempts military installations, such as Fort Lewis (Department of Ecology, 2001). As such, the Preferred Alternative would have no impacts on consistency with the Coastal Zone Management Act. All construction activities would occur outside the 200-foot shoreline management area established around American Lake, and the proposed project would not result in any modifications or disturbance of the shoreline area.

No Action Alternative

Under the No Action Alternative, no geo-well field construction would occur, and there would be no adverse impacts on water resources.

4.3 VEGETATION

The purpose of the Endangered Species Act (ESA) is to protect and recover imperiled species and the ecosystems upon which they depend. The ESA prohibits projects that impact species of plants that are in danger of extinction or that endanger the designated critical habitat of these species.

4.3.1 Affected Environment

The project area was historically prairie habitat and mixed Douglas Fir/Oregon White Oak habitat that was modified with development of the site with the Veterans Administration Hospital in 1923. There is no undisturbed native vegetation in the project area footprint. Vegetation in the project area is limited and includes a mowed lawn strip 10 feet wide in the North Ground Source Field, and mowed lawn with a mixed Douglas fir (Pseudotsuga menziesii) and a single Oregon White Oak (Quercus garryana). Oregon White Oak stands are considered a priority habitat by WDFW because of their importance to several wildlife species, including the western gray squirrel. Surrounding vegetation north of the North Ground Source Field includes a Washington State Department of Fish and Wildlife documented oak stand, and mowed lawn. Vegetation to the south of the North Ground Source Field includes a gravel road with a stand of mature fir trees beyond the road. Vegetation to the east includes a paved parking lot, and vegetation to the west includes a gravel road with a stand of fir trees and a grassy unmowed field.

The Building 17 Ground Source Field is located at the site of a recently demolished building on the west side of Musser Avenue, and vegetation includes nine ornamental hawthorn trees, one ornamental holly shrub and mowed lawn. Surrounding the Building 17 Ground Source Field to the north and south are stands of mature fir trees and mowed lawn. The area to the west of the Building 17 Ground Source Field is unvegetated with buildings, and Musser Avenue lies to the east.

According to the Washington State Department of Natural Resources, Natural Heritage Information System website, updated November 5, 2010, no rare plants or high quality ecosystems are located in the specific township, range and section of the project area (Section 17, Township 19 North, Range 2 East, W.M.).

4.3.2 Environmental Impacts and Mitigation Measures

Preferred Alternative

The Preferred Alternative will remove five mature fir trees with mowed lawn understory in the north source field, 7 ornamental hawthorn trees, mowed lawn and one ornamental holly shrub in the Building 17 Ground Source Field. The single oak tree within the North Ground Source Field will be retained and drilling will not occur under the drip line of the tree branches. The mowed lawn areas will be converted to pervious surface gravel or asphalt. No areas of previously undisturbed native vegetation will be disturbed, and no listed plant species will be impacted.

Mitigation measures incorporated into the Preferred Alternative include the use of a Temporary Erosion and Sedimentation Control (TESC) Plan and a Stormwater Pollution Prevention Plan (SWPPP), which implement Best Management Practices (BMP) to prevent (a) removal of vegetation outside the clearing limits, (b) control erosion and transport of sediment outside the limits of the construction area that could impact surrounding vegetation. These BMP's consist of the following:

- Installation of silt fences to define the clearing limits of the project.
- Covering and stabilization of soil stockpiles using plastic covering, mulching, and temporary hydroseed application;
- Application of temporary erosion control seed mix to disturbed areas that have reached final grade or that will remain unworked for more than 30 days; and
- Application of mulch to disturbed areas to protect hydroseed applications and prevent seed and sediment loss due to runoff.
- Installation of catch basin sediment protection to prevent sediment-laden runoff from entering existing drainage conveyance system.

With mitigation measures incorporated, the Preferred Alternative is not anticipated to result in any significant unavoidable adverse impacts to vegetation.

No Action Alternative

Under the No Action Alternative, no vegetation would be impacted and there would be no adverse impact on vegetation.

4.4 WILDLIFE AND HABITAT

The Endangered Species Act prohibits projects that impact species of fish or wildlife that are in danger of extinction, or that endanger the designated critical habitat of these species. The Migratory Bird Treaty Act makes it illegal to "take" migratory birds or their eggs, feathers or nests. The Bald Eagle Protection Act of 1940 prohibits the taking, possession, or commerce of both bald and golden eagles. Bald eagles were delisted under the Endangered Species Act in 2007 but are still protected under the federal Bald Eagle Protection Act, the Migratory Bird Treaty Act, and the Washington State Bald Eagle Protection Act (RCW 77.12.655). The state of Washington Department of Fish and Wildlife (WDFW) identifies Priority Habitats and Species that warrant additional protection or special management.

4.4.1 Affected Environment

The project area currently contains gravel parking, paved areas and limited wildlife habitat in the form of ornamental trees, mowed lawn and Douglas fir trees. Undisturbed habitat does not exist on the project site. American Lake is located approximately 460 feet southeast of the Building 17 Ground Source Field and 825 feet from the North Ground Source Field. Protected species that have potential to be located in the immediate vicinity of the project location and could possibly be affected by direct or indirect impacts associated with the project are listed in Table 1.

Table 1. Protected Wildlife Species Potentially Located in the Vicinity of the Project Area

Common Name	Scientific Name	Federal Status	State Status	Detected at ALVA Campus
Western Toad	Anaxyrus boreas	Species of Concern	Candidate	No
Western Gray Squirrel	Sciurus griseus	Species of Concern	Threatened	Historically
Mazama pocket gopher	Thomomys mazama ssp. glacialis and tacomensis	Candidate	Threatened	No
Long-eared myotis	Myotis evotis	Species of Concern	None	No
Long-legged myotis	Myotis volans	Species of Concern	None	No
Townsend's western big-eared bat	Corynorhinus townsendii townsendii	Species of Concern	Candidate	No
Bald Eagle	Haliaeetus leucocephalus	Species of Concern	Sensitive	Yes, but not in regulated distance

The WDFW Priority Habitat and Species (PHS) map dated July 2009 documents the presence of bald eagles nest, a great blue heron rookery, past western gray squirrel presence in the vicinity of the site and large waterfowl concentrations in American Lake. This is consistent with current habitat and species data as shown by the WDFW PHS online mapping tool. (WDFW, 2011)

There are four bald eagle nests along the shores of American Lake within a ½-mile of the project area. Three nests are located northeast of the project area in the forested area at Picnic Point. One nest is located south along the lake. None of these nests are within 2,000 feet of the project area. A Washington State designated eagle management zone extends 800 feet from nest trees and 250 feet inland from the shoreline of American Lake. The project area is not within the eagle management zone.

A great blue heron rookery is located approximately 1,300 feet south of the project area near the wetland in Marsh Park. Great blue herons are a Washington State Monitored species and have no federal status. Over 75 nests were documented in 2000 (WDFW, 2009). There have been reports of a decrease in the number of heron nest at the rookery. If active heron nests are present at the time of construction, Washington State typically restricts logging or heavy construction within 3,280 feet of the nest from February 15 to July 31. This would include the entire project area.

The western gray squirrel is generally associated with the oak and conifer woodlands. A western gray squirrel was sighted in 1978 at the base of a large fir tree near the golf course on the north side of Veteran's Drive near the project area. In 1986, eastern gray squirrels, a Western Washington non-native species, were occupying the site, indicating that western gray squirrels

would not use the area. However, WDFW felt that there might still be potential for western gray squirrels to reclaim this area.

Other sensitive bird species that have a state documented presence near the site include large waterfowl concentrations in American Lake.

In addition, the local region is considered important as a corridor for marbled murrelets between coastal feeding grounds and nesting grounds in the Cascades. It is also considered important for spotted owls as a location between Olympic Peninsula and western Cascade populations. However, no spotted owls or marbled murrelets have been seen near the Veterans Administration Campus for many years, and it is highly unlikely that either spotted owls or murrelets would utilize the campus. The same is true of northern goshawks, which occupy similar habitats to the spotted owl.

No federally listed fish species are present in American Lake or in the upper reaches of Sequalitchew Creek which drains out of the lake. Species that are documented in American Lake include rainbow trout (Oncorhynchus mykiss), kokanee salmon (Oncorhynchus nerka), cutthroat trout (Oncorhynchus clarki), largemouth bass (Micropterus salmoides), yellow perch (Perca flavescens), rock bass (Ambloplites rupestris), brown bullhead (Ameiurus nebulosus), and black crappie (Pomoxis nigromaculatus). Rainbow trout, Kokanee salmon, and resident cutthroat trout are all Washington State Priority Species.

ALVA campus is within the Pacific flyway for migratory birds. Migratory birds may pass through the campus while traveling between breeding areas to the north and wintering areas to the south or they may winter or breed at the ALVA.

4.4.2 Environmental Impacts and Mitigation Measures

Preferred Alternative

The Preferred Alternative is not expected to have an impact on any federally listed threatened or endangered species. The majority of the project area is currently parking lot, roads, buildings and lawns, with no undisturbed native vegetation and a relatively high level of human activity. Wildlife species that currently utilize the site are likely urban-adapted species that are tolerant of human activity. The noise associated with construction could cause temporary disruption to wildlife in the vicinity, which are likely to simply avoid the area during construction.

Removal of mature trees could impact species that use these trees for roosting, nesting, feeding, or cover. WDFW has determined that western gray squirrels are not currently in the project area. Eagles may use some of the larger trees for perch or roost trees. Migratory birds are likely to nest or roost in the trees. To minimize impacts to migratory birds, trees to be removed will be cut down outside of the active nesting season. Currently, eagle nests are not located in the project area and construction will not occur within 250 feet of the shoreline of the lake where eagles may forage. The heron rookery should be inspected for active nesting prior to construction. If great blue herons are nesting at the rookery, WDFW should be contacted regarding specific measures the project could take to minimize disruption.

Fish species in American Lake should not be impacted by the project since best management practices will be employed to prevent runoff from exposed soils reaching the lake through the storm system or direct runoff. Following construction, most runoff from the project area will be infiltrated through pervious asphalt or returned to existing conditions as a gravel parking area,

reducing the potential for turbid or contaminated water reaching the lake through the storm system.

Once the well fields are constructed, impacts to wildlife should be very similar to current conditions.

No Action Alternative

Under the No Action Alternative, no wildlife or critical wildlife habitat would be impacted.

4.5 CULTURAL RESOURCES

4.5.1 Affected Environment

Prehistoric

Human occupation of the Puget Sound region may date as far back as 14,000 years, and the vicinity of American Lake was once home to a variety of native tribes, including the Nisqually, Puyallup, Squaxin, and Steilacoom. The nearby prairies served as important food sources for the numerous native villages. Archaeological studies have been conducted on or near the ALVA site, the most recent of which (2009) covered the entire campus. While several prehistoric sites and isolates were identified northeast of the main hospital campus, no prehistoric evidence was found in the project area. (AMEC, 2009)

Historic

Europeans began settlement of the Puget Sound area in the 1830s when the British Hudson Bay Company established a trading outpost at the mouth of the Nisqually River. Euro-American settlers began moving into the area, and the United States military established a series of forts, the nearest of which was Fort Steilacoom, built in the 1850s. By the end of the 19th Century, most of the native tribes had lost their original territory in the area, and American Lake was a summer recreation destination for wealthy city residents. Pierce County granted the rights to the Fort Lewis reservation, including the ALVA site, to the U.S. military in 1917. (AMEC 2009)

Construction on the ALVA campus began in 1923, and by February 1924, the site consisted of 19 buildings. A major expansion occurred from 1927-1939, and a second building campaign was launched in the 1940s. The current primary hospital facility, Building 81, was built as part of this effort, and construction was completed in 1947. Few expansions were made to the campus for several decades until the construction of the canteen in 1980 and the addition of a receiving wing to the north side of Building 81 in the 1990's.

In 2008, a 115-acre portion of the ALVA campus was listed on the National Register of Historic Places (NRHP) as a historic district. The Preservation Plan for the campus, prepared in 2010, contains an inventory of significant site features that contribute to the character and integrity of the historic district, including both structures and landscapes. The Preservation plan establishes vegetation management zones throughout the campus to preserve native forest canopy, historic ornamental plantings, and shoreline vegetation, all of which contribute to the character of the district. The proposed site of the Building 17 Ground Source Field lies within the historic district, adjacent to Building 17, which is listed in the Preservation Plan building inventory as one of the original structures built when the hospital campus was established in 1923. The lawn area where the wells would be installed, however, has been modified over the years and is neither within a vegetation management zone, nor listed as a contributing feature of the district.

(Artifacts, 2010) The North Ground Source Field site lies outside the historic district. The proposed source field sites and the boundary of the NRHP district are shown on Figure 6.

4.5.2 Environmental Impacts and Mitigation Measures

Preferred Alternative

Construction activities associated with the Preferred Alternative would occur entirely within areas classified as having minimal archaeological resource concerns, so the potential for impacts to archaeological resources is low. However, as a precautionary measure and mitigation for any inadvertent discovery, it is recommended that the construction contractor prepare an inadvertent discovery plan and that an archaeologist be present during excavation of the well fields to monitor construction activities.

Construction activities associated with the Preferred Alternative would occur partially within a historic district listed on the NRHP, but no new buildings would be constructed that would alter the historic character of the area, and no existing historic buildings would be altered or demolished. The Building 17 Ground Source Field would convert a currently vacant lawn area adjacent to Building 17 into a parking lot, which would not result in significant degradation to the character of the historic district. Construction of the North Ground Source Field would require demolition of an existing tennis court that has been classified as historic, though it is in poor condition and is not currently used for recreation. AHBL visited the site in May, 2011 and observed safety warning signs to keep out of the tennis court posted by the Seattle District of the U.S. Army Corps of Engineers. The tennis court is also located outside the historic district and was identified in the 2009 cultural resources study as having minimal historic significance (AMEC, 2009).

No Action Alternative

Under the No Action Alternative, no geo-well installation would occur on the ALVA campus, and no impacts to cultural resources would occur.

4.6 HAZARDOUS MATERIALS

4.6.1 Affected Environment

PBS Engineering performed a Phase I Environmental Site Assessment and a Hazardous Materials Survey on the ALVA campus in late 2010 and identified the locations of several underground storage tanks (UST) on the site, including decommissioned, operational, and closed in-place tanks. The site assessment identified two 30,000-gallon underground heating oil tanks on the east side of Building 21, which is across the street from the Building 17 Ground Source Field site. The site assessment also identified an underground 5,000-gallon heating oil tank at the fenced electrical substation southwest of the North Ground Source Field site. This tanks powers backup generators that serve as an emergency power supply for the ALVA campus in the event of a power failure. (PBS, 2011) None of these tanks are located in areas that would be disturbed by the proposed project.

Building 112, a small shed immediately west of the North Ground Source Field site, was used for pesticide storage in the past but has been vacant since 2003. No chemical mixing was

conducted, and no bulk spillage was recorded. The site assessment prepared by PBS Engineering categorized this structure as a low concern. (PBS, 2011)

4.6.2 Environmental Impacts and Mitigation Measures

Preferred Alternative

The Preferred Alternative would not entail the excavation or removal of any underground storage tanks. In the event that undocumented storage tanks are uncovered during site excavation and well drilling, the project will incorporate appropriate BMPs to ensure that any underground storage tanks, their contents, and accessory connector pipes are removed in a manner that does not cause damage that may result in leakage. If any tanks are removed, surrounding soils and groundwater will be tested for contamination. Contaminated soils will be removed from the site and disposed of at an approved landfill.

The heat pump system design specifies the use a thermally conductive brine composed primarily of propylene glycol, which is known to be mildly toxic to humans. A discussion of the potential impacts associated with brine leakage and necessary mitigation measures is included in Section 4.2.2 – Groundwater.

No Action Alternative

Under the No Action Alternative, no subsurface construction would occur, and no underground storage tanks would be disturbed. None of the tanks identified in the PBS site assessment were determined to be leaking; therefore, leaving these tanks in place under the No Action Alternative is not anticipated to result in any impacts from exposure to hazardous materials.

4.7 TRANSPORTATION AND PARKING

4.7.1 Affected Environment

The only traffic access to or from the ALVA campus is along Veteran's Drive SE, which enters the campus from the northeast via the City of Lakewood. Vehicular access to the various campus buildings is available by several loop roads that return traffic to Veteran's Drive SW. The North Ground Source Field site currently operates as an overflow parking area and is accessible by traveling through the main parking area, which is immediately adjacent to Veteran's Drive SW. While officially designated as overflow parking, the North Ground Source Field site is extensively used during daytime hours by hospital visitors and outpatients.

The Building 17 Ground Source Field site is accessible from Veteran's Drive SW by traveling southeast on Engle Way and turning left onto Musser Avenue. A small parking lot of 3 spaces is located adjacent to Building 17 on the northeast side of the building.

4.7.2 Environmental Impacts and Mitigation Measures

Preferred Alternative

Under the Preferred Alternative, the available parking supply on the ALVA campus would increase by approximately 95 spaces. The North Ground Source Field site would return to its present use and parking capacity, and 95 new spaces would be provided when the Building 17

Ground Source Field is resurfaced as a parking lot.. Adverse effects on parking and vehicle travel routes would be temporary in nature and would occur primarily during construction.

Construction activities at the North Ground Source Field site would preclude its use for parking while well drilling is underway, creating a temporary shortage of parking on the campus. The North Ground Source Field site, which is currently used for overflow parking, and the main parking area, which is adjacent to the southeast side of North Ground Source Field, have a combined parking capacity of approximately 527 spaces (PBS, 2011). Based on relative size, closure of the North Ground Source Field site may result in the temporary loss of up to 250 parking spaces. Construction at the North Ground Source Field would be limited to two drilling rigs at any one time, and drilling would be phased to only require closure of one half of the gravel parking lot at a time, allowing the other half to be used for parking.

Construction at the North Ground Source Field would also temporarily disrupt use of a gravel access road between the parking lot and several storage buildings located to the southwest. Several geothermal wells would be drilled within the current road footprint, and the roadbed would be restored once the wells were in place. In addition, access to the storage building is available via Engle Way and another dirt access road that approaches from the north and lies outside the construction zone.

Additional recommended mitigation measures to reduce temporary impacts to parking capacity include the following:

- Schedule project construction to complete the Building 17 Ground Source Field prior to beginning construction on the North Ground Source Field. The new parking lot on the southern site could then be used to partially offset closure of the north site.
- Designate an alternate traffic route while the gravel access road is closed for well drilling, thus allowing ALVA staff to continue access to campus facilities.

No Action Alternative

Under the No Action Alternative, no disruptions to on-campus traffic patterns or parking capacity would occur.

4.8 NOISE

4.8.1 Affected Environment

The ALVA campus is relatively isolated from surrounding land uses, and no significant sources of ambient noise are located on or near the ALVA campus, making the area relatively quiet. The campus is separated from residential uses on American Lake by forested areas and is surrounded on the north and west by a mix of farm fields, forests, and golf course. Primary noise sources include on-site mechanical equipment (fans, the steam plant, grounds keeping equipment), vehicles, and recreational noise from the lake (motor boats, jet skis, etc.). The nearby McChord Airfield and Fort Lewis training areas are sources of occasional noise. (PBS, 2011)

4.8.2 Environmental Impacts and Mitigation Measures

Preferred Alternative

The Preferred Alternative would result in temporary increases in noise levels for portions of the ALVA campus near demolition and construction zones. Noise levels will vary with location and activity, as well as with distance from the noise source. The primary source of construction noise will be from vehicles, heavy equipment, such as excavators, and drilling rigs used for installation of the geothermal wells. Limited use of demolition equipment, such as jackhammers, will be necessary for removal of the tennis court at the North Ground Source Field site, and the concrete sidewalks and canopy pads at the south field site. Some patients at ALVA suffer from post-traumatic stress disorder (PTSD) and can be adversely affected by sudden loud noises. Installation of the geothermal wells could be accomplished using a variety of drilling techniques, including hydraulic rotary drilling or sonic vibratory drilling. Noise from drilling operations would be relatively steady and low-frequency, with no large variations or spikes in noise production anticipated. Drilling rigs would be powered by diesel engines that would produce noise levels comparable to portable diesel-powered electric generators. (Klingele, pers. comm.) Conventional rotary drilling rigs typically produce steady noise levels that attenuate to approximately 65-75 decibels (dB) at a distance of 200 feet. Sonic vibratory drilling would be slightly louder but would likewise result in a relatively steady noise level. (Snorsky, pers. comm.)

Construction and demolition noise can be reduced through the use of quieter equipment, turning off equipment that is not in use, and installing mufflers on construction machinery. Work hours should also be restricted to minimize adverse impacts on patients, particularly at the Building 17 Ground Source Field site, which is located near several patient-occupied buildings.

As described in Section 4.4, a great blue heron rookery lies within 1,300 feet of the project area, and prolonged construction noise has the potential to disrupt breeding and nesting activities. As recommended in that discussion, WDFW should be contacted prior to construction to identify specific measures to minimize disruption.

No Action Alternative

Under the No Action Alternative, no construction or demolition activities would take place, and no new sources of noise would be introduced. No adverse noise impacts are anticipated under the No Action Alternative.

4.9 UTILITIES

4.9.1 Affected Environment

The ALVA campus receives its utilities from JBLM, including potable water, sanitary sewer, and power. The campus maintains two 5 kilovolt (kV) diesel generators as an emergency backup power supply. These generators are located in an electrical service yard south of the North Ground Source Field. ALVA also maintains its own stormwater collection and drainage system, which directs stormwater flows to American Lake. Currently, stormwater is not treated before discharge. (PBS, 2011)

Underground utility service lines currently cross both proposed ground source field sites. A power line crosses the North Ground Source Field near its north-south midpoint, and the

southwest corner of the field contains underground electric, water, natural gas, and sewer lines. The Building 17 Ground Source Field contains underground electric, sewer, telephone, and steam lines.

4.9.2 Environmental Impacts and Mitigation Measures

Preferred Alternative

While the Preferred Alternative would not add new buildings or population to the campus and would not increase demand for utility services, it would involve excavation of areas where existing utility service lines are buried. While the Preferred Alternative would not require relocation, abandonment, or temporary closure of any active utility lines, excavation in these areas could potentially cause unintentional damage to these utility lines, temporarily disrupting service.

Mitigation incorporated into the Preferred Alternative includes the location and marking of all on-site utilities. All active utilities in the construction areas will be protected during construction activities, and geothermal wells will be located to avoid drilling through existing utility lines. With mitigation incorporated, no significant adverse impacts to utility services are anticipated.

No Action Alternative

Under the No Action Alternative, no construction or demolition activities would take place, and no utility lines would be abandoned or relocated. No adverse impacts to utility service are anticipated under the No Action Alternative.

4.10 CUMULATIVE IMPACTS

Cumulative impacts are defined under federal law as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or Non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." (40 CFR 1508.7) Cumulative impacts are required to be examined during the environmental review process for federal projects.

4.10.1 Affected Environment

Since initial construction in the 1920's, the ALVA campus has undergone widespread changes, including construction of new buildings and renovation or demolition of original buildings. As described in the cultural resources study and the campus preservation plan, the ALVA campus has managed to retain much of its original character through careful design and aesthetic continuity. However, as the existing historic structures continue to age, many have become or will become unsuitable for providing high-quality medical services. Seismic design deficiencies in the current primary hospital facility (Building 81) have prompted plans for the construction of a new primary hospital building at the southwest corner of Veterans Drive and Musser Avenue; this project is currently undergoing environmental review (PBS, 2011). The Building 81 replacement project area overlaps that of the current project. The North Ground Source Field will be converted from a gravel overflow parking lot to an asphalt parking lot with striped stalls,

landscaping, and lighting as part of the Building 81 project, and Building 112 will be demolished.

The ALVA Master Plan also includes plans for several new development projects on the northwest and southwest edges of the campus, including a new building and redesigned parking area adjacent to the North Ground Source Field site proposed under the Preferred Alternative.

Outside the ALVA campus, the JBLM is anticipated to continue the rapid growth that it has experienced over the last decade, due to additional resident military personnel and the return of combat troops from overseas. In response, a number of capital improvement projects are planned to support this growth, including construction of a housing development near the hospital campus. (AECOM, 2010) The JBLM golf course immediately north of the campus is also planning an expansion that would nearly double its size. (PBS, 2011)

4.10.2 Environmental Impacts and Mitigation Measures

Preferred Alternative

The Preferred Alternative would directly support future construction and renovation of buildings on the ALVA campus. As described in the Purpose and Need statement, the installation of a ground-source heat pump system would provide an energy efficient means of providing heating and cooling for new and existing buildings, primarily the future Building 201. While the future Building 201 is not strictly dependent upon the installation of a ground-based heat pump system, this feature is a key component of the building's sustainable design and provides a means for the new hospital facility to fulfill the VA's commitment to energy efficiency and environmental sustainability.

While the Preferred Alternative impacts previously developed and altered land, it does include an expansion to the northwest which will remove five Douglas fir trees, ornamental trees and mowed lawn. There will be an associated decrease in vegetated area with the loss of five trees that are not priority species. Prairie habitat has not been present at the ALVA for many years, and the project does not impact this priority plant community. The project is not expected to contribute to cumulative impacts to federally protected plant or animal species, since none have been documented as being present presence in the project area. Future development both on and adjacent to the campus will continue to reduce open space and potential wildlife habitat. The VA is developing a Campus Master Plan which will guide future development and the long-term management of vegetation on the campus. The Master Plan will allow for needed expansion while still preserving the park-like setting of the campus.

The Preferred Alternative would increase the available parking capacity on the ALVA campus, which will help alleviate pent-up parking demand that has resulted from the gradual expansion of the ALVA campus over time. Construction of the pervious asphalt parking lot on the Building 17 Ground Source Field site would partially mitigate increased demand from past and future development while providing a system that would offset the stormwater treatment needs normally associated with increased parking.

No Action Alternative

Under the No Action Alternative, no geothermal well fields would be installed, and future development at the ALVA campus would have to rely on conventional methods of building heating and cooling, which would not provide the energy efficiency and greenhouse gas (GHG)

reduction benefits associated with a ground-source heat pump system. The No Action Alternative would also not include construction of the Building 17 Ground Source Field parking lot and would therefore not provide any relief from projected future parking shortages.

4.11 POTENTIAL FOR GENERATING SUBSTANTIAL CONTROVERSY

The proposed project is designed to support future development on the ALVA campus, as well as provide energy-efficient heating and cooling to existing buildings. The ALVA campus is relatively isolated from surrounding communities and land uses, to the degrees that on-campus activities have relatively little impact outside the campus. The project would not result in the demolition of any historic structures, nor would it cause surrounding areas to experience marked increases in traffic or noise. There has been no indication that local agencies or citizens groups are opposed to the project, and the project is not anticipated to result in any significant controversy.

5.0 Public Involvement

5.1 INDIVIDUALS CONTACTED

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5.2 DISTRIBUTION LIST

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Pierce County Department of Planning and Land Services
2401 South 35th Street
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Puyallup Tribe of Indians
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Washington State Department of Ecology – SW Regional Office
PO Box 47775
Olympia, WA 98504-7775

Washington State Dept of Natural Resources – South Puget Sound Region
950 Farman Avenue North
Enumclaw, WA 98022-9282

Washington State Department of Fish and Wildlife – Region 6
48 Devonshire Road
Montesano, WA 98563-9618

6.0 Environmental Permits/Modifications Required

- Environmental Protection Agency Construction General Permit Notice of Intent

7.0 Summary of Environmental Impacts and Mitigation

A number of mitigation measures have been recommended to offset potential impacts associated with the proposed project. Table 2 includes a summary of potential impacts and proposed mitigation.

Table 2. Summary of Environmental Impacts and Mitigation Measures for Project Alternatives

	Preferred Alternative	No Action
Geology and Soils		
Impacts:	Increased potential for wind and water erosion from disturbance of approximately 154,000 square feet of soil.	No adverse impacts anticipated.
Mitigation:	Temporary Erosion and Sedimentation Control (TESC) Plan and Stormwater Pollution Prevention Plan (SWPPP) will include best management practices to control erosion, including the following: • Installation of silt fences and hay bales to capture silt-laden runoff; • Covering and stabilization of soil stockpiles using plastic covering, mulching, and temporary hydroseed application; • Application of temporary erosion control seed mix to disturbed areas that have reached final grade or that will remain unworked for more than 30 days; and • Application of mulch to disturbed areas to protect hydroseed applications and prevent seed and sediment loss due to runoff. • Installation of catch basin sediment protection to prevent sediment-laden runoff from entering drainage conveyance systems.	None

	Preferred Alternative	No Action
Water Resources		
Impacts:	Soil disturbance has the potential to increase sediment and pollutant loads in stormwater drainage to American Lake, which may further degrade water quality. Leakage of propylene glycol brine from heat pump system may enter local groundwater table. Local groundwater flows to American Lake, and leakage of propylene glycol may further degrade water quality, though concentrations would likely be too low for impacts to wildlife or human health.	No adverse impacts anticipated.
Mitigation:	Disturbed areas will be subject to TESC and SWPPP protocols, including the following BMPs: • Installation of silt fences and hay bales to capture silt-laden runoff; • Covering and stabilization of soil stockpiles using plastic covering, mulching, and temporary hydroseed application; • Application of temporary erosion control seed mix to disturbed areas that have reached final grade or that will remain unworked for more than 30 days; and • Application of mulch to disturbed areas to protect hydroseed applications and prevent seed and sediment loss due to runoff. Brine line pressure will be monitored, and the system will be shut down in the event of a pressure drop that indicates a possible brine leak.	None
Vegetation		
Impacts:	No impact to listed plant species. 5 mature native fir trees removed. Conversion of mowed lawn to surface gravel or pervious asphalt.	No adverse impacts anticipated.
Mitigation:	None required.	None
Wildlife and Habitat		
Impacts:	Removal of native and ornamental trees Construction noise and disruption	No adverse impacts anticipated.
Mitigation:	Trees will be cut down outside migratory bird nesting season Construction BMPs Consult with WDFW regarding timing restrictions if herons nesting	None

	Preferred Alternative	No Action
Cultural Resources		
Impacts:	Based on a 2009 cultural resource study (AMEC, 2009), the project sites are located in an area of very low concern for archaeological resources, and no historic structures would be demolished or altered. No adverse impacts to cultural resources are anticipated.	No adverse impacts anticipated.
Mitigation:	None required	None
Hazardous Materials		
Impacts:	No underground storage tanks are documented within the construction area. However, construction may disturb previously undocumented underground storage tanks containing petroleum products that may require removal.	No adverse impacts anticipated.
Mitigation:	If any tanks are discovered or removed, soil and groundwater testing will be conducted to identify any contamination. Contaminated soils will be removed and disposed of at an approved landfill.	None
Transportation and Parking		
Impacts:	Temporary reduction in campus parking capacity and disruption of traffic routes.	No adverse impacts anticipated.
Mitigation:	Construction will be phased to complete the Building 17 Ground Source Field and parking lot first in order to offset closure of the north parking lot. Construction of North Ground Source Field will be phased to avoid complete closure of the lot and allow parking to continue in areas not currently under construction.	None
Noise		
Impacts:	Temporary increase in ambient noise levels from construction equipment and demolition activities.	No adverse impacts anticipated.
Mitigation:	Implementation of BMPs for construction noise control, including use of mufflers and limited work hours. See Wildlife and Habitat section for mitigation related to noise impacts on heron rookery.	None

8.0 Conclusions

This Draft EA concludes that, with the incorporation of mitigation measures, the Preferred Alternative would have no significant unavoidable adverse environmental impacts.

9.0 List of Preparers

Theresa Dusek	Natural Resources Ecologist
Kevin Gifford	Project Planner
Lisa Klein	Planning Principal
Gabe Snedeker	Planning Manager

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PERSONAL COMMUNICATIONS

Klingele, Dennis. Principal. Klingele & Associates, Yakima, WA. May 5, 2011 – Telephone conversation regarding toxicity of propylene glycol thermal brine.

Klingele, Dennis. Principal. Klingele & Associates, Yakima, WA. June 7, 2011 – Telephone conversation regarding anticipated noise levels from geothermal well drilling equipment.

Snorsky, Steve. Vice President. Geo Loop Tech, Seattle, WA. June 7, 2011 – Telephone conversation regarding anticipated noise levels from various types of geothermal well drilling rigs.

11.0 List of Acronyms and Abbreviations

ALVA	American Lake Veterans Administration
BMP	Best Management Practices
CZMA	Coastal Zone Management Act
DOD	U.S. Department of Defense
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
GHG	Greenhouse Gas
HDPE	High Density Polyethylene
HVAC	Heating, Ventilating, and Air Conditioning
LEED	Leadership in Energy and Environmental Design
JBLM	Joint Base Lewis McChord
kV	Kilovolt
NRHP	National Register of Historic Place
NEPA	National Environmental Policy Act
SWPPP	Stormwater Pollution Prevention Plan
TESC	Temporary Erosion and Sedimentation Control
UST	Underground Storage Tank
VA	U.S. Department of Veterans Affairs
VAPSHCS	Veterans Administration Puget Sound Health Care System
WDFW	Washington Department of Fish and Wildlife