Draft Environmental Impact Statement

Prepared for

Fort Lawton Army Reserve Center Redevelopment Project

TECHNICAL APPENDICES

Prepared by the City of Seattle

December 14, 2017

Appendix A

Scoping Summary

Seattle
Office of Housing

Environmental Impact Statement –

Summary of the Public Scoping Process

FORT LAWTON ARMY RESERVE CENTER REDEVELOPMENT

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and

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Introduction

The purpose of this document is to summarize the comments received during the State Environmental Policy Act (SEPA) scoping period for the Fort Lawton Army Reserve Center Redevelopment Environmental Impact Statement (EIS) and, as necessary, to update the SEPA EIS scope based on comments received during the scoping period. The SEPA Determination of Significance (DS) and Request for Comments on the Scope of the EIS was published on June 5, 2017. A 21-day comment period was identified in the DS/Request for Comments, as stipulated in WAC 197-11-410.

Project Background

The project is located at the 28-acre former Fort Lawton Army Reserve Center, which is in the Magnolia neighborhood in northwest Seattle. Following the decision to close the base in 2005, the Army named the City of Seattle the Local Redevelopment Authority (LRA), responsible for preparing and implementing a redevelopment plan. The City conducted an extensive public process from 2006 through 2008 that resulted in a detailed plan to create a diverse, mixed-income community with housing for homeless individuals and families and market rate housing, while also preserving existing wildlife habitat and creating a new neighborhood park. The plan was put on hold, when the City was directed to undergo State Environmental Protection Act (SEPA) review, followed by significant changes in market conditions.

The City is now carrying forward its past planning efforts into a vision for Fort Lawton that creates an affordable, livable community for people with low incomes, and takes advantage of the opportunity to increase recreational and open space. Specifically, the City envisions a mix of affordable housing including supportive housing for formerly homeless seniors, as well as affordable rental and ownership housing for low income families and individuals, and a variety of park uses, including preservation of natural areas, development of new park spaces that could support a range of uses including active recreation, and re-use of an existing structure as a park maintenance facility.

Proposed Scope

The DS/Request for Comments *preliminarily* identified the following elements of the environment for analysis in the EIS:

- Geology/Soils
- Air Quality
- Biological Resources
- Environmental Health
- Noise
- Land Use
- Housing/Socioeconomics/Environmental Justice
- Aesthetics/Visual Resources
- Recreation/Open Space
- Historic/Cultural Resources
- Transportation
- Public Services
- Utilities

The DS/Request for Comments *preliminarily* identified four alternatives for analysis in the EIS:

- **Alternative 1 – Mixed Income Affordable Housing and Public Park Uses**
  Development of a mix of affordable housing onsite, including homeless and affordable rental and ownership housing, with a portion of the site likely rezoned to Lowrise residential zoning. Public park uses would also be created, including active park facilities, preserved existing natural areas and conversion of an existing structure to a park maintenance facility;
- **Alternative 2 – Market Rate Housing Onsite; Affordable and Homeless Housing Offsite**
  Development of market rate single family housing under current zoning onsite, and construction of homeless and affordable housing at an off-site location;
- **Alternative 3 – Public Park Onsite; Affordable and Homeless Housing Offsite**
  Development of the entire site as a public park, and construction of homeless and affordable housing at an off-site location; and
- **Alternative 4 – No Action**
  No redevelopment of the site; existing structures onsite would be maintained.

This document contains an overview of the Fort Lawton Army Reserve Center Redevelopment project, a detailed summary of the EIS scoping process, a summary of the comments received during the scoping comment period and any revisions to the EIS scope based on public input received through the scoping process. **Attachment A** provides a table of comments that are representative of common themes and topics. **Attachment B** includes public notice documentation and a complete mailing list. **Attachment C** contains a list of all the commenters on the EIS scope during the scoping period.

EIS Scoping Process

The Seattle Office of Housing is the lead agency and is responsible for performing the duties required by SEPA for the Fort Lawton Army Reserve Center Redevelopment project. The Director of the Seattle Office of Housing is the Responsible Official for SEPA review. Seattle Office of Housing determined that the proposal is reasonably likely to have adverse impacts on the environment. An EIS will be prepared consistent with WAC 197-11-400 through 460 to address probable significant impacts associated with the proposal.

Scoping provides notice to agencies, organizations and the public that a EIS will be prepared for a proposed project. The intent of scoping is to gather public and agency comments on the environmental issues and alternatives to be addressed in the EIS. Based on the comments received during the scoping process, the Seattle Office of Housing will finalize the EIS Scope and direct preparation of the Draft EIS.

On June 5, 2017, the Seattle Office of Housing initiated the EIS scoping process for the Fort Lawton Army Reserve Center Redevelopment project by carrying out the following actions:

- Met with representatives of local community organizations, and individual neighbors that have expressed interest in the project, to give advance notice of the scoping process.
- Issued a SEPA DS/Request for Comments on the Scope of the EIS. The DS/Request for Comments included notification of a public meeting on June 19 to provide the public with an opportunity to become more familiar with the proposal and to comment on the scope of the EIS. It also gave notice of the minimum 21-day scoping period. The DS/Request for Comments is available for review at: http://www.seattle.gov/Documents/Departments/Housing/Footer%20Pages/Fort%20Lawton%20DS_Scoping%20Notice.pdf
- Mailed copies of the DS/Request for Comments to federal, state, regional and local agencies, local organizations;
- Mailed copies of the DS/Request for Comments to approximately 450 households within 300 feet of the site (measured from the boundaries of the property);
- Mailed postcards advertising the June 19 public meeting to a broader group of approximately 5,000 households in the Magnolia neighborhood;
- Published the DS/Request for Comments in the WA Department of Ecology's SEPA Register;
- Published the DS/Request for Comments in the City of Seattle Department of Planning and Development's Land Use Information Bulletin;
- Published the DS/Request for Comments in the *Daily Journal of Commerce*;
- Posted a *Project Sign* at the site;
- Advertised a second public meeting on June 21, following feedback from residents who wanted to attend but had a scheduling conflict with other important community events. Notice was emailed on to all members of the public who had expressed interest in the project.

Attachment B includes documentation of the public notice actions listed above, and includes the DS/Request for Comments mailing list. The EIS Scoping notification actions meet or exceed the applicable noticing requirements.

Public Meetings

The first EIS Public Scoping meeting was held on June 19, 2017, from 6:30 to 8:30 at the Daybreak Star Cultural Center in Discovery Park in Seattle. A total of 232 attendees signed in at the first meeting (the actual number of attendees may have been greater because not everyone may have elected to sign in). The meeting was set up as an open house, with a formal presentation by the Seattle Office of Housing and Seattle Parks and Recreation, and continuous opportunity to provide written or oral comment throughout the meeting. A court reporter was made available to record and eventually transcribe

oral comments. The presentation described past planning efforts, the current vision for Fort Lawton, the range of alternatives and the elements of the environment proposed for study in the EIS, and the project timeline going forward. Partner community organizations also provided information about their mission and housing model, and low-income homeowners joined the meeting to speak about their experiences living in affordable housing. City staff and community partners were available throughout the open house to answer questions about the proposal.

The second meeting was held on June 21, 2017, from 6:30 to 8:30 at the Magnolia Community Center in the Magnolia Neighborhood in Seattle. A total of 129 attendees signed in at the second meeting. The meeting included a similar presentation and open house format, with public comment accepted through written forms.

Following the meetings, presentation and other materials were made available online at http://www.seattle.gov/housing/ft-lawton.

Number and Form of Comments Received

During the EIS scoping period, a total of 715 comments were received from 676 unique commenters (some individuals provided multiple comments). Comments were largely submitted by individuals, with one from a public agency (the King County Wastewater Treatment Division), and a handful from community organizations, including the Discovery Park Community Alliance, Housing Development Consortium, Fort Lawton School Coalition, District Neighborhood Action Council, and the Brightwater School. The following chart shows the breakdown of comments received.

Type	**Total Comments**	Number of unique commenters
Email	583	583
Mail	6	6
Oral	29	21
Hand written	97	66
Total	715	676

In addition to public comments, the Office of Housing received a petition started on change.org requesting the addition of a school alternative. The petition contained 1,001 unique signatures at the time of submission (146 signatories also submitted a public comment).

All the comment letters/emails/forms/transcript are available for review at the Seattle Office of Housing.

Comments on the Range of Alternatives

Many commenters expressed support or opposition to some of the proposed alternatives. The chart below illustrates the number of comments received in support of each proposed alternative.

Support for Outlined Alternatives	**Number of unique commenters**
Alternative 1: Affordable Housing and Park	189
Alternative 2: Market Rate Housing On-Site; Affordable Housing Off-Site	6
Alternative 3: Public Park On-Site; Affordable Housing Off-Site	57
Alternative 4: No Action	14

Requests for New or Revised Alternatives

In addition to comments on the proposed alternatives, a number of commenters made specific requests to consider new or revised alternatives. These comments included the following requests:

- Add a school option
- Include an off leash dog park in the park component
- Increase density of affordable housing
- Give land to United Indians
- Give land to the Duwamish Tribe
- Create new athletic facilities
- Create meeting spaces and vacation rentals
- Remove off-site housing component of alternatives 2 and 3

Requests for Changing Proposal to Include a School

The largest volume of comments on the range of alternative were for inclusion of a school. This would be a significant change to the underlying proposal. The majority of these specifically requested consideration of a high school, with another group simply expressing support for schools generally, and one commenter requesting purchase of part of the property for a private Waldorf school. Another subset expressed support for the combination of a school with affordable housing. The breakdown of these comments was as follows:

Total Comments Supporting a School	293
General Support for Schools	61
Support for Elementary School	2
Support for Middle School	3
Support for Middle/High School	15
Support for High School	193
Support for Private School	1
Support for School and Affordable Housing	18

In addition to official comments received via publicized methods, the Office of Housing received a petition started via change.org that requested that the City partner with Seattle Public Schools to develop a high school and additional park space at Fort Lawton. The petition was signed by 1,001 individuals at the time of submission (of whom 146 also submitted a separate comment). While the petition specifically identified a high school and park uses, some individual commenters expressed support for both a school and affordable housing, or for a middle school instead of a high school.

Petition commenters cited a range of reasons for requesting a school option, including:

- Concern about overcrowding in public schools
- Lack of school choices
- Opposition to homeless and low-income housing
- Interest in the promoting environmental education

Review by Seattle Public Schools

In response to the large volume of comments regarding a school, the Office of Housing reached out to Seattle Public Schools to provide them with an opportunity to assess the site for feasibility. SPS conducted a thorough review that addressed basic feasibility questions, including ability to meet Department of Education requirements for educational conveyances. Ultimately, SPS communicated that it would unfortunately not be able to take meet federal requirements, citing key challenges:

- SPS lacked the immediate resources necessary to qualify for a federal educational conveyance, with the next school levy not scheduled until 2019.

- SPS would be unable to demonstrate immediate need for a school in this area, another requirement for a federal educational conveyance, given other projects already underway aimed at addressing existing demand in this area.

- Re-use of existing buildings was not a viable alternative to building a new school, given the condition of the buildings and need for seismic upgrades.

Concerns Regarding Impacts of the Proposal

In addition to comments on the proposed alternatives, many comments expressed concerns about different impacts from the proposal. Below is a chart that illustrates the number of comments by topic area, followed by a description of major themes.

	Number of comments
Comments on Elements of the Environment	
· Geology/Soils – soils, geology, topography	28
· Biological Resources - plants, animals and wetlands	42
· Air Quality – air and greenhouse gas (GHG) emissions	27
· Noise – noise generation	28
· Environmental Health – hazardous materials and substances	35
· Land Use/Relationship to Plans and Policies – land uses, relationship to City, County, State and other local plans/policies, and key federal plans/policies	33
· Aesthetics/Visual Resources – aesthetic character, views, light and glare, shadows	28
· Housing, Socioeconomics and Environmental Justice - housing types and affordability, demographic conditions, disproportionate impacts on minority and low income populations	65
· Recreation and Open Space - parks and recreation	57
· Historic and Cultural Resources – historic, archaeological and cultural resources	32
· Transportation – motorized and non-motorized	132
· Public Services – police, fire/emergency services, schools	96
· Utilities – water and sewer	30
Comments on Specific Themes	
Access to Grocery and other services	89
Discovery Park	55
Property values	14
Public health/safety (Drugs/alcohol/individuals with criminal backgrounds)	56
Pollution	25
Water quality	21
Great Blue Heron Management Plan	24
Financial Cost	6
Parking	9
More sidewalks	1

Impacts to Discovery Park, Kiwanis Memorial Preserve Park, and Immediate Neighbors
Recreation/Open Space, Biological Resources, Geology/Soils, Air Quality, Noise, Visual Resources/Aesthetics
Many commenters expressed concern about impacts of the proposal on aspects of Discovery Park, including on plants and animals (particularly the great blue heron, and other bird species), air quality, views, and the overall experience of visitors to the park. Many commenters expressed their belief that the property in question is a part of the park, rather than a separate facility. Several of these comments also asserted the applicability of the Discovery Park Master Plan to the property. Some commenters also viewed the proposal for Fort Lawton as part of a larger pattern of negative impacts on the park, whether from the private development of former officers' homes within the park, the West Point wastewater treatment facility, the use of the park by homeless individuals, or the general impacts of a growing population. In addition, some immediate neighbors expressed concern about detrimental impacts in air quality, noise, and views.

Impacts to Existing Public Infrastructure, Services and Facilities
Transportation/Traffic, Schools, Police, Utilities
A large number of comments centered on how the proposal would place a burden on existing public infrastructure, services and facilities, whether to roads/public transportation, schools, police/fire/emergency services, or water/sewer systems. Traffic was the most common concern, followed by impacts on public services such as schools and law enforcement. Some commenters who were concerned about traffic made sure to note that their concerns applied equally to the potential school option, as well as to any housing alternative. Pedestrian and bicyclist safety was also raised, as was concern over potential spill-over parking from the development.

Concern about Proposed Residents / Adequacy of Services
Socioeconomics/Housing
A large number of commenters objected to the proposed population for the housing development, with the most common reason being the lack of services in the area for low-income and homeless people. Some viewed Magnolia as more of a suburb than a city, distinct from other Seattle neighborhoods. Many of these comments were based on an assumption that low-income households would not be able to afford cars, and would be forced to shop at the neighborhood Metropolitan Market for groceries. The second most frequent objection related to presumed impacts on public health and safety, while a third reason cited was on potential negative impacts on property values.

Some commenters offered suggestions about better locations for low-income housing, including:

- Aurora Avenue
- Interbay / 15th Avenue
- South Seattle

- Memorial Stadium
- Multiple smaller locations
- "Outskirts" of the city

Conclusions/Revisions to the EIS Scope

Many of the comments received during the public scoping period expressed concerns regarding: the **EIS Alternatives**, **Transportation, Public Services, Recreation and Open Space** and **Socioeconomics/Housing**. Other comments related to Geology/Soils, Biological Resources, Air Quality, Noise, Environmental Health, Land Use/Plans and Policies, Historic/Cultural Resources, Utilities and Property Values and Financial Costs**.**

Regarding the range of alternatives, the Office of Housing will continue to move forward with the four alternatives previously outlined. The inclusion of a school was considered but ultimately eliminated due to fundamental feasibility concerns.

Regarding areas of impact, the majority of concerns fell into elements already identified for study. However, many of these comments raised particular concerns within the broadly defined topic areas. Other comments were received regarding issues that are typically beyond the scope of SEPA review (e.g., property values and financial costs). Based on a review of these comments, the Lead Agency and the Responsible Official have expanded the scope of the EIS to include the following:

- **Discovery Park/Kiwanis Ravine/Relationship to Existing Plans:** Analyses of geology/soils, biological resources, recreation/open space, visual resources, air quality and noise will specifically include Discovery Park and the Kiwanis Memorial Preserve Park. In addition, the EIS will include a discussion of the proposal in relationship to the Discovery Park Master Plan, the Great Blue Heron Management Plan, and other plans such as the Comprehensive Plan.
- **Proposed Services for Affordable Housing Residents:** The EIS will include a review of the proposed services for residents of the affordable housing, and suggest any additional services or transportation assistance necessary to connect residents to services.
- **Anticipated Demand for Metro Bus Service:** The EIS will estimate increased demand for bus service, and work with SDOT and King County Metro to analyze relevant long-term planning for public transportation to this area.
- **Discussion of Low-Income Housing and Property Values:** The EIS will include a review of relevant studies documenting the relationship between low-income housing and changes in nearby property values.
- **Discussion of Low-Income Housing and Public Safety:** The EIS will include a review of relevant information, to the extent available, describing the relationship of low-income housing to crime rates.

- **Anticipated School Demand:** The EIS was already intended to include an analysis of the increase in school-age population connected with the proposal, and the anticipated capacity of the public school system to absorb this increase in demand. In addition, the analysis will consider any available data on whether low-income households are likely to generate school-age children at a higher rate than upper-income households. SPS will also be invited to review the analysis and incorporate its findings into SPS planning processes.
- **Pedestrian Safety:** The transportation element will include analysis of pedestrian accessibility and safety.
- **Parking:** The EIS will include a review of the proposed parking, and any anticipated spillover into adjacent areas.
- **West Point Treatment Facility:** As part of the EIS process, the Lead Agency will reach out to King County to discuss the impact of the project on the ongoing operation and maintenance of the West Point Treatment, and ensure the integrity of existing sewer tunnels.

ATTACHMENT A

Summary of Public Comments

Comments on Alternatives

EIS Topic	Comment
Supporting Alternative 1: **Affordable Housing and Park Uses**	• "The City has tailored the scale of the proposed housing portion of the development so as to better fit with the neighborhood (than the 2008 plan) and to provide much-needed public park activity and maintenance spaces… I believe the site would not be a good location for a primary or a secondary school—primarily because of its lack of good transportation infrastructure. Discovery Park should not become a traffic hairball! It is a precious resource to urban residents." • "I 'm writing in support of the Fort Lawton Redevelopment Plan. I support alternative 1, Mixed Use Affordable Housing and Park Uses. I supported the previous proposal and last testified in favor of it September 4, 2008 at a City Council hearing. Since the past planning process, the number of homeless has increased by 37% and the cost of rental housing and has made Seattle unaffordable for almost all low and moderate income renters. The availability of the Ft Lawton site presents a rare opportunity to increase affordable housing. Land is so expensive in Seattle that non-profit developers cannot build unless they receive gifted land or purchase it for less than fair market price. For these reasons every effort should be made to maximize the land space for housing." • "At a time when land prices are skyrocketing and our affordable housing dollars buy less and less, it is the perfect opportunity to take advantage of the 28 acres of land in one of the most high-opportunity neighborhoods in Seattle. Magnolia has high-performing schools, low crime and lots of open space - all things positively correlated with social advancement. If we're serious about being an equitable city, this is exactly the kind of neighborhood we should be opening up to people of all income levels." • "Opportunity for active recreation is an important need of Seattle citizens especially in Magnolia that has an increasing proportion of younger families and kids. Whichever alternatives are considered, the addition of a playfield, preferably synthetic turf with lights would add greatly needed capacity to Seattle's inventory of athletic fields, especially in Magnolia which has no year-round playfields."
Supporting Alternative 2: **Market Rate Housing On-Site, Affordable Housing Off-Site**	• "Magnolia is more like a suburb then a city neighborhood. A car is required to access amenities and there is an overall lack of walkability to services such as grocery stores, hospitals, etc. and public transit is not good. These factors do not make Magnolia an ideal location for affordable housing and homeless shelters. I would support Alternative 2, as I believe that more market rate housing is needed in Magnolia due to the growth of Seattle based companies and overall influx of people into Seattle."

- "I'm in favor of Alternative 3, which turns all of it back to public park. This is also what the original Discovery Park Master Plan advocates when it was written in the late 70's. The park is a great place. Why mess with the vision of the original planners."

- "Although the Fort Lawton Army Reserve is not part of Discovery Park, its proximity is unique and exceptional. All the reason NOT to build there. We have an opportunity to add to Seattle's largest urban park. Adding green space and tree canopy has been an ongoing goal of Seattle. Offering a place for respite, for recreation, for nature, to maintain biodiversity - for all of Seattle to enjoy.

Supporting Alternative 3:

All Park Uses On-Site, Affordable Housing Off-Site

From http://www.seattle.gov/environment/trees-and-green-space:
Trees and open spaces are integral to healthy urban environments. Trees are an important part of Seattle's built and natural environment. They promote social, economic, and environmental health by capturing and slowing rain; filtering air pollution; providing food and habitat; and contributing to the character and aesthetic beauty of our neighborhoods and business districts.

This is especially important in an area that borders Elliot, Shilshole, and Salmon Bays. Indeed in a city growing as fast as Seattle, the tendency is to build anywhere land is available. It's not always easy to look forward and make decisions that benefit the greater good in, and for the long run.

Please look to the future and leave a legacy. Consider Alternative 3."

- "I support Alternative 3 to be consistent with the rest of the fort that was surrendered and placed into park for all to use onsite, with affordable housing and homeless housing offsite. Site selection should be more within the guidelines of the City near frequent transit corridor, walk-able to services, near employment base and within Urban HUB or Urban Village zones which is more conducive to multifamily rentals and Townhomes regardless of affordable housing assistance."

Supporting Alternative 4:

No Action

- "My husband and I are totally opposed to any kind of housing at Fort Lawton. We moved to this neighborhood because of the park. We just want Fort Lawton to blend into the park. We are in favor of Alternative 4-No Action. Period."

Requests for New or Revised Alternatives

EIS Topic	Comment
Off-leash dog park	• "I would like to see an off leash dog area be a part of any plan! We are in desperate need of legal off leash space and this area is already used by many dog owner to run their dogs off lease. If you take this area away from them, then it is equivalent to closing a park. Please include on off leash area in whatever plan is decided upon."
Land for Duwamish Tribes	• "The land now known as Fort Lawton was historically connected to the Duwamish Nation, but the Nation's rights were ceded to the United States government in the 1855 Treaty of Point Elliott. The federal government has not met its obligations under that treaty. This redevelopment project provides an opportunity for the City of Seattle to help the Duwamish Nation establish a land base to support its claim for recognition of its rights."
Community Spaces	• "If the FLARC property must be redeveloped, I can think of so many better uses for it than a homeless housing project, uses that would actually enhance life for Magnolia residents. How about a first-class community arts center or arts school where local residents could enjoy concerts and dance performances? Or an indoor sports facility featuring a large heated indoor pool and several indoor tennis courts among other amenities (like a daycare center). Or a world-class environmental research and education center? How about a new police station and precinct? Even a new school would be better than more housing. But it seems the City has no interest in looking at these community enhancing options."
School	• "Our current public schools located on and near Magnolia have some of the largest overcrowding issues in the state. We must evaluate how to adequately deliver these resources prior to building more housing. There will simply be no place for these children to go to school. The addition of a school would have a huge impact on the overcrowding issue and help address this huge problem." • "Our elementary schools are overcrowded by hundreds of kids. Actually, the city is opening a new elementary school in Magnolia in 2018 to relieve some of the crowding. However, the crowding is so intense that the schools will still face overcrowding! While something is being done at the elementary level to relieve the overcrowding, nothing is being done to plan for the future. More and more families keep moving to Magnolia and Queen Anne and we have a thriving family community. However, when Our kids get to middle and high school, there will be nowhere for them to go. Currently, Ballard High School cannot accommodate the gigantic student population that will be coming their way. A new high school must be built. The parent community has been talking about Fort Lawton as the perfect place for a Magnolia and Queen Anne high school to be built. It presents an excellent opportunity for science and nature to be integrated into the classroom experience. What a great way to serve our future leaders!"

Concerns Regarding Impacts of the Proposal

EIS Topic	Comment
Impacts to Discovery Park, Kiwanis Memorial Preserve Park, and Immediate Neighbors ***Recreation/Open Space, Biological Resources, Geology/Soils, Air Quality, Noise, Land Use/Relationship to Existing Plans***	• "This development will irreversibly alter Discovery Park. We need to preserve the last bit of nature and wildlife that is left in Seattle. Our children and citizens deserve open space preservation." • "With more construction eating away precious landscape, Discovery Park and Fort Lawton are one of Seattle's last few open spaces, and home to many vulnerable wildlife populations. In addition, Fort Lawton's military past calls for a land study to ensure the safety of its subsurface." • "Discovery Park is best used as a park- it is a gem in this city. It should be developed into a natural park space that everyone in the city (and visitors outside of our city can enjoy). I was not in support of the officer housing being developed into multi-million dollar homes and I am not in support of smaller houses being put into the area either. This park is unique unto itself- people from all over the world come to visit when they visit Seattle- we need to keep this gem safe." • "The area includes the great blue heron protection area that is covered by a Directors Rule, which limits construction between 1st Feb and 31st August. It is also a critical area, slope, and close to a wetland and waterway (Ship Canal). The wooded parts of FLARC help provide a wildlife corridor between Discovery Park and Kiwanis Ravine - I am pleased to hear that these areas will remain open space, and that the proposal includes keeping the trees along the east boundary on 36th Ave West. Those are mature trees which we can ill afford to lose, they will be an amenity for those on both sides." • "I have been visiting Discovery Park since it opened to the public, and have lived in Magnolia since 1986. In that time, I have seen the park become degraded by public apathy. Dog owners often treat it as an off-leash area. Littering is more noticeable. Wildlife has diminished. The West Point Sewage Treatment Plant has taken a larger footprint. And private homes (for the well-to-do) have changed the character of what should be a completely public park." • "Mayor Wes Ulsan and the city of seattle designated this to be a park and it should remain so. We can use other spaces in the denser parts of the city for schools, housing the homeless, etc. we can never reclaim this beautiful space that houses trails and wildlife." • "Specific to the SEPA process, I would also like to add an emphasis on air quality during the redevelopment. We moved our family to Magnolia in part due to asthma concerns. Large construction projects, as envisioned by the City, use diesel powered trucks and equipment that have a high impact to local air quality." • "With various winds, the odor of creosote and diesel fumes from the trains or the vapors originating from the West Point sewer treatment plant taint the neighborhood. For all these reasons removing trees has a significant and possibly harmful impact on the area. Please study the impact of removing these trees on wild birds, air

quality, noise, construction dust, human health, neighborhood character and property value for the proposed alternatives."

- "How will the City control what happens in this new community to be housed next to the city's largest public park? Off-leash dogs already trample sensitive bird nesting areas in the park, vagrants routinely toss beer cans and liquor bottles into the pond off the park's north parking lot, and while birding on less-traveled trails, I have come upon individual tents that look pretty permanent. With such a huge influx of new residents directly adjacent to the park, how will the city assure that the park will continue to be the nature-filled place where thousands of residents and tourists come annually to walk, hike, run, bike, bird, picnic, or just enjoy the beautiful views?"

Impacts to Existing Public Infrastructure, Services and Facilities

Transportation/Traffic, Utilities, Public Services/Schools/ Police

- "The redevelopment plan needs to consider traffic issues. We cannot imagine 400 new cars coming through our quiet streets and more importantly adding to the congestion for getting out of Magnolia or along the 15th Avenue corridor."

- "As a mother of 3 young children, i am worried about the additional resources that will be required to support the occupants coming in to Magnolia. Our schools are already bursting. There are not enough daycare options and the options that exist are expensive. If we want low income families to find jobs, they need childcare that is cheaper than their earnings, and this can't be found in magnolia. What also doesn't exist in magnolia are jobs for these people.... which means they need to commute in and out of the neighborhood everyday.

  We only have 1 bus servicing this area not to mention the backlog of traffic that occurs on the Emerson overpass and dravus exists as soon as the Ballard bridge is open even once per day.

  The area is very isolated and could breed crime since it is quiet and desolate. I would be afraid to walk by in the evenings since there isn't regular foot traffic or cars passing by."

- "Ensuring the needs/safety of pedestrians and bicyclists is important – not to mention ensuring all infrastructure is ADA compliant and meets the needs of seniors. Working with Metro to improve transit service would be excellent."

- "I hear complaints about traffic. There will most likely be an impact on Emerson bridge and maybe also Dravus. Emerson gets backed up at rush hour now so that could get worse with more people living nearby. However that impact will be the same whether it is market rate or affordable housing - probably worse with market rate as those residents are less likely to use public transit. 36th Ave West is a dead end, the impact on that street will be lessened by using Texas Way as the main entrance. You can enter Texas Way from the south (via Government Way) or north (via Commodore Way), or form the west through Discovery Park, so we're not talking about limited access."

- "Please do a detailed study on how adding over 200 residents will increase the need for additional policing in our community. Specifically how the city will address the potential increase in crime as it was pointed out in the Berkshire Report last year that Seattle is not adequately staffing its police force to address the needs of a population of our size."

- "With the influx of population into the Seattle area related to the growth of technology companies such as Amazon more and more young families are moving into Magnolia due the proximity to downtown Seattle. As a result, the schools have become overcrowded and a new elementary school is being added. However, the middle and high school capacity issues have not yet been addressed. Additionally, with the move of Expedia headquarters to Interbay, this will result in more capacity issues at the schools in Magnolia as more young families move into the neighborhood."

- "My kids attend Catharine Blaine K-8, which is projected to be at 800 students next school year. The right size capacity for this school is 480. There are six portable classrooms on the playground at the moment and more will be added for next year's increase in enrollment. The school is doing its best to manage so many students (does it have a choice?), but space and resources are scarce when spread across the board for so many students.

  The Fort Lawton area is currently in the Lawton Elementary School attendance area, but that school is also over-capacity, as are the schools in Queen Anne. Lawton does not have the ability to expand with portables as much as Blaine has due to geographic constraints.

  Seattle Public Schools in the process of re-activating an old school building in Magnolia that has been closed for decades (Magnolia Elementary School). This school, however, will not provide enough capacity for the rate of growth that this area is experiencing. Plus, as the current elementary school students continue through the system, they will soon be middle school students and then high school students. Blaine currently has five 1st grade classes with a projection of needing five kindergartens next year, as well. My son is in 2nd grade currently and he is one of about 100 students spread across four 2nd grade classes. There is no way that Blaine can continue at this rate of growth as a K-8 school, if every incoming kindergarten grade needs four or five classes to accommodate all of the students. There will only be so much room for portables and that does not take into account time and space for art, music, technology, and PE classes. When these kids get to middle school and high school, the over-crowding issues will be compounded as other neighborhoods and schools outside of the Magnolia and Queen Anne areas are also experiencing increases in population."

- "As a resident of the down-slope area just north of the Ft. Lawton site, I would be remiss not to mention that Ft. Lawton as originally developed by the federal government created drainage problems for us—by not addressing 100-year old US Army storm sewer outfalls that just dump water on the surface so it can run downhill into our backyards. You can imagine how much fun this is during the wintertime (and I have been here 20 years—which is pre-USARC). Whatever form the new development assumes, the City should take the opportunity to correct these surface water issues (and, I believe, is legally required to do so upon assuming ownership). Likewise, the

pavement of the northern segment of Texas Way has been continuously deteriorating since the USARC constructed it; my guess is that the roadbed might have an inadequate base course (the federal government retains the option to use its own building codes rather than the local codes in force during construction—really!). Another possibility is that the amount of excess surface drainage flowing across this section of road from the surface parking lot for the VA facility above it causes the roadway to continuously deteriorate during the winter months. This should be addressed with any new development."

Concern about Proposed Residents / Adequacy of Services

- "I, like many other parents shop at 4 different grocery stores and travel out to Costco and Targets for deals. My guess is low-income residents may not have the transportation nor the time for those affordable options."
- "Magnolia itself is somewhat isolated already, but the Fort Lawton site is isolated even within Magnolia's boundaries. Bus line 33 is the only one currently possibly easily walkable from the site (particularly by older residents) and goes downtown; line 24 is less close and meanders through Magnolia before also going downtown. Multiple transfers are required to access other parts of Seattle, making public transit not always the most feasible option for people with children and work schedules (especially if coordinating more than one job). The nearest grocery store, Metropolitan Market, is expensive. Other shops and restaurants are clustered at the other end of Magnolia, not an easy or short walk from the Fort Lawton area. Geographically isolating the individuals and families the housing will serve does not seem like a solution that is sustainable or empowering for them."
- "Magnolia is essentially a suburb, without the typical facilities of an actual City. To promote this location for homeless, seniors, and low income is faulty ideology. The services/resources required for this segment of the population are not provided in the Magnolia area and it is not rationale to think that they ever will be given remoteness/limited access and market conditions. Also, there is limited public transit and it is extremely challenging to get to the freeways (especially if you don't have adequate means of transportation, such as a reliable vehicle)."
- "While I understand and appreciate the need for housing, this is right next to a park which is next to impossible to police (no roads etc. just hundreds of acres of fields and trails). Police would not be able to respond to safely complaints within the park."
- "Seattle has not gotten a grip on the drug and crime caused by drugs and I do not want to see that culture infused into the heart of Magnolia where the queen of all parks resides for all of Seattle to enjoy. Can you imagine the heart break of addicts with knives wandering around in Discovery Park? How would it be policed and citizens protected. The idea is absolutely irresponsible. Ft. Lawton is not near a grocery store and the closest one is the most expensive in the city. Residents could walk no where for services. There are tons of empty buildings around the county that could be used to house the homeless in a much more suitable location. There are many, many seniors, families with children and all of us who would be put at serious risk with the mentally ill free to roam our beautiful parks and streets. We buy here for a reason and I think you should support a comfortable and

safe place for your citizens to live. You are understaffed on the police force, do not enforce the laws equally, are too lenient with drug users, pushers and the mentally ill. Until you provide services for them it is unhelpful to just stick them somewhere especially when it impacts us so greatly."

- "There's so much building going on everywhere else ... isn't there another more logical spot in Magnolia or Interbay where this housing project could be built? Someplace that would give residents better access to downtown, a walkable (affordable) grocery store and facilities, etc.?"

- "Creating a homeless or subsidized low income area in the middle of an affluent neighborhood just doesn't make sense. Though the current plan proposes services in addition to housing, will the city also be subsidizing the new businesses in the area? Who will develop a business to serve the elderly homeless and subsidized low income folks? For example, the minimal bus service and absence of a walkable retail area would maroon people without private transportation.

  What's the plan to keep that corner of Magnolia from developing into The Projects that plague other cities, once the area is 20 years old? What's the research on Projects built abutting affluent areas—there probably is none, because the idea is so bad. Are homeless people, with higher rates of addiction and mental illness, safe for an area abutting Discovery Park, which draws families with children?

  How much ongoing tension will arise? Magnolia is one of the only remaining areas that is safe enough that you can see unaccompanied children playing outside. This plan almost has to end that sense of safety.

  The homeless and low income folks should be served on the outskirts of the city, where property values are lower and there can be access to neighborhood services. Please don't waste this valuable resource."

- **"**Unfortunately, subsidized housing projects have a complicated and often notorious reputation in America, and for good reason. They often isolate and concentrate together individuals who disproportionately suffer from serious social, mental health, and substance abuse problems, and surrounding neighborhoods often pay the price in increased levels of crime and decreased property values. Under Alternative 1, what guarantees would I and my neighbors have that the very character of our safe, family-centered neighborhood would not change for the worse? Are we to believe the promises of city housing officials and homeless industry advocates--who have no equity in my neighborhood--that "everything will be just fine"?

- "I have concerns about potential increased crime, creating safety issues for our kids, noise, disturbance of our properties, and lack of integration with the existing community.

  We currently let our kids play on the streets, ride their bikes around, ride to Discovery Park, walk home from the bus stop. If you bring homeless to Ft. Lawton, we would not feel safe anymore to let our kids go out on the streets. I am not saying that all homeless are criminals, but many homeless have heroin and other drug issues,

serious mental issues and some have convicted felonies or are sex offenders. I don't want heroin addicts, sex offenders, etc living next to us.”

ATTACHMENT B

Public Notice Documentation/ Complete Mailing List

Scoping Notice Mailing:

Seattle
Office of Housing

DETERMINATION OF SIGNIFICANCE (DS)
AND REQUEST FOR COMMENTS ON SCOPE OF EIS

Project Name: Fort Lawton Army Reserve Center Redevelopment

Proponent: City of Seattle Office of Housing

Lead Agency[1]**:** City of Seattle Office of Housing

Project Location: The site is the former Fort Lawton Army Reserve Center and is bordered by W Lawton Street to the north, 36th Avenue W to the east, W Government Way to the south and Discovery Park to the west.

Description of the Proposal: The City of Seattle is considering redevelopment options to allow housing and park uses on the 28-acre former Fort Lawton Army Reserve Center site located in the Magnolia neighborhood in northwest Seattle. Anticipated uses include supportive housing for formerly homeless people, affordable rental and ownership housing for low income families and individuals, a variety of public park uses (including both active and natural uses), and a park maintenance facility.

Environmental Determination: City of Seattle Office of Housing, as the SEPA lead agency, has determined that this proposal may have significant adverse environmental impacts on the environment. An EIS is required under RCW 43.21C.030 (2)(c) and will be prepared. The EIS will address probable significant adverse environmental impacts of the proposed Fort Lawton Army Reserve Center Redevelopment.

Elements of the Environment: The lead agency has *preliminarily* identified the following elements for analysis in the EIS:

- **Geology/Soils**
- **Air Quality**
- **Biological Resources**
- **Environmental Health**
- **Noise**
- **Land Use**
- **Housing/Socioeconomics/Environmental Justice**
- **Aesthetics/Visual Resources**
- **Recreation/Open Space**
- **Historic/Cultural Resources**
- **Transportation**
- **Public Services**
- **Utilities**

[1] This is the agency that is responsible for compliance with the procedural requirements of the State Environmental Policy Act (SEPA) for this project.

Seattle
Office of Housing

Alternatives: The lead agency has *preliminarily* identified four alternatives that will be analyzed in the EIS:

- **Alternative 1 – Mixed Income Affordable Housing and Public Park Uses**
  Development of a mix of affordable housing onsite, including homeless and affordable rental and ownership housing, with a portion of the site likely rezoned to Lowrise residential zoning. Public park uses would also be created, including active park facilities, preserved existing natural areas and conversion of an existing structure to a park maintenance facility;
- **Alternative 2 - Market Rate Housing Onsite; Affordable and Homeless Housing Offsite**
  Development of market rate single family housing under current zoning onsite, and construction of homeless and affordable housing at an off-site location;
- **Alternative 3 - Public Park Onsite; Affordable and Homeless Housing Offsite**
  Development of the entire site as a public park, and construction of homeless and affordable housing at an off-site location; and
- **Alternative 4 – No Action**
  No redevelopment of the site; existing structures onsite would be maintained.

Scoping: Agencies, affected tribes, and members of the public are invited to comment on the scope of the EIS. You may comment on alternatives, mitigation measures, probable significant adverse impacts, and licenses or other approvals that may be required. Methods for presenting your comments are described below. **All comments are due no later than 5:00 PM, June 26th, 2017**, and may be submitted:

- **Via e-mail to:** OH_Comments@seattle.gov
- **In writing to:** Lindsay Masters, Office of Housing, PO Box 94725, Seattle, WA 98124-4725
- **In writing and/or verbally at the EIS Public Scoping Meeting/Open House:** This meeting will provide an opportunity to learn more about the project and proposed actions, and to provide input on the environmental review process.

  Meeting Location: Daybreak Star Cultural Center, 5011 Bernie Whitebear Way, Seattle, WA 98199
  Meeting Date/Time: June 19th, 2017, 6:30 – 8:30 PM
  6:30-7:30pm: Open House
  7:30-8:30pm: Public Comment

Date: June 5th, 2017 **SEPA Responsible Official:** _____
Steve Walker
Director of Office of Housing

Land Use Bulletin Notice:

Jun 05, 2017
Seattle Department of Construction and Inspections

Land Use Information Bulletin

A Twice-Weekly Bulletin Announcing Land Use Applications, Decisions, Hearings, and Appeals
www.seattle.gov/dpd

NOTICE OF DETERMINATION OF SIGNIFICANCE (DS) and SCOPING FOR PROPOSED FORT LAWTON REDEVELOPMENT
Area: Address:
Project: Zone: Notice Date: 06/05/2017

Proponent: City of Seattle Office of Housing
Lead Agency: City of Seattle Office of Housing

Project Location: The site is the former Fort Lawton Army Reserve Center and is bordered by W Lawton Street to the north, 36th Avenue W to the east, W Government Way to the south and Discovery Park to the west.

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- Geology/Soils
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- Recreation/Open Space
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- Transportation
- Public Services
- Utilities

ALTERNATIVES
The lead agency has *preliminarily* identified four alternatives that will be analyzed in the EIS:

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Development of market rate single family housing under current zoning onsite, and construction of homeless and affordable housing at an off-site location;

- **Alternative 3 - Public Park Onsite; Affordable and Homeless Housing Offsite**

Development of the entire site as a public park, and construction of homeless and affordable housing at an off-site location; and

- **Alternative 4 – No Action**

No redevelopment of the site; existing structures onsite would be maintained.

SCOPING
Agencies, affected tribes, and members of the public are invited to comment on the scope of the EIS. You may comment on alternatives, mitigation measures, probable significant adverse impacts, and licenses or other approvals that may be required. Methods for presenting your comments are described below. **All comments are due no later than 5:00 PM, June 26, 2017**, and may be submitted:

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5011 Bernie Whitebear Way
Seattle, WA 98199

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6:30-7:30pm: Open House
7:30-8:30pm: Public Comment

SEPA Responsible Official:
Steve Walker
Director, Office of Housing
PO Box 94725
Seattle, WA 98124-4725

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City of Seattle

NOTICE OF DETERMINATION OF SIGNIFICANCE (DS) and SCOPING FOR PROPOSED FORT LAWTON REDEVELOPMENT

Proponent: City of Seattle Office of Housing

Lead Agency: City of Seattle Office of Housing

Project Location: The site is the former Fort Lawton Army Reserve Center and is bordered by W Lawton Street to the north, 36th Avenue W to the east, W Government Way to the south and Discovery Park to the west.

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ENVIRONMENTAL DETERMINATION

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- Biological Resources
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- Utilities

ALTERNATIVES

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Meeting Location: Daybreak Star Cultural Center

5011 Bernie Whitebear Way

Seattle, WA 98199

Meeting Date/Time: June 19, 2017, 6:30 – 8:30 PM

6:30-7:30pm: Open House

7:30-8:30pm: Public Comment

SEPA Responsible Official:

Steve Walker

Director, Office of Housing

PO Box 94725

Seattle, WA 98124-4725

Date of publication in the Seattle Daily Journal of Commerce, June 5, 2017.

6/5(350533)

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Mailing list for Scoping Notice:

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RESIDENT	3510 W COMMODORE WAY	SEATTLE	WA	98199-1119		2
RESIDENT	3514 W COMMODORE WAY	SEATTLE	WA	98199-1119		3
RESIDENT	3501 W COMMODORE WAY	SEATTLE	WA	98199-1100		4
RESIDENT	3600 W COMMODORE WAY	SEATTLE	WA	98199-1107		5
RESIDENT	3606 W COMMODORE WAY APT A	SEATTLE	WA	98199-1107		6
RESIDENT	3606 W COMMODORE WAY APT B	SEATTLE	WA	98199-1107		7
RESIDENT	3610 W COMMODORE WAY	SEATTLE	WA	98199-1107		8
RESIDENT	3614 W COMMODORE WAY	SEATTLE	WA	98199-1107		9
RESIDENT	3626 W COMMODORE WAY	SEATTLE	WA	98199-1107		10
RESIDENT	3630 W COMMODORE WAY	SEATTLE	WA	98199-1107		11
RESIDENT	3632 W COMMODORE WAY	SEATTLE	WA	98199-1107		12
RESIDENT	3636 W COMMODORE WAY	SEATTLE	WA	98199-1107		13
RESIDENT	3641 W COMMODORE WAY	SEATTLE	WA	98199-1106		14
RESIDENT	3629 W COMMODORE WAY	SEATTLE	WA	98199-1106		15
RESIDENT	3621 W COMMODORE WAY	SEATTLE	WA	98199-1106		16
RESIDENT	3611 W COMMODORE WAY	SEATTLE	WA	98199-1106		17
RESIDENT	3607 W COMMODORE WAY	SEATTLE	WA	98199-1106		18
RESIDENT	3603 W COMMODORE WAY	SEATTLE	WA	98199-1106		19
RESIDENT	3640 W COMMODORE WAY	SEATTLE	WA	98199-1107		20
RESIDENT	3654 W COMMODORE WAY	SEATTLE	WA	98199-1107		21
RESIDENT	3653 W COMMODORE WAY	SEATTLE	WA	98199-1106		22
RESIDENT	4202 36TH AVE W	SEATTLE	WA	98199-1325		23
RESIDENT	3520 W ELMORE ST	SEATTLE	WA	98199-1378		24
RESIDENT	3518 W ELMORE ST	SEATTLE	WA	98199-1378		25
RESIDENT	3510 W ELMORE ST APT 1	SEATTLE	WA	98199-1359		26
RESIDENT	3510 W ELMORE ST APT 2	SEATTLE	WA	98199-1359		27
RESIDENT	3510 W ELMORE ST APT 101	SEATTLE	WA	98199-1359		28
RESIDENT	3510 W ELMORE ST APT 102	SEATTLE	WA	98199-1359		29
RESIDENT	3510 W ELMORE ST APT 103	SEATTLE	WA	98199-1359		30
RESIDENT	3510 W ELMORE ST APT 201	SEATTLE	WA	98199-1359		31
RESIDENT	3510 W ELMORE ST APT 202	SEATTLE	WA	98199-1359		32
RESIDENT	3510 W ELMORE ST APT 203	SEATTLE	WA	98199-1359		33
RESIDENT	4201 35TH AVE W APT 101	SEATTLE	WA	98199-1347		34
RESIDENT	4201 35TH AVE W APT 102	SEATTLE	WA	98199-1347		35
RESIDENT	4201 35TH AVE W APT 201	SEATTLE	WA	98199-1347		36
RESIDENT	4201 35TH AVE W APT 202	SEATTLE	WA	98199-1347		37
RESIDENT	4201 35TH AVE W APT 301	SEATTLE	WA	98199-1347		38
RESIDENT	4201 35TH AVE W APT 302	SEATTLE	WA	98199-1347		39
RESIDENT	3505 W ELMORE ST	SEATTLE	WA	98199-1377		40
RESIDENT	4212 35TH AVE W APT A101	SEATTLE	WA	98199-1360		41
RESIDENT	4212 35TH AVE W APT A102	SEATTLE	WA	98199-1360		42
RESIDENT	4212 35TH AVE W APT A103	SEATTLE	WA	98199-1360		43
RESIDENT	4212 35TH AVE W APT A104	SEATTLE	WA	98199-1360		44
RESIDENT	4212 35TH AVE W APT A201	SEATTLE	WA	98199-1384		45
RESIDENT	4212 35TH AVE W APT A202	SEATTLE	WA	98199-1384		46
RESIDENT	4212 35TH AVE W APT A203	SEATTLE	WA	98199-1361		47
RESIDENT	4212 35TH AVE W APT A204	SEATTLE	WA	98199-1361		48
RESIDENT	4212 35TH AVE W APT A301	SEATTLE	WA	98199-1361		49
RESIDENT	4212 35TH AVE W APT A302	SEATTLE	WA	98199-1361		50

COMPANY	ADDRESS_1	CITY	STATE	ZIP	COUNTRY	NO
RESIDENT	4212 35TH AVE W APT A303	SEATTLE	WA	98199-1397		51
RESIDENT	4212 35TH AVE W APT A304	SEATTLE	WA	98199-1397		52
RESIDENT	4212 35TH AVE W APT B101	SEATTLE	WA	98199-1398		53
RESIDENT	4212 35TH AVE W APT B201	SEATTLE	WA	98199-1362		54
RESIDENT	4212 35TH AVE W APT B202	SEATTLE	WA	98199-1362		55
RESIDENT	4212 35TH AVE W APT B203	SEATTLE	WA	98199-1362		56
RESIDENT	4212 35TH AVE W APT B204	SEATTLE	WA	98199-1362		57
RESIDENT	4212 35TH AVE W APT B301	SEATTLE	WA	98199-1367		58
RESIDENT	4212 35TH AVE W APT B302	SEATTLE	WA	98199-1367		59
RESIDENT	4212 35TH AVE W APT B303	SEATTLE	WA	98199-1367		60
RESIDENT	4212 35TH AVE W APT B304	SEATTLE	WA	98199-1367		61
RESIDENT	4206 36TH AVE W	SEATTLE	WA	98199-1325		62
RESIDENT	4208 36TH AVE W	SEATTLE	WA	98199-1325		63
RESIDENT	3508 W GOVERNMENT WAY	SEATTLE	WA	98199-1322		64
RESIDENT	3512 W GOVERNMENT WAY	SEATTLE	WA	98199-1322		65
RESIDENT	3514 W GOVERNMENT WAY	SEATTLE	WA	98199-1322		66
OCCUPANT	4300 36TH AVE W STE 122	SEATTLE	WA	98199-1675		67
OCCUPANT	4300 36TH AVE W STE 200	SEATTLE	WA	98199-1675		68
OCCUPANT	4585 TEXAS WAY W	SEATTLE	WA	98199-1012		69
OCCUPANT	4565 TEXAS WAY W	SEATTLE	WA	98199-1012		70
OCCUPANT	4555 TEXAS WAY W	SEATTLE	WA	98199-1012		71
RESIDENT	3754 W LAWTON ST	SEATTLE	WA	98199-1116		72
RESIDENT	3760 W LAWTON ST	SEATTLE	WA	98199-1116		73
RESIDENT	3764 W LAWTON ST	SEATTLE	WA	98199-1116		74
RESIDENT	3770 W LAWTON ST	SEATTLE	WA	98199-1116		75
RESIDENT	3774 W LAWTON ST	SEATTLE	WA	98199-1116		76
RESIDENT	4812 40TH AVE W	SEATTLE	WA	98199-1122		77
RESIDENT	4820 40TH AVE W	SEATTLE	WA	98199-1122		78
RESIDENT	3801 DISCOVERY PARK BLVD	SEATTLE	WA	98199-1029		79
RESIDENT	3517 W GOVERNMENT WAY APT 101	SEATTLE	WA	98199-1380		80
RESIDENT	3517 W GOVERNMENT WAY APT 102	SEATTLE	WA	98199-1380		81
RESIDENT	3517 W GOVERNMENT WAY APT 103	SEATTLE	WA	98199-1380		82
RESIDENT	3517 W GOVERNMENT WAY APT 104	SEATTLE	WA	98199-1380		83
RESIDENT	3517 W GOVERNMENT WAY APT 105	SEATTLE	WA	98199-1381		84
RESIDENT	3517 W GOVERNMENT WAY APT 206	SEATTLE	WA	98199-1381		85
RESIDENT	3517 W GOVERNMENT WAY APT 207	SEATTLE	WA	98199-1381		86
RESIDENT	3517 W GOVERNMENT WAY APT 208	SEATTLE	WA	98199-1381		87
RESIDENT	3517 W GOVERNMENT WAY APT 209	SEATTLE	WA	98199-1382		88
RESIDENT	3517 W GOVERNMENT WAY APT 210	SEATTLE	WA	98199-1382		89
RESIDENT	3517 W GOVERNMENT WAY APT 311	SEATTLE	WA	98199-1382		90
RESIDENT	3517 W GOVERNMENT WAY APT 312	SEATTLE	WA	98199-1382		91
RESIDENT	3517 W GOVERNMENT WAY APT 313	SEATTLE	WA	98199-1383		92
RESIDENT	3517 W GOVERNMENT WAY APT 314	SEATTLE	WA	98199-1383		93
RESIDENT	3517 W GOVERNMENT WAY APT 315	SEATTLE	WA	98199-1383		94
RESIDENT	3517 W GOVERNMENT WAY APT B100	SEATTLE	WA	98199-1383		95
RESIDENT	3505 W GOVERNMENT WAY UNIT 101	SEATTLE	WA	98199-1356		96
RESIDENT	3505 W GOVERNMENT WAY UNIT 102	SEATTLE	WA	98199-1356		97
RESIDENT	3505 W GOVERNMENT WAY UNIT 103	SEATTLE	WA	98199-1356		98
RESIDENT	3505 W GOVERNMENT WAY UNIT 104	SEATTLE	WA	98199-1356		99
RESIDENT	3505 W GOVERNMENT WAY UNIT 105	SEATTLE	WA	98199-1356		100

COMPANY	ADDRESS_1	CITY	STATE	ZIP	COUNTRY	NO
RESIDENT	3505 W GOVERNMENT WAY UNIT 106	SEATTLE	WA	98199-1356		101
RESIDENT	3505 W GOVERNMENT WAY UNIT 201	SEATTLE	WA	98199-1301		102
RESIDENT	3505 W GOVERNMENT WAY UNIT 202	SEATTLE	WA	98199-1301		103
RESIDENT	3505 W GOVERNMENT WAY UNIT 203	SEATTLE	WA	98199-1301		104
RESIDENT	3505 W GOVERNMENT WAY UNIT 204	SEATTLE	WA	98199-1301		105
RESIDENT	3505 W GOVERNMENT WAY UNIT 205	SEATTLE	WA	98199-1301		106
RESIDENT	3505 W GOVERNMENT WAY UNIT 206	SEATTLE	WA	98199-1301		107
RESIDENT	3505 W GOVERNMENT WAY UNIT 301	SEATTLE	WA	98199-1357		108
RESIDENT	3505 W GOVERNMENT WAY UNIT 302	SEATTLE	WA	98199-1357		109
RESIDENT	3505 W GOVERNMENT WAY UNIT 303	SEATTLE	WA	98199-1357		110
RESIDENT	3505 W GOVERNMENT WAY UNIT 304	SEATTLE	WA	98199-1357		111
RESIDENT	3505 W GOVERNMENT WAY UNIT 305	SEATTLE	WA	98199-1357		112
RESIDENT	3505 W GOVERNMENT WAY UNIT 306	SEATTLE	WA	98199-1357		113
RESIDENT	4300 35TH AVE W APT 1	SEATTLE	WA	98199-1348		114
RESIDENT	4300 35TH AVE W APT 2	SEATTLE	WA	98199-1348		115
RESIDENT	4300 35TH AVE W APT 3	SEATTLE	WA	98199-1348		116
RESIDENT	4300 35TH AVE W APT 4	SEATTLE	WA	98199-1348		117
RESIDENT	4300 35TH AVE W APT 5	SEATTLE	WA	98199-1348		118
RESIDENT	4300 35TH AVE W APT 6	SEATTLE	WA	98199-1345		119
RESIDENT	4300 35TH AVE W APT 7	SEATTLE	WA	98199-1345		120
RESIDENT	4300 35TH AVE W APT 8	SEATTLE	WA	98199-1345		121
RESIDENT	4300 35TH AVE W APT 9	SEATTLE	WA	98199-1345		122
RESIDENT	4300 35TH AVE W APT 10	SEATTLE	WA	98199-1345		123
RESIDENT	4318 35TH AVE W APT 101	SEATTLE	WA	98199-4403		124
RESIDENT	4318 35TH AVE W APT 102	SEATTLE	WA	98199-4403		125
RESIDENT	4318 35TH AVE W APT 103	SEATTLE	WA	98199-4403		126
RESIDENT	4318 35TH AVE W APT 201	SEATTLE	WA	98199-1379		127
RESIDENT	4318 35TH AVE W APT 202	SEATTLE	WA	98199-1379		128
RESIDENT	4318 35TH AVE W APT 203	SEATTLE	WA	98199-1379		129
RESIDENT	4324 35TH AVE W	SEATTLE	WA	98199-1364		130
RESIDENT	4334 35TH AVE W	SEATTLE	WA	98199-1364		131
RESIDENT	4339 35TH AVE W	SEATTLE	WA	98199-1363		132
RESIDENT	4333 35TH AVE W	SEATTLE	WA	98199-1363		133
RESIDENT	4325 35TH AVE W	SEATTLE	WA	98199-1363		134
RESIDENT	4323 35TH AVE W	SEATTLE	WA	98199-1363		135
RESIDENT	4317 35TH AVE W	SEATTLE	WA	98199-1363		136
RESIDENT	4315 35TH AVE W	SEATTLE	WA	98199-1363		137
RESIDENT	4313 35TH AVE W	SEATTLE	WA	98199-1363		138
RESIDENT	4311 35TH AVE W	SEATTLE	WA	98199-1363		139
RESIDENT	4309 35TH AVE W	SEATTLE	WA	98199-1363		140
RESIDENT	4307 35TH AVE W	SEATTLE	WA	98199-1363		141
RESIDENT	3500 W GOVERNMENT WAY APT 1	SEATTLE	WA	98199-4402		142
RESIDENT	3500 W GOVERNMENT WAY APT 2	SEATTLE	WA	98199-4402		143
RESIDENT	3500 W GOVERNMENT WAY APT 3	SEATTLE	WA	98199-4402		144
RESIDENT	3500 W GOVERNMENT WAY APT 4	SEATTLE	WA	98199-4402		145
RESIDENT	3500 W GOVERNMENT WAY APT 6	SEATTLE	WA	98199-1385		146
RESIDENT	3500 W GOVERNMENT WAY APT 7	SEATTLE	WA	98199-1385		147
RESIDENT	3500 W GOVERNMENT WAY APT 8	SEATTLE	WA	98199-1385		148
RESIDENT	4304 36TH AVE W UNIT A	SEATTLE	WA	98199-1467		149
RESIDENT	4304 36TH AVE W UNIT B	SEATTLE	WA	98199-1467		150

COMPANY	ADDRESS_1	CITY	STATE	ZIP	COUNTRY	NO
RESIDENT	4304 36TH AVE W UNIT C	SEATTLE	WA	98199-1467		151
RESIDENT	4304 36TH AVE W UNIT D	SEATTLE	WA	98199-1467		152
RESIDENT	4316 36TH AVE W APT A	SEATTLE	WA	98199-1157		153
RESIDENT	4316 36TH AVE W APT B	SEATTLE	WA	98199-1157		154
RESIDENT	4316 36TH AVE W APT C	SEATTLE	WA	98199-1157		155
RESIDENT	4316 36TH AVE W APT D	SEATTLE	WA	98199-1157		156
RESIDENT	4320 36TH AVE W APT 1	SEATTLE	WA	98199-1390		157
RESIDENT	4320 36TH AVE W APT 2	SEATTLE	WA	98199-1390		158
RESIDENT	4320 36TH AVE W APT 3	SEATTLE	WA	98199-1390		159
RESIDENT	4320 36TH AVE W APT 4	SEATTLE	WA	98199-1390		160
RESIDENT	4320 36TH AVE W APT 5	SEATTLE	WA	98199-1390		161
RESIDENT	4324 36TH AVE W APT A	SEATTLE	WA	98199-1150		162
RESIDENT	4324 36TH AVE W APT B	SEATTLE	WA	98199-1150		163
RESIDENT	4324 36TH AVE W APT C	SEATTLE	WA	98199-1150		164
RESIDENT	4326 36TH AVE W APT A	SEATTLE	WA	98199-1151		165
RESIDENT	4326 36TH AVE W APT B	SEATTLE	WA	98199-1151		166
RESIDENT	4326 36TH AVE W APT C	SEATTLE	WA	98199-1151		167
RESIDENT	4332 36TH AVE W	SEATTLE	WA	98199-1333		168
RESIDENT	4338 36TH AVE W	SEATTLE	WA	98199-1333		169
RESIDENT	4342 36TH AVE W	SEATTLE	WA	98199-1333		170
RESIDENT	4346 36TH AVE W	SEATTLE	WA	98199-1333		171
RESIDENT	4352 36TH AVE W	SEATTLE	WA	98199-1333		172
RESIDENT	3501 W OHMAN PL	SEATTLE	WA	98199-1153		173
RESIDENT	4414 36TH AVE W	SEATTLE	WA	98199-1334		174
RESIDENT	4420 36TH AVE W	SEATTLE	WA	98199-1334		175
RESIDENT	4426 36TH AVE W	SEATTLE	WA	98199-1334		176
RESIDENT	4428 36TH AVE W	SEATTLE	WA	98199-1334		177
RESIDENT	4438 36TH AVE W	SEATTLE	WA	98199-1334		178
RESIDENT	4500 36TH AVE W	SEATTLE	WA	98199-1154		179
RESIDENT	4510 36TH AVE W	SEATTLE	WA	98199-1154		180
RESIDENT	4514 36TH AVE W	SEATTLE	WA	98199-1154		181
RESIDENT	4516 36TH AVE W	SEATTLE	WA	98199-1154		182
RESIDENT	4522 36TH AVE W	SEATTLE	WA	98199-1154		183
RESIDENT	4526 36TH AVE W	SEATTLE	WA	98199-1154		184
RESIDENT	4532 36TH AVE W	SEATTLE	WA	98199-1154		185
RESIDENT	3509 W MCCORD PL	SEATTLE	WA	98199-1152		186
RESIDENT	3508 W MCCORD PL	SEATTLE	WA	98199-1152		187
RESIDENT	3414 W MCCORD PL	SEATTLE	WA	98199-1102		188
RESIDENT	4558 35TH AVE W	SEATTLE	WA	98199-1109		189
RESIDENT	4562 35TH AVE W	SEATTLE	WA	98199-1109		190
RESIDENT	4576 35TH AVE W	SEATTLE	WA	98199-1109		191
RESIDENT	3411 W LAWTON ST	SEATTLE	WA	98199-1140		192
RESIDENT	3401 W LAWTON ST	SEATTLE	WA	98199-1140		193
RESIDENT	3408 W LAWTON ST	SEATTLE	WA	98199-1141		194
RESIDENT	3414 W LAWTON ST	SEATTLE	WA	98199-1141		195
RESIDENT	4575 35TH AVE W	SEATTLE	WA	98199-1108		196
RESIDENT	4571 35TH AVE W	SEATTLE	WA	98199-1108		197
RESIDENT	4567 35TH AVE W	SEATTLE	WA	98199-1108		198
RESIDENT	4555 35TH AVE W	SEATTLE	WA	98199-1108		199
RESIDENT	4526 35TH AVE W	SEATTLE	WA	98199-1137		200

COMPANY	ADDRESS_1	CITY	STATE	ZIP	COUNTRY	NO
RESIDENT	4522 35TH AVE W	SEATTLE	WA	98199-1137		201
RESIDENT	4520 35TH AVE W	SEATTLE	WA	98199-1137		202
RESIDENT	4516 35TH AVE W	SEATTLE	WA	98199-1137		203
RESIDENT	4512 35TH AVE W	SEATTLE	WA	98199-1137		204
RESIDENT	4508 35TH AVE W	SEATTLE	WA	98199-1137		205
RESIDENT	4502 35TH AVE W	SEATTLE	WA	98199-1137		206
RESIDENT	4440 35TH AVE W	SEATTLE	WA	98199-1328		207
RESIDENT	4436 35TH AVE W	SEATTLE	WA	98199-1328		208
RESIDENT	4426 35TH AVE W	SEATTLE	WA	98199-1328		209
RESIDENT	4433 35TH AVE W	SEATTLE	WA	98199-1327		210
RESIDENT	4437 35TH AVE W	SEATTLE	WA	98199-1327		211
RESIDENT	3502 W FORT ST	SEATTLE	WA	98199-1332		212
RESIDENT	4505 35TH AVE W	SEATTLE	WA	98199-1136		213
RESIDENT	4511 35TH AVE W	SEATTLE	WA	98199-1136		214
RESIDENT	4515 35TH AVE W	SEATTLE	WA	98199-1136		215
RESIDENT	4519 35TH AVE W	SEATTLE	WA	98199-1136		216
RESIDENT	4525 35TH AVE W	SEATTLE	WA	98199-1136		217
RESIDENT	4527 35TH AVE W	SEATTLE	WA	98199-1136		218
RESIDENT	4533 35TH AVE W	SEATTLE	WA	98199-1136		219
RESIDENT	3417 W MCCORD PL	SEATTLE	WA	98199-1101		220
RESIDENT	3411 W MCCORD PL	SEATTLE	WA	98199-1101		221
RESIDENT	3407 W MCCORD PL	SEATTLE	WA	98199-1101		222
RESIDENT	3401 W MCCORD PL	SEATTLE	WA	98199-1101		223
RESIDENT	3410 W MCCORD PL	SEATTLE	WA	98199-1102		224
RESIDENT	3400 W LAWTON ST	SEATTLE	WA	98199-1141		225
RESIDENT	4578 36TH AVE W	SEATTLE	WA	98199-1146		226
RESIDENT	3505 W LAWTON ST	SEATTLE	WA	98199-1142		227
RESIDENT	3502 W LAWTON ST	SEATTLE	WA	98199-1143		228
RESIDENT	3510 W LAWTON ST	SEATTLE	WA	98199-1143		229
RESIDENT	3514 W LAWTON ST	SEATTLE	WA	98199-1143		230
RESIDENT	3518 W LAWTON ST	SEATTLE	WA	98199-1143		231
RESIDENT	3522 W LAWTON ST	SEATTLE	WA	98199-1143		232
RESIDENT	4554 36TH AVE W	SEATTLE	WA	98199-1146		233
RESIDENT	4558 36TH AVE W	SEATTLE	WA	98199-1146		234
RESIDENT	4564 36TH AVE W	SEATTLE	WA	98199-1146		235
RESIDENT	4570 36TH AVE W	SEATTLE	WA	98199-1146		236
RESIDENT	4574 36TH AVE W	SEATTLE	WA	98199-1146		237
RESIDENT	4623 LAWTON LN W	SEATTLE	WA	98199-1144		238
RESIDENT	4617 LAWTON LN W	SEATTLE	WA	98199-1144		239
RESIDENT	4607 LAWTON LN W	SEATTLE	WA	98199-1144		240
RESIDENT	4601 LAWTON LN W	SEATTLE	WA	98199-1144		241
RESIDENT	4600 LAWTON LN W	SEATTLE	WA	98199-1145		242
RESIDENT	4608 LAWTON LN W	SEATTLE	WA	98199-1145		243
RESIDENT	4618 LAWTON LN W	SEATTLE	WA	98199-1145		244
RESIDENT	4624 LAWTON LN W	SEATTLE	WA	98199-1145		245
RESIDENT	4630 LAWTON LN W	SEATTLE	WA	98199-1145		246
RESIDENT	4634 LAWTON LN W	SEATTLE	WA	98199-1145		247
RESIDENT	4638 36TH AVE W	SEATTLE	WA	98199-1148		248
RESIDENT	4644 36TH AVE W	SEATTLE	WA	98199-1148		249
RESIDENT	3531 W LAWTON CIR	SEATTLE	WA	98199-1158		250

COMPANY	ADDRESS_1	CITY	STATE	ZIP	COUNTRY	NO
RESIDENT	3507 W LAWTON CIR	SEATTLE	WA	98199-1158		251
RESIDENT	3501 W LAWTON CIR	SEATTLE	WA	98199-1158		252
RESIDENT	3504 W LAWTON CIR	SEATTLE	WA	98199-1158		253
RESIDENT	3508 W LAWTON CIR	SEATTLE	WA	98199-1158		254
RESIDENT	3516 W LAWTON CIR	SEATTLE	WA	98199-1158		255
RESIDENT	3522 W LAWTON CIR	SEATTLE	WA	98199-1158		256
RESIDENT	3528 W LAWTON CIR	SEATTLE	WA	98199-1158		257
RESIDENT	3534 W LAWTON CIR	SEATTLE	WA	98199-1158		258
RESIDENT	3515 W COMMODORE WAY	SEATTLE	WA	98199-1178		259
RESIDENT	4663 36TH AVE W	SEATTLE	WA	98199-1120		260
RESIDENT	3626 W LAWTON ST	SEATTLE	WA	98199-1155		261
RESIDENT	3634 W LAWTON ST	SEATTLE	WA	98199-1155		262
RESIDENT	3642 W LAWTON ST	SEATTLE	WA	98199-1155		263
RESIDENT	3648 W LAWTON ST	SEATTLE	WA	98199-1155		264
RESIDENT	3700 W LAWTON ST	SEATTLE	WA	98199-1180		265
RESIDENT	3704 W LAWTON ST	SEATTLE	WA	98199-1180		266
RESIDENT	3718 W LAWTON ST	SEATTLE	WA	98199-1180		267
RESIDENT	3720 W LAWTON ST	SEATTLE	WA	98199-1180		268
RESIDENT	3722 W LAWTON ST	SEATTLE	WA	98199-1180		269
RESIDENT	3726 W LAWTON ST	SEATTLE	WA	98199-1180		270
RESIDENT	3734 W LAWTON ST	SEATTLE	WA	98199-1180		271
RESIDENT	3752 W LAWTON ST	SEATTLE	WA	98199-1180		272

Postcard mailer sent to broader neighborhood:

Property sign installed at the site:

ATTACHMENT C

List of Commenters on Scope of EIS

A. H. Powers
Aaron Allan
Aaron Merhoff
Abbie Bowen
Abe Saeed
AC Miceli
Adam Phillabaum
Adele Maruo
Adit Vohra
Aiden Ward
Aimee Voelz
Alain & Marva Semet
Alan Gibbs
Alan Potter & Karen Ford
Alex Cooper
Alex Johnson
Alex Sutter
Alexander Froehlich
Alexander Wakeman Rouse
Alice Bremner
Alicia Hoppers
Allison Bolgiano
Amanda Bauer
Amanda Fulmer
Amanda Shaw
Amanda Vail
Amit Shah
Amy Brustkern
Amy Hooey
Amy Mandell
Amy Wells
Ana B
Andrea Lewellen
Andrew Funk
Andrew Katz
Andrew Lowe
Andrew Sang
Angela Burton
Angela Herndon
Anne Morgan
Annelise Gasserud
AnnMarie Lamsek
Anthony Reeves
April Atwood
Arthur Day
Arthur Torelli
Asako Hamaya
Ashley Millett
Athena
Aubrey Ciro
Aven Frey
Aviral Gupta
Aylin Kim
Baird Nuckolls
Barbara Kiley
Becky Shields
Ben Hansen
Benjamin Lukoff
Benjamin Ward
Betsey Matsubara
Betsy Ross
Bill Condon
Bill Farmer
Bill Maxwell & Gayle Puccinelli
Bill Singer
Bill Sornsin
Bob Eramia
Bob Hinckley
Bob Moore
Bozena Jakubik
Brad Carmichael
Brendan O'Cassidy
Brian Bass
Brian Chu
Brian Mankinen
Brian Wells
Brie Gyncild
Brie Remily
Brittan Stockert
Bronwen Sainsbury
Brooke Brod
Brooke Hindes
Bryan Kirschner
Bryan Kopel
Bryce Johnson
Caleb Heeringa
Carese Busby
Carla Kotila
Carla Peterson
Carol Burton
Carol Morter
Carrie Bruno
Carrington McDuffie
Catherine Hinrichsen
Cecelia Lehmann
Charlene Strong
Charles Chang
Charles Davis
Charles Londo
Charlie Lipthratt
Charly McCreary
Cheri Kilty
Cheryl Brenner
Cheryl Conway
Cheryl Jacobs
Chip McElearney
Chris Baldwin
Chris Bruno
Chris Jackins
Chris Kapplex
Christina Brooks
Christina Polwarth
Christine Anderson
Christine Atkins
Christine Chan Anderson
Christine Merker
Chuck Ross
Cindy Pierce
Clare Tremper
Clark Smith
Claudia Fernandez Pearson
Claudia Isquith
Clay Vredevoogd
Cody Davis
Colette Mercier
Colin Hansen
Colleen Laing
Colleen McCann
Colleen Monette
Colleen Sitlani
Connie Carroll

Conrad Albert
Corey Rusk
Courteney Bealko
Craig Allegro
Cristina Barr
Cynthia Chavez
Cynthia Faw
Dale Kuizera
Dan Dickenson
Daniel Johnson
Danielle Browne
Darcy Peth
Darlene Von Lehman
Daron Mackie
David Albertson
David Cunningham
David Handa
David Hutchinson
David Schuchardt
Dawn Bourdo
DC
Dean Kralios
Deanna Heikkanin
Deborah Alt
Deborah Berger
Dee Henderson
Deeann Shah
Denis Marthynowych
Denise Ashbaugh
Denise Capen
Denise Derr
Denise Rodrigeuz
Dennis Kelly
Derwin Hosteller
Diana Gustafson
Diane Rusk
Dieter Plapp
Dimitri Groce
District 7 Neighborhood Action Council
Doris Koo
Dorota Ward
Douglas Ito
Duncan Chaliers
Dustin Neighly
Eden Mach
Elaine Sonntag Johnson
Elena Ramirez
Elisabeth Hamon
Elizabest Noble
Elizabeth Campbell
Elizabeth Hester
Elizabeth Noll
Elizabeth Rinehart
Elizabeth Wortley
Elliot Cain
Emily Darling
Emily Leedy
Emily McKeon
Emma Bartholomew
Emmy Misner
Eric Hess
Eric Leitzinger
Eric Peiffer
Ericka Nash
Erik Gunderson
Erin House
Erin Phillips
Erin Rants
Esther Handy
Ethan Phelps-Goodman
Fabio Governato
Fort Lawton School Coalition
Franca Baroni & Alan Alhadeff
Frances Williams
Francine Walsh
Fred Kiga
Gail Ward
Gary Holcombe
Gary Konop
Gary McNeil
Gary Stone
Gay Goodman
Geoffrey Heller
George Bergeron
George Smith
Gina Thompson
Giovannina Souers
Glen Boyd
Glenn Osako
Grace Smith
Greg Vouros
Gregory Quetin
Gretchen Taylor
Gypsy Lovett
Hal Kussick
Halina Murphy
Hannah Hunthausen
Hazel Flynn
Heather MacClintock
Heather Shoultz
Heidi Carpine
Heidi Hespelt
Helen Holter
Hilary Sallee
Howard Cutler
Ian Crozier
Ian Ward
Irene Akio
Israel Herrejon
Jaclyn Green
Jacob Lee
Jacob Mihalak
Jacque Decker
James Davis
James Madden
James McIntosh
James Petersen
James Wright
Jamie Brubaker
Jamie Stone
Jamie Voss
Jana Wagar
Janet Anderson
Janet Riordan
Janina Jakubik
Janyce Fink
Jason Knaggs
Jason Langlais
Jason Stucky
Jason Weill

Jay Lazerwitz
Jean Schwinberg
Jeanne Coulson
Jeff Flagel
Jenna Kirksey
Jennifer Alexander-Hill
Jennifer Crow
Jennifer Lowe
Jennifer McDonald
Jennifer Peters
Jennifer Rooth
Jennifer SavageCrane
Jennisfer Jolley
Jenny Howe
Jenny Taylor
Jeremy Kern
Jeremy Wilkening
Jerry Bridges
Jessica & Michael McFarlane
Jessica Andrews
Jessica Escott
Jessica Luke
Jessica Mogk
Jessica Smits
Jill Pampia
Jim Bruce
Jinpei Shan
Jirair Kevorkian
Jo Stone
Joanna Johnson
John Chaney
John Davis
John Doyle
John Gosink
John Guros
John Haygeman
John Laurer
John Putre
John Rabourn
John Reed
John Walker
Jonathan Korn
Jonathan Tingstad
Joni A. Reeves
Jordan Hopkins
Joseph Mucci
Josh Quinn
Joy Levien
Juan Calaf
Juan Chavez
Juanita McLaughlin
Judi Gibbs
Judith Walker
Julie Berard
Julie Carr
Julie Mayer
Julie Wright
Justin Donaldson
Karen Clark
Karen Erickson
Karen Holt
Karen Nims
Karen Nissen
Karen Overstreet
Karen Sherrard
Karin Frank
Kassandra Bradberry
Kate Cottrell
Kate Criss
Kate Liotta
Kate Smith
Kateryna Adams
Katharine Revello
Katherine Braun
Katherine Dobson
Katherine Harris
Katherine Selvocki
Kathleen Cunningham
Kathleen Hosfeld
Kathlyn Paananen
Kathryn Banke
Kathryn Jacoby
Kathy Bodor
Kathy Johnson
Kathy Slettebak
Katie Hopps
Katie Maynard
Katie Price
Katrina Lehto
KC Dietz
Keara Berlin
Keith Anderson
Keith Conti
Kelley Chen
Kelley Goldmanis
Kelli Larsen
Kellie LaRue
Kelly Clark
Kelly Fahlman
Kelly Hickman
Ken Bryan
Ken Bryant
Kevin Ascher
Kevin Craig
Kevin Kroll
Kevin McCullough
Kim Carmel
Kim Miska
Kim Toskey
Kira Baum
Kjersti Weisenberg
Krista Dalton
Kristeen Penrod
Kristen
Kristina Wilke
Kristine Kershul
Kyle Anderson
Kyle Smits
L. Kay Humm
Larry Tyson
Laura Benjamin
Laura Chin
Laura Donnell
Laura Goldberg
Laura Griffith
Laura Heller
Laura Jeffs
Laura Loe (Bernstein)
Laura Newcomb
Laura Osterbrock
Laura Quandt
Laura Snider

Lauren Jordan
Laurie Pickering
Lea
Len Quai
Lesa Linster
Leslie Reed
Lilie Clenins
Linda Bothell
Linda Kurij
Linda Roeder
Linda Wheeler
Lindsay Thome Saeed
Lisa Barnes
Lisa Evans
Lisa Hagen
Lisa Moore
Lisa Potts
Lisa Spinazze
Lisa Wolf
Liudmila Tatyanina
Lloyd Johnston
Loree and Jon Schoonover
Loree Wagner
Lori Stevens
Lorraine Betts
Lorraine Hartmann
Louis Kim
Lyndsey Cameron
Lynn Ferguson
Lynn McBride
M Smith
MA Leonard
Mairdig Sheridan
Manasi Kashyap
Marcia McCorkle
Margaret Casey
Mari Kim
Maria
Maria Records
Marian Gillis
Marian Wineman
Marie Niekamp
Marilene Bysshe
Marilyn Jarrell
Marilyn Klepper
Marissa Roesijadi
Mark Bailey
Mark Foltz
Mark Gaaserud
Mark McDuff
Mark Plunkett
Mark Stone
Marla Master
Marry Ann Lanphier
Martha Holt
Martha Tofferi
Martijn Buning
Marty Kooistra
Mary Ann Schroeder
Mary Beth Abel
Mary Beth Avedesian
Mary Jean Bustard
Mary Kennedy
Mary Murphy
Mary Steele-Klein
Mary Sweeney
Mary Wong
Mathew Johnson
Matt Adkins
Matt Behrmann
Matt Furlong
Matt Peterson
Matt Tilghman-Havens
Max Dale
Maxwell Baker
McCaela Daffern
Megan Espinoza
Megan Moore
Melissa Gehrig
Melissa Lerch
Mersina Ruediger
Michael Davis
Michael Goldman
Michael Kugler
Michael Laufert
Michael Lord
Michael Morgan
Michael Winkelhorst
Michele Marchi
Michelle Orgill
Michelle Umadhay
Mike Klacrynski
Miko Ruby
Miller Myers
Mona Sanger
Monica Romano
Monica Scott
Muna Mohamed
Myra Lara
Nan McMurry
Nancy Davis
Nancy Miller
Naoko Inoue Shatz
Naomi Menahem
Naomi Mittet
Naomi Nash
Nate Strong
Nathan Arnold
Neal Nuckolls
Nell Gross
Netra Clogston Doyle
Nicki Olivier Hellenkamp (HDC)
Nicki Stein
Nicole
Nicole Hosking
Nicole Lux-Ritchie
Nikki Harpster
Pallavi Goray
Pam Derry
Pam McMillan
Pam O'Brien
Pat Moylan
Patricia Corbin
Patricia Zoberst
Paul Chapman
Paul Hanson
Paul Quinn
Paul Ravetta
Penelope Kock-Patterson
Penny Patterson
Pete Pulliam

Peter Hoelz
Peter Kruger
Phil Andrews
Philippa Nye
Phyllis Rosen
Phyllis Tobias
Rachel Warren
Ramen Dhesi
Randy Barbee
Rebecca Johnson
Rebecca Roy
Renee Tackett
Reuben Hawkins
Richard Starnes
Rick Mohler
Rie Shintani
Robb Maculd
Robert Femiano
Robert Kaminski
Robert Odel
Robert Stephens
Robin White
Robyn Amonson
Rochelle Winnett
Roger Tucker
Rosalind Tan
Roseann Seeley
Roselle Kovitz
Roxanne Duniway
Rozaril Lunch
Russell Power
Ruth Schaefer
Ryan Curren
Ryan Packer
Sallie Lin
Sally Keadle
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Appendix B

Geology/Soils Report

Earth Element Technical Report
Fort Lawton Army Reserve Center Redevelopment Project
Seattle, Washington

December 11, 2017

Prepared for

EA Engineering, Science, and Technology, Inc.

On behalf of

City of Seattle

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Earth Element Technical Report
Fort Lawton Army Reserve Center Redevelopment Project
Seattle, Washington

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INTRODUCTION

This report provides background information to support preparation of the Earth Element section of the Draft Environmental Impact Statement (EIS) for the proposed redevelopment of the Fort Lawton Army Reserve Center and Talaris sites in Seattle, Washington (Figure 1). The existing Fort Lawton and Talaris site conditions are shown on Figures 2 and 3, respectively.

This document has been prepared in support of planning efforts for the Fort Lawton Army Reserve Center Redevelopment project and should not be used beyond the planning stage. Additional site-specific analyses would be performed as part of the specific design and permitting of infrastructure and buildings associated with future site development.

The table below summarizes the development under the EIS Alternatives.

Summary of Development – EIS Alternatives

	ALT. 1		ALT. 2		ALT. 3		ALT. 4	
	F.L. SITE	T. SITE	F.L. SITE	T. SITE	F.L. SITE	T. SITE	F.L SITE	T. SITE
HOUSING								
Number of Housing Units	238	0	113	238[2]	0	238[2]	0	0
Area of Housing (SF)	202,291	0	316,400	256,551	0	256,551	0	0
PARKS & RECREATION								
Number of Sports Fields	2	0	0	0	3	0	0	0
Area of Parks & Recreation (Ac)[1]	21.6	0	0	0	29.0	0	0	0
COMMUNITY FACILITIES								
Area of Community Facilities (SF)	0	0	0	30,621	0	30,621	0	0
PARKING								
Number of Parking Spaces	266	0	254	295	90	295	0	0
Area of Surface Parking (Ac)	4.4	0	0	3.3	4.2	3.3	0	0

Source: Seattle Office of Housing 2017.

F.L. = Fort Lawton; T. = Talaris
Ac = acre; SF = square feet
[1] Includes active and passive parks, Seattle Parks and Recreation maintenance facility and area dedicated to Discovery Park.
[2] For purposes of conservative analysis in this EIS, the same number of affordable and formerly homeless housing units are assumed on the Talaris site under Alternatives 2 and 3 as on the Fort Lawton site under Alternative 1.

EARTH

This section describes the affected earth environment and existing geologic conditions on and in the vicinity of the Fort Lawton and Talaris sites, the impacts from the existing geologic conditions related to future site development under development Alternatives 1 through 3 and a No Action Alternative, potential mitigation measures that may be implemented to address these impacts, and significant unavoidable adverse impacts.

AFFECTED ENVIRONMENT

The information summarized in this document is based on a review of readily available geotechnical information and published sensitive area maps and surficial geologic maps for the project areas. The literature review included both in-house project files and outside sources. Outside sources of information included US Geological Survey (USGS) maps; geologic maps from the Washington State Department of Natural Resources Division of Geology; Soil Survey of King County; borehole logs from the Washington State Department of Natural Resources Division of Geology; Sensitive Areas Maps from the City of Seattle; the online Washington State Department of Ecology well records; and other sources. The sources of information referred to within this technical report are listed in the references section of this report.

The subsurface data collected in support of this document varied across the project area in level of detail, depth of exploration, quality, usefulness, and availability. However, the level of information gathered is considered adequate for an EIS-level report and for the purpose of characterizing subsurface conditions in the study areas, understanding the potential impacts, and identifying proposed and possible mitigation measures for site development.

Fort Lawton Site

General Geology and Topography

The Fort Lawton site, in the Magnolia neighborhood in northwest Seattle, Washington, is located in the central portion of the Puget Lowland physiographic province, an elongated north-south trending topographical and bedrock structural depression situated between the Olympic Mountains and the Cascade Range in western Washington. The topography surrounding the project area is dominated by a series of north-south trending elongated ridges and glacial uplands. The uplands are separated by large, glacially carved troughs that are now partially occupied by tidal waters or large lakes that have been modified by fluvial processes following the retreat of the most recent ice sheet. The major troughs are now partially occupied by Puget Sound, Hood Canal, Lake Washington, Lake Sammamish, and the other large water bodies of western Washington (Booth 1987, Liesch et al. 1963, Mullineaux et al. 1965).

The geology of the Puget Sound region includes a thick sequence of overconsolidated glacial and normally-consolidated non-glacial soils overlying bedrock. Glacial deposits were formed by ice sheets originating in the mountains of British Columbia and from alpine glaciers that descended from the Olympic and Cascade Mountains. These ice sheets invaded the Puget Lowland at least four times during the early to late Pleistocene Epoch (approximately 150,000 to 10,000 years before present). The southern extent of these glacial advances was near present-day Olympia, Washington. Between these glacial advances and after the last glaciation, portions of the Puget Lowland filled with alluvial sediments deposited by rivers, draining the western slopes of the Cascades and the eastern slopes of the Olympics.

The most recent glacial advance, the Fraser Glaciation, included the Vashon Stade, during which the Puget Lobe of the continental ice sheet advanced and retreated through the Puget Sound Basin. Radiocarbon dating indicates that the Vashon ice sheet occupied the Puget Sound area about 15,000 years ago and retreated to the north approximately 13,000 years ago (Thorson 1980). Existing topography, surficial geology, and hydrogeology in the project area were heavily influenced by the advance and retreat of the Vashon ice sheet.

The Fort Lawton redevelopment site is situated within a glacial upland that is locally referred to as the Magnolia Bluff. The Magnolia Bluff is bounded by Shilshole Bay and Salmon Bay to the north, Elliott Bay and Smith Cove to the south, Puget Sound to the west, and the Interbay Trough to the east. Glacial uplands such as the Magnolia Bluff are generally composed of very dense and hard glacial soils that were laid down during the advance and retreat of several glaciers. Since the late 19th century, the project site has been home to the Fort Lawton US Army Reserve Center and as a result, significant grading has occurred across the site.

Surficial Geology

An understanding of the surficial geology of the Fort Lawton site was derived from a review of The Geologic Map of Seattle – a Progress Report (Troost et al. 2005), published by the USGS. Generally, the surficial geology of the project site is mapped as advance outwash.

Geologic Units

Various geologic units are reported to have been encountered in the deeper subsurface explorations reviewed for the Fort Lawton site; these units are referred to throughout this document and are described in the following section.

Very few geologic units have precise boundaries or contacts and the geology of an area can change drastically both horizontally and vertically within a few feet or, in some instances, can remain fairly consistent for hundreds of feet. Typical descriptions of the geologic units reportedly encountered by others at or in the vicinity of the Fort Lawton project site are presented below. In general, the geologic units are ordered from the most recent, or younger deposits, to the oldest. The geologic units that are younger than Vashon-age glacial till have not been glacially over-ridden. The Vashon-age glacial till and the older units have been glacially consolidated and are typically very dense or hard.

Vashon Till

Glacial till typically consists of a heterogeneous mix of gravelly sand with scattered cobbles and boulders in a clay/silt matrix deposited beneath glacial ice. This very dense unit is locally referred to as “hardpan.” Glacial till typically exhibits high shear strength and low compressibility characteristics. Competent sections of till often form bluffs above Puget Sound. Vashon till deposits in the vicinity of the Fort Lawton site are typically 3 to 30 feet (ft) thick.

Vashon-Age Advance Outwash

Meltwater streams emanating from advancing glaciers deposited stratified glacial advance outwash. Glacially over-ridden advance outwash typically consists of unoxidized to slightly oxidized, dense to very dense, well-sorted sand and gravel with cobbles and occasional boulders. Advance outwash locally sits atop Lawton clay deposits and grades downward with increasing silt content. This unit may include overlying areas of Vashon till too small to show at map scale. This unit is regionally important as an aquifer. Where it is thick, groundwater saturated sections occur (Turney et al. 1995). Where underlain by low permeability sediment, the unit may discharge spring water from surface outcrops. In the vicinity of the Fort Lawton site, advance outwash deposits are known to be more than 200 ft thick.

Lawton Clay

Lawton clay typically consists of stiff to hard, laminated to massive silt, clayey silt, and silty clay that was deposited in lowland or proglacial lakes. Dropstones may be locally present as well as fine-grained sediment of the underlying Olympia beds. The thickness of Lawton clay deposits ranges from a few feet to more than 100 ft.

Olympia Beds

Olympia beds typically consist of very dense or hard, thinly interbedded sand, silt, gravel, and peat deposited by lowland streams or in floodplain and/or lacustrine environments during the Olympia non-glacial interval. Following the Olympia non-glacial interval, the Olympia beds were overridden by the Vashon glacial advance.

Groundwater

Due to the thick deposits of advance outwash at the surface overlying Lawton clay deposits, it is likely that any groundwater present at the Fort Lawton site is perched atop the relatively impermeable Lawton clay. Previous subsurface investigations conducted by others (CH2M HILL and Associated Firms 1989) have identified groundwater levels in the vicinity of the Fort Lawton site at a maximum of approximately 160 ft below ground surface (bgs). Previous analyses conducted by others (Booth et al. 2005) generally indicate groundwater flow laterally to the steep hillsides along the coast and deep ravines, such as the Interbay Trough, where groundwater ultimately discharges into Elliott Bay. Furthermore, it is anticipated that groundwater conditions will vary depending on local subsurface conditions, the season, recent weather patterns, and other factors.

Geologic Hazards

Washington State's Growth Management Act (Chapter 36.70A of the Revised Code of Washington [RCW]) requires all cities and counties to identify critical areas within their jurisdictions and to formulate development regulations for their protection. Among the critical areas designated by the Growth Management Act are geologically hazardous areas, defined as such because of their potential

susceptibility to erosion, sliding, earthquake, or other geologic events, or because of their past use (i.e., landfill). These areas may not be suited for development consistent with public health and safety concerns without conducting specific studies during the design and permitting process.

The City of Seattle defines and identifies geologic hazard areas in its Environmentally Critical Areas Ordinance (Chapter 25.09.020 of the Seattle Municipal Code [SMC]) and has developed a folio of maps of the geologically hazardous areas. In general, before development is allowed in or immediately adjacent to mapped critical areas, detailed geotechnical studies must be conducted to address specific standards relating to site geology and soils, seismic hazards, and facility design.

A discussion of steep slope and landslide, seismic, landfill, erosion, and flood hazards is provided below.

Steep Slope and Landslide Hazards

Steep slope areas are generally defined as those areas that rise at an inclination of 40 percent or more with a vertical change in elevation of at least 10 ft. Generally, landslide hazard areas can be defined as:

- Any area with a combination of:
  - Slopes greater than 15 percent;
  - Impermeable soils (typically silt and clay) frequently interbedded with granular soils (predominantly sand and gravel); and
  - Springs or groundwater seepage.
  - Any area that has shown movement during the Holocene Epoch (from 10,000 years ago to present) or is underlain by mass wastage debris of that epoch
  - Any area subject to instability as a result of rapid stream erosion, stream bank erosion, or undercutting by wave action
  - Any area that shows evidence of, or is at risk from, snow avalanches
  - Any area located on an alluvial fan that is presently subject to, or potentially subject to, inundation by debris flows or deposition of stream-transported sediments.

Areas of known landslides are included in the City of Seattle's mapped critical areas. Some of these areas have a history of repeated landsliding. Frequently, these areas of repeated landsliding are located within areas mapped as steep slope hazard areas. Landslide deposits and landslide scars are indicators of past landslides.

The degree of potential sloughing and sliding varies with the steepness and height of the slope. Steeper, higher slopes are more likely to create larger slides, whereas shorter slopes tend to produce smaller surficial sloughs. Slopes that are susceptible to movement under non-earthquake (static) conditions also present a hazard under earthquake loading conditions.

According to the City of Seattle Department of Planning and Development GIS website, the northern portion as well as an area along the western portion of the Fort Lawton site are mapped as potential slide areas with smaller, localized areas mapped as steep slopes (City of Seattle; accessed October 6, 2017). Additionally, the City of Seattle has identified previous slide activity both to the north and south of the Fort Lawton site. Site-specific analyses for future improvements at the Fort Lawton site are needed prior to any construction to ensure compliance with City of Seattle requirements for setback and design.

Seismic Hazards

Seismic hazard areas are generally defined as those areas subject to severe risk of earthquake damage as a result of ground shaking, ground rupture, or soil liquefaction. Ground shaking can occur large distances from the earthquake source, ground rupture occurs only along active fault traces, and liquefaction requires a certain combination of soil and groundwater conditions at the site.

Ground Shaking and Ground Motion Amplification

The entire Puget Sound region lies within a seismically active area, and moderate to high levels of ground shaking should be anticipated during the design life of the proposed Fort Lawton project. Due to the previous development at the Fort Lawton site, there is potential for undocumented near-surface deposits of relatively loose/soft fill soils that may be susceptible to amplified earthquake ground motions at various frequencies. Consequently, the near-surface soils at the Fort Lawton site could affect the level of earthquake ground shaking felt in the area. Seismic design using current design codes and generally accepted engineering standards and practices should be conducted during the design phase of future site improvements. This includes use of the current version of the International Building Code (IBC) as amended by the City of Seattle, which contains provisions to address life safety issues and incorporates data obtained from recent seismic events in the seismic design standards (ICC 2014).

Ground Rupture

The Puget Sound region contains numerous fault zones and the Seattle Fault Zone, located about 6 miles south of the Fort Lawton site, is the closest reported fault zone to the project site. The Seattle Fault Zone is about 3 to 4 miles wide and consists of a series of east-west trending faults. Future ground rupture may occur within the Seattle Fault Zone; however, the actual risk at the Fort Lawton site posed by such ground rupture is considered to be relatively small given the relatively thick deposits of glacial soils and the distance between the site and the fault zone. Consequently, design to account for ground rupture will likely not be a significant part of the site-specific seismic design for future site improvements.

Liquefaction

When shaken by an earthquake, certain soils lose strength and temporarily behave as if they were a liquid. This phenomenon is known as liquefaction. The seismically induced loss of strength can result in loss of bearing capacity for shallow foundations, reduction in vertical and lateral deep foundation capacities, downdrag forces on deep foundations, ground surface settlement, embankment instability, and lateral spreading. Seismically induced liquefaction typically occurs in loose, saturated, sandy material commonly associated with recent river, lake, and beach sedimentation. In addition, seismically induced liquefaction can be associated with areas of loose, saturated fill.

Due to the glacially consolidated nature of the soils and deep depth to groundwater at the Fort Lawton site, it is not anticipated that liquefaction will pose a large hazard to the proposed site development. While there may be undocumented fill at the site, it is unlikely that it will be thick enough or saturated enough to pose a serious liquefaction threat to the proposed development.

Erosion Hazards

Erosion hazard areas are defined as those areas containing soils that may experience severe to very severe erosion from construction activity. The susceptibility to erosion is generally a function of soil type, topography, occurrence of groundwater seepage or surface runoff, and the built environment.

The surficial geology at the Fort Lawton site has been identified as advance outwash and likely undocumented fill. When unvegetated and/or disturbed, advance outwash and fill materials may experience severe to very severe erosion hazards on slopes exceeding 15 percent.

Landfill Areas

No landfills are known to exist in or adjacent to the Fort Lawton site.

Flood Hazard

The Fort Lawton site is not mapped in a flood hazard area.

Talaris Site

General Geology and Topography

The Talaris site, in the Laurelhurst neighborhood of Seattle, approximately 5 miles east of the Fort Lawton site, is located in the central portion of the Puget Lowland physiographic province, an elongated north-south trending topographical and bedrock structural depression situated between the Olympic Mountains and the Cascade Range in western Washington. The topography surrounding the project area is dominated by a series of north-south trending elongated ridges and glacial uplands. The uplands are separated by large, glacially carved troughs that are now partially occupied by tidal waters or large lakes that have been modified by fluvial processes following the retreat of the most recent ice sheet. The major troughs are now partially occupied by Puget Sound, Hood Canal, Lake

Washington, Lake Sammamish, and the other large water bodies of western Washington (Booth 1987, Liesch et al. 1963, Mullineaux et al. 1965).

The geology of the Puget Sound region includes a thick sequence of overconsolidated glacial and normally-consolidated non-glacial soils overlying bedrock. Glacial deposits were formed by ice sheets originating in the mountains of British Columbia and from alpine glaciers that descended from the Olympic and Cascade Mountains. These ice sheets invaded the Puget Lowland at least four times during the early to late Pleistocene Epoch (approximately 150,000 to 10,000 years before present). The southern extent of these glacial advances was near Olympia, Washington. Between these glacial advances and after the last glaciation, portions of the Puget Lowland filled with alluvial sediments deposited by rivers, draining the western slopes of the Cascades and the eastern slopes of the Olympics.

The most recent glacial advance, the Fraser Glaciation, included the Vashon Stade, during which the Puget Lobe of the continental ice sheet advanced and retreated through the Puget Sound Basin. Radiocarbon dates indicate that the Vashon ice sheet occupied the Puget Sound area about 15,000 years ago and retreated to the north approximately 13,000 years ago (Thorson 1980). Existing topography, surficial geology, and hydrogeology in the project area were heavily influenced by the advance and retreat of the Vashon ice sheet.

The Talaris redevelopment site is situated in the Laurelhurst neighborhood of north Seattle, which is bounded by Union Bay to the south, Wolf Bay and Lake Washington to the east, the Union Bay Natural Area (formerly the Montlake Landfill) and the University of Washington bluff to the west, and the Hawthorne Hills and Ravenna neighborhoods to the north. The Laurelhurst neighborhood includes glacial uplands as well as marshlands, and as a result, soils in this area may consist of a mixture of loose to very dense glacial soils and very soft marsh deposits.

Surficial Geology

An understanding of the surficial geology of the Talaris site was derived from a review of The Geologic Map of Seattle – a Progress Report (Troost et al. 2005) and the results of a previous subsurface investigation conducted by others at the site (Shannon & Wilson 2013). Generally, the surficial geology of the project site is mapped as peat, ice contact deposits, and recessional outwash.

Geologic Units

Various geologic units are reported to have been encountered in the deeper subsurface explorations reviewed for the Talaris site; these units are referred to throughout this document and are described in the following section.

Very few geologic units have precise boundaries or contacts and the geology of an area can change drastically both horizontally and vertically within a few feet or, in some instances, can remain fairly consistent for hundreds of feet. Typical descriptions of the geologic units reportedly encountered by

others at or in the vicinity of the Talaris project site are presented below. In general, the geologic units are ordered from the most recent, or younger deposits, to the oldest.

Peat Deposits

Peat deposits typically consist of plant material and woody debris that have accumulated in marshy areas. This unit tends to be very loose and may exhibit extreme levels of compressibility. Peat deposits in the vicinity of the Talaris project site are reportedly about 10 ft thick, except near the southwest corner of the site where they are reportedly as much as 15 ft thick.

Recessional Outwash

Recessional outwash typically consists of stratified sand and gravel, and occasionally silty sand and silt that was deposited in outwash channels that carried glacial meltwater during a period of glacial retreat. Previous work at the site by others (Shannon & Wilson 2013) has identified this unit as medium dense to dense, silty to slightly silty sand with interbeds of sandy silt, gravelly sand, and sandy gravel.

Ice Contact Deposits

Ice contact deposits typically consist of irregularly shaped bodies of glacial till and outwash soils that were deposited at the margin of a glacier. Previous work at the site by others (Shannon & Wilson 2013) has identified this unit as medium dense to very dense, silty sand with varying amounts of gravel. Glaciolacustrine deposits consisting of silt and clay that was deposited in lakes formed at the toe of the glacier also exist within the ice contact deposits. The silt and clay are thinly bedded and are hard due to being overridden by the advancing glaciers.

Groundwater

Previous subsurface investigations conducted by others at the Talaris site (Shannon & Wilson 2013) have identified groundwater at depths ranging from 0 to 25 ft bgs. It is worth noting that two of the Shannon & Wilson borings, B-4-2001 and B-5-2001, encountered artesian groundwater conditions, indicating the presence of a confined aquifer beneath the ice contact deposits. It should be anticipated that groundwater will be encountered at shallow depths in the vicinity of the marsh and will be deeper in upland areas of the site.

Geologic Hazards

Washington State's Growth Management Act (Chapter 36.70A RCW) requires all cities and counties to identify critical areas within their jurisdictions and to formulate development regulations for their protection. Among the critical areas designated by the Growth Management Act are geologically hazardous areas, defined as such because of their potential susceptibility to erosion, sliding, earthquake, or other geologic events, or because of their past use (i.e., landfill). These areas may not

be suited for development consistent with public health and safety concerns without conducting specific studies during the design and permitting process.

The City of Seattle defines and identifies geologic hazard areas in its Environmentally Critical Areas Ordinance (SMC 25.09.020) and has developed a folio of maps of the geologically hazardous areas. In general, before development is allowed in or immediately adjacent to mapped critical areas, detailed geotechnical studies must be conducted to address specific standards relating to site geology and soils, seismic hazards, and facility design.

A discussion of steep slope and landslide, seismic, landfill, erosion, and flood hazards is provided below.

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- Any area with a combination of:
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  - Any area that has shown movement during the Holocene Epoch (from 10,000 years ago to present) or is underlain by mass wastage debris of that epoch
  - Any area subject to instability as a result of rapid stream erosion, stream bank erosion, or undercutting by wave action
  - Any area that shows evidence of, or is at risk from, snow avalanches
  - Any area located on an alluvial fan that is presently subject to, or potentially subject to, inundation by debris flows or deposition of stream-transported sediments.

Areas of known landslides are included in the City of Seattle's mapped critical areas. Some of these areas have a history of repeated landsliding. Frequently, these areas of repeated landsliding are located within areas mapped as steep slope hazard areas. Landslide deposits and landslide scars are indicators of past landslides.

The degree of potential sloughing and sliding varies with the steepness and height of the slope. Steeper, higher slopes are more likely to create larger slides, whereas shorter slopes tend to produce smaller surficial sloughs. Slopes that are susceptible to movement under non-earthquake (static) conditions also present a hazard under earthquake loading conditions.

The City of Seattle Department of Planning and Development GIS website has identified localized steep slope areas along the eastern edge of the Talaris site, as well as along Talaris Way; however, no

areas in the vicinity of the site have been identified as potential slide areas (City of Seattle; accessed October 6, 2017). Site-specific analyses for future improvements at the project site may be needed prior to any construction to ensure compliance with City of Seattle requirements for setback and design.

Seismic Hazards

Seismic hazard areas are generally defined as those areas subject to severe risk of earthquake damage as a result of ground shaking, ground rupture, or soil liquefaction. Ground shaking can occur large distances from the earthquake source, ground rupture occurs only along active fault traces, and liquefaction requires a certain combination of soil and groundwater conditions at the site.

Ground Shaking and Ground Motion Amplification

The entire Puget Sound region lies within a seismically active area, and moderate to high levels of ground shaking should be anticipated during the design life of the proposed Talaris development. Due to the presence of relatively thick peat deposits at the Talaris site, the site may be susceptible to amplified earthquake ground motions at various frequencies. Consequently, the near-surface soils at the Talaris site could affect the level of earthquake ground shaking felt in the area. Seismic design using current design codes and generally accepted engineering standards and practices should be conducted during the design phase of the future site improvements. This includes use of the current version of the IBC as amended by the City of Seattle, which contains provisions to address life safety issues and incorporates data obtained from recent seismic events in the seismic design standards.

Ground Rupture

The Puget Sound region contains numerous fault zones, and the Seattle Fault Zone, located about 5 miles south of the Talaris site, is the closest reported fault zone to the project site. The Seattle Fault Zone is about 3 to 4 miles wide and consists of a series of east-west trending faults. Future ground rupture may occur within the Seattle Fault Zone; however, the actual risk at the Talaris site posed by such ground rupture is considered to be relatively small given the relatively thick deposits of glacial soils and the distance between the site and the fault zone. Consequently, design to account for ground rupture will likely not be a significant part of the site-specific seismic design for future site improvements.

Liquefaction

When shaken by an earthquake, certain soils lose strength and temporarily behave as if they were a liquid. This phenomenon is known as liquefaction. The seismically induced loss of strength can result in loss of bearing capacity for shallow foundations, reduction in vertical and lateral deep foundation capacities, downdrag forces on deep foundations, ground surface settlement, embankment instability, and lateral spreading. Seismically induced liquefaction typically occurs in loose, saturated, sandy

material commonly associated with recent river, lake, and beach sedimentation. In addition, seismically induced liquefaction can be associated with areas of loose, saturated fill.

Due to the presence of relatively thick peat deposits and portions of the recessional outwash unit that could be loose to medium dense at the Talaris site, it is anticipated that soil liquefaction would pose a risk to development at the site. Liquefaction hazard mitigation will likely be a major focus of the seismic design for future site improvements.

Erosion Hazards

Erosion hazard areas are defined as those areas containing soils that may experience severe to very severe erosion from construction activity. The susceptibility to erosion is generally a function of soil type, topography, occurrence of groundwater seepage or surface runoff, and the built environment.

The soils at the Talaris site have been identified as peat, recessional outwash, ice contact deposits, and also likely include undocumented fill. When unvegetated and/or disturbed (e.g., during construction activities), ice contact deposits, recessional outwash, and fill materials may experience severe to very severe erosion hazards on slopes exceeding 15 percent. Peat deposits are typically found on very shallow slopes or flat areas and would not be expected to be an erosion hazard; however, depending on the composition of the peat, it may be erodible in unprotected cut slopes.

Landfill Areas

The City of Seattle Department of Planning and Development GIS website has identified the abandoned Montlake Landfill to the south and east of the Talaris site (City of Seattle; accessed October 6, 2017). While the Talaris site is within the 1,000-ft methane buffer identified by the City of Seattle, previous work by others (Shannon & Wilson 2013) has identified the risk of methane migrating from the abandoned landfill onto the property as being low.

Flood Hazard

The Talaris site is not mapped in a flood hazard area.

IMPACTS OF THE ALTERNATIVES

This section evaluates the potential impacts that the existing earth elements at the site may have on the Fort Lawton EIS alternatives, as well as how the alternatives could impact the earth elements at the site. These impacts include both short-term construction impacts and long-term operational impacts. For identified impacts, some potential mitigation measures are noted in this section to supplement the discussion in the subsequent required/proposed Mitigation Measures section of this document.

Alternative 1: Mixed Income Affordable Housing and Public Park Uses On Site

Fort Lawton Site

The following sections describe impacts related to Alternative 1 at the Fort Lawton site.

Geologic Hazard Impacts

Geologic hazard impacts are discussed below in terms of how existing geologic conditions at the site could affect the Fort Lawton development under Alternative 1.

Settlement

The surficial soil anticipated at the Fort Lawton site is not expected to have unfavorable settlement characteristics for the proposed development.

Landsliding/Steep Slopes

There is a potential for landsliding of existing, steep, landslide–prone slopes in the northern and western portions of the Fort Lawton site. Landsliding could be triggered by a seismic event; the natural process of stabilization of a steep slope to a flatter profile; an increase in pore water pressure from excessive rainfall that could destabilize the slope; or construction that traverses or cuts into a steep slope. The impact of landsliding is considered to be moderately low for Alternative 1 given that these portions of the site would be maintained as non-developed areas.

Erosion

The surficial geology at the Fort Lawton site has been identified as advance outwash and likely undocumented fill. When unvegetated and/or disturbed, advance outwash and fill materials may experience severe to very severe erosion hazards on slopes exceeding 15 percent.

Portions of the site have slopes that exceed 15 percent and development in these areas will require analysis on a case-by-case basis and site-specific analyses would need to be performed for each structure to mitigate this impact. Additionally, construction on slopes would include employing temporary erosion control measures and Best Management Practices (BMPs) during construction to mitigate erosion impacts (see the Mitigation Measures section of this document for details).

Ground Shaking and Ground Motion Amplification

The entire Puget Sound region lies within a seismically active area, and moderate to high levels of ground shaking should be anticipated during the design life of the proposed Fort Lawton development. Due to the previous development at the Fort Lawton site, there is potential for undocumented near-surface deposits of relatively loose/soft fill soils that may be susceptible to amplified earthquake ground motions at various frequencies. Consequently, the near-surface soils at the Fort Lawton site could affect the level of earthquake ground shaking felt in the area. Seismic

design using current design codes (including the IBC as amended by the City of Seattle) and generally accepted engineering standards and practices would be conducted during the design phase of future site improvements to reduce the potential impacts to buildings and infrastructure due to ground shaking.

Ground Rupture

The Fort Lawton site is located about 6 miles north of the Seattle Fault Zone. The Seattle Fault Zone is about 3 to 4 miles wide and consists of a series of east-west trending faults. Future ground rupture may occur within the Seattle Fault Zone; however, the actual risk at the Fort Lawton site posed by such ground rupture is considered to be relatively small given the relatively thick deposits of glacial soils and the distance between the site and the fault zone. Consequently, design to account for ground rupture will not be a significant part of the site-specific seismic design for future site improvements.

Liquefaction

Due to the glacially consolidated nature of the soils and deep depth to groundwater at the Fort Lawton site, it is not anticipated that liquefaction will pose a major hazard to the proposed site development. While there may be undocumented fill at the site, it is unlikely that it will be thick enough or saturated enough to pose a serious liquefaction threat to the proposed development.

Seismically Induced Landslides

Because the proposed structures in Alternative 1 are not in the vicinity of any landslide hazard areas, it is not anticipated that seismically induced landslides will present a threat to the proposed development.

Landfill Areas

No landfills are known to exist on or adjacent to the Fort Lawton site; therefore, there is no anticipated need to mitigate landfill impacts.

Groundwater

As previously discussed, the primary groundwater system at the Fort Lawton site consists of perched groundwater atop the relatively impermeable Lawton clay. Previous subsurface investigations conducted by others (CH2M HILL and Associated Firms 1989) have identified groundwater levels in the vicinity of the Fort Lawton site to be at a maximum of approximately 160 ft bgs. Previous analyses conducted by others (Booth et al. 2005) generally indicate groundwater flow laterally to the steep hillsides along the coast and deep ravines, such as the Interbay Trough, where groundwater ultimately discharges into Elliott Bay. Furthermore, it is anticipated that groundwater conditions will vary depending on local subsurface conditions, the season, recent weather patterns, and other factors.

The future site improvements under Alternative 1 will typically replace existing impervious surfaces with new buildings and pavements, and there may be a slight reduction in impervious surfaces at the site; however, no significant loss of recharge to the perched aquifer is anticipated. The project stormwater management system may include retention basins and rain gardens. Depending on the specific location and design of these facilities, there could be some recharge to the aquifer in the vicinity of these facilities.

While temporary excavation dewatering could potentially be required for certain structures and infrastructure, the effect on groundwater would be temporary and localized (also see the Construction Dewatering section below).

Construction-Related Impacts

Many of the potential impacts due to geologic hazards could be mitigated by implementing effective design and construction techniques or selecting appropriate foundation types.

The development of Alternative 1 at the Fort Lawton site would include removing some of the existing pavement and structures and preparing subgrade soils by grading, placing, and compacting structural fill.

Erosion During Construction

Construction associated with Alternative 1 could have erosion impacts on exposed soil and soil stockpiles, which could cause onsite and offsite transport of sediment. However, standard temporary erosion and sedimentation control measures and BMPs (as summarized in the Mitigation Measures section of this document) would be implemented during construction of future site improvements to reduce the potential for erosion-related impacts.

Construction Excavations

Temporary excavations will likely be required for the installation of future structures and infrastructure, including new/upgraded underground utilities under Alternative 1. Without mitigation, these excavations could have a potentially adverse effect on immediately adjacent existing and future structures (i.e., structures within a distance equal to about the depth of the excavation), utilities, and other improvements. However, standard construction measures, such as use of properly designed and installed temporary shoring systems, would reduce the potential for such adverse impacts.

Construction Dewatering

The depth to groundwater at the Fort Lawton site is expected to be relatively deep; however, groundwater may be encountered at relatively shallow depths, particularly during the winter and spring months. Therefore, construction dewatering may be required to control groundwater flow into certain excavations. The process of excavation dewatering could potentially cause some ground settlement and damage to adjacent utilities and structures. The radius of influence of a dewatering

system is related to the amount of drawdown of the water table. If extensive dewatering is required, site-specific analyses will determine what structures (existing or future, on site or off site) may be influenced by excavation dewatering. Examples of mitigation measures to control the potential impact of excavation dewatering include minimizing the extent and duration of dewatering, and installing groundwater cut-off walls.

Placement of Structural Fill

It is anticipated that a substantial amount of surficial onsite soil that is excavated as part of site development will be suitable for reuse as onsite fill, provided that the excavated material is properly handled and moisture-conditioned prior to placement and compaction. All structural fill and backfill material placed as part of future site improvements would be densely compacted, which can cause vibrations and potential settlement of structures in the immediate vicinity of the construction work. Placement of large volumes of fill can also cause settlement/ground subsidence that could impact existing or future structures (on site or off site) in the immediate area of the fill; however, the potential for offsite impacts applies only to significant fills placed for future development at the perimeter of the Fort Lawton site.

It is understood that under Alternative 1, the proposed structures would be designed to conform to the existing site topography and minimal grading would occur, except possibly toward the south end of the site next to an existing road where site elevations increase and a large cut is proposed. Potential impacts to existing structures on and near the site to be retained (such as the existing Veterans Administration [VA] office off site and the Maintenance Building – Building 245 on site), as well as to future onsite and existing offsite structures, will be mitigated by site-specific analysis and design of fill placement near existing settlement-sensitive structures.

Construction/Excavation On or Adjacent to Landslide-Prone Areas

Based on the information available at the time this report was written, it is understood that proposed structures associated with Alternative 1 will not be located in the vicinity of any landslide-prone areas or their associated buffers. Therefore, it is not anticipated that construction activities will have an effect on slope stability in the area.

Talaris Site

Because Alternative 1 includes no development of the Talaris site, there are no anticipated impacts.

Alternative 2: Market Rate Housing On Site; Affordable/Homeless Housing Off Site

Fort Lawton Site

The following sections describe impacts related to Alternative 2 at the Fort Lawton site.

Geologic Hazard Impacts

Geologic hazard impacts are discussed below in terms of how existing geologic conditions at the site could affect the Fort Lawton development under Alternative 2.

Settlement

The surficial soil anticipated at the Fort Lawton site is not expected to provide unfavorable settlement characteristics for the proposed development under Alternative 2.

Landsliding/Steep Slopes

There is a potential for landsliding of existing, steep, landslide–prone slopes in the northern and western portions of the Fort Lawton site. Landsliding could be triggered by a seismic event; the natural process of stabilization of a steep slope to a flatter profile; an increase in pore water pressure from excessive rainfall that could destabilize the slope; or construction that traverses or cuts into a steep slope. The impact of landsliding is considered to be relatively high for Alternative 2 because some of the proposed structures are located in landslide hazard areas; however, through good site planning, it would likely be possible to avoid this potential adverse earth impact. Furthermore, site-specific analyses for future improvements in the vicinity of areas mapped as landslide hazard areas are needed prior to any construction to ensure compliance with City of Seattle requirements for setback and design. Landslide mitigation may include the construction of retaining walls and/or deep foundations such as driven piles.

Erosion

The surficial geology at the Fort Lawton site has been identified as advance outwash and likely undocumented fill. When unvegetated and/or disturbed, advance outwash and fill materials may experience severe to very severe erosion hazards on slopes exceeding 15 percent.

Portions of the site have slopes that exceed 15 percent and development in these areas under Alternative 2 will require analysis on a case-by-case basis and site-specific analyses would need to be performed for each structure to mitigate this impact. Additionally, construction on slopes would include employing temporary erosion control measures and BMPs during construction to mitigate erosion impacts (see the Mitigation Measures section of this document for details).

Ground Shaking and Ground Motion Amplification

The entire Puget Sound region lies within a seismically active area, and moderate to high levels of ground shaking should be anticipated during the design life of the proposed Fort Lawton development. Due to the previous development at the Fort Lawton site, there is potential for undocumented near-surface deposits of relatively loose/soft fill soils that may be susceptible to amplified earthquake ground motions at various frequencies. Consequently, the near-surface soils at the Fort Lawton site could affect the level of earthquake ground shaking felt in the area. Seismic

design using current design codes (including the IBC as amended by the City of Seattle) and generally accepted engineering standards and practices would be conducted during the design phase of future site improvements under Alternative 2.

Ground Rupture

The Fort Lawton site is located about 6 miles north of the Seattle Fault Zone. The Seattle Fault Zone is about 3 to 4 miles wide and consists of a series of east-west trending faults. Future ground rupture may occur within the Seattle Fault Zone; however, the actual risk at the Fort Lawton site posed by such ground rupture under Alternative 2 is considered to be relatively small given the relatively thick deposits of glacial soils and the distance between the site and the fault zone. Consequently, design to account for ground rupture will not be a significant part of the site-specific seismic design for future site improvements.

Liquefaction

Due to the glacially consolidated nature of the soils and deep depth to groundwater at the Fort Lawton site, it is not anticipated that liquefaction will pose a major hazard to the proposed site development under Alternative 2. While there may be undocumented fill at the site, it is unlikely that it will be thick enough or saturated enough to pose a serious liquefaction threat to the proposed development.

Seismically Induced Landslides

While the surficial soils at the Fort Lawton site are not considered to be liquefiable, slope failures may still result under Alternative 2 as the dynamic shear stresses produced by earthquake shaking increase the load along a potential failure plane. To address the potential impact of such slope movement, mitigation measures would include site-specific slope stability analysis and design of any proposed structures near steep slope or landslide hazard areas.

Landfill Areas

No landfills are known to exist on or adjacent to the Fort Lawton site; therefore, there is no anticipated need to mitigate landfill impacts.

Groundwater

As previously discussed, the primary groundwater system at the Fort Lawton site consists of perched groundwater atop the relatively impermeable Lawton clay. Previous subsurface investigations conducted by others (CH2M HILL and Associated Firms 1989) have identified groundwater levels in the vicinity of the Fort Lawton site at a maximum of approximately 160 ft bgs. Previous analyses conducted by others (Booth et al. 2005) generally indicate groundwater flow laterally to the steep hillsides along the coast and deep ravines, such as the Interbay Trough, where groundwater ultimately

discharges into Elliott Bay. Furthermore, it is anticipated that groundwater conditions will vary depending on local subsurface conditions, the season, recent weather patterns, and other factors.

The future site improvements under Alternative 2 will typically replace existing impervious surfaces with new buildings and pavements, and there may be a slight reduction in impervious surfaces at the site; however, no significant loss of recharge to the perched aquifer is anticipated. The project stormwater management system may include retention basins and rain gardens. Depending on specific location and design of these facilities, there could be some recharge to the aquifer in the vicinity of these facilities.

While temporary excavation dewatering could potentially be required for certain infrastructure, the effect on groundwater would be temporary and localized (also see the Construction Dewatering section below).

Construction-Related Impacts

Many of the potential impacts due to geologic hazards could be mitigated by implementing effective design and construction techniques or selecting appropriate foundation types.

Development of Alternative 2 at the Fort Lawton site would include removing some of the existing pavement and all of the structures and preparing subgrade soils by grading, placing, and compacting structural fill. Construction of retaining walls and/or deep foundations may be necessary to properly mitigate landslide hazards.

Erosion During Construction

Construction associated with Alternative 2 could have erosion impacts on exposed soil and soil stockpiles, which could cause onsite and offsite transport of sediment. However, standard temporary erosion and sedimentation control measures and BMPs (as summarized in the Mitigation Measures section of this document) would be implemented during construction of future site improvements to reduce the potential for erosion-related impacts.

Construction Excavations

Temporary excavations will likely be required for the installation of future structures and infrastructure, including new/upgraded underground utilities under Alternative 2. Without mitigation, these excavations could have a potentially adverse effect on immediately adjacent existing and future structures (i.e., structures within a distance equal to about the depth of the excavation), utilities, and other improvements. However, standard construction measures, such as use of properly designed and installed temporary shoring systems, would reduce the potential for such adverse impacts.

Construction Dewatering

The depth to groundwater at the Fort Lawton site is expected to be relatively deep; however, groundwater may be encountered at relatively shallow depths, particularly during the winter and spring months. Therefore, construction dewatering may be required to control groundwater flow into certain excavations under Alternative 2. The process of excavation dewatering could potentially cause some ground settlement and damage to adjacent utilities and structures. The radius of influence of a dewatering system is related to the amount of drawdown of the water table. If extensive dewatering is required, site-specific analyses will determine what structures (existing or future, on site or off site) may be influenced by excavation dewatering. Examples of mitigation measures to control the potential impact of excavation dewatering include minimizing the extent and duration of dewatering, and installing groundwater cut-off walls.

Placement of Structural Fill

It is anticipated that a substantial amount of surficial onsite soil that is excavated as part of site development will be suitable for reuse as onsite fill under Alternative 2, provided that the excavated material is properly handled and moisture-conditioned prior to placement and compaction. All structural fill and backfill material placed as part of future site improvements would be densely compacted, which can cause vibrations and potential settlement of structures in the immediate vicinity of the construction work. Placement of large volumes of fill can also cause settlement/ground subsidence that could impact existing or future structures (on site or off site) in the immediate area of the fill; however, the potential for offsite impacts applies only to significant fills placed for future development at the perimeter of the Fort Lawton site, which is not proposed under Alternative 2.

It is understood that under Alternative 2, the proposed structures would be designed to conform to the existing site topography and minimal grading would occur. Potential impacts to future onsite and existing offsite structures would be mitigated by site-specific analysis and design of fill placement near existing settlement-sensitive structures.

Construction/Excavation On or Adjacent to Landslide-Prone Areas

The northern portion as well as part of the western portion of the Fort Lawton site have been identified as landslide hazard areas by the City of Seattle.

Alternative 2 involves constructing approximately 113 market rate housing units and 254 parking spaces on the Fort Lawton site. Some of these proposed housing units would be built in the vicinity of these landslide hazard areas and as such, site-specific slope stability analyses and design of the residential units and any associated earth retention structures required along the top of the slope would mitigate the potential adverse effect of construction on the stability of these areas. The potential use of pile- or pier-supported foundations would have less impact to steep slopes. Additionally, measures that can be used to reduce construction impacts on the stability of the slope

would include employing temporary erosion control measures and BMPs during construction (see the Mitigation Measures section of this document).

Deep Foundations

Due to the presence of landslide hazard areas in the vicinity of some of the housing units proposed under Alternative 2, deep foundations may be used to minimize impacts to the stability of the slopes. Actual pile foundation types to be used for future site improvements would be determined as part of the site-specific design of individual structures, and could include driven piles or drilled micropiles. The depth of pile foundations would be determined as part of the site-specific slope stability analysis of individual structures, and would depend on various factors that include the pile type, the building loads, and site-specific soil conditions.

Driven Piles

During installation of driven piles for foundation support of structures under Alternative 2, potential obstructions may be encountered, such as boulders and other debris that could obstruct pile driving and possibly result in damage to some of the piles.

Increased levels of noise and vibration can occur within about 50 to 100 ft of pile-driving activities. Peak particle velocities within 10 to 15 ft of pile driving can, in certain cases, exceed 2.0 inches per second (ips), gradually diminishing with distance. Structural damage can occur at peak particle velocities of 2.0 ips and greater.

Soil densification can occur with driven displacement piles when peak particle velocities approach 0.20 ips, which is generally within about 100 ft of pile driving. Soil densification could potentially impact adjacent structures or utilities. The potential impact to existing or future adjacent structures or utilities is directly related to the intensity of the vibration, the diameter of the pile, the inherent density of the soil, and the sensitivity of the adjacent structure or utility to vibrations. The impact of vibrations is difficult to quantify and needs to be addressed on a case-by-case basis and may extend offsite for pile-supported structures located near the perimeter of the Fort Lawton site.

Drilled Piles

Drilled piles could potentially be used in various different systems for stabilizing steep slopes in the landslide hazard areas identified on the Fort Lawton site. These systems could include auger-cast piles, micropile root piles, or soldier piles. Construction of drilled piles can be impacted by caving soils, soil heave, and large obstructions. The installation of drilled piles generally does not produce significant vibrations; however, installation of temporary casing can produce ground vibrations and localized ground settlement around the drilled pile construction area. Potential mitigation measures for drilled piles include using casing to control caving soils and monitoring the ground surface during construction.

Talaris Site

The following sections describe impacts related to Alternative 2 at the Talaris site.

Geologic Hazard Impacts

Geologic hazard impacts are discussed below in terms of how existing geologic conditions at the site could affect the development of Alternative 2 at the Talaris site.

Settlement

Portions of the Talaris site are underlain by loose/soft compressible deposits. Constructing heavy structures or placing significant heights of fill directly on these soil types under Alternative 2 could cause foundation settlement, particularly in the southwest portion of the site where the depth to competent native soil is as much as 25 ft bgs. Such settlement could result in damage to structures and utilities. In order to preclude adverse settlement impacts, typical construction mitigation measures would be implemented, and could include using deep foundation systems for heavy structures or preloading a building site prior to construction of relatively light structures on spread foundations.

Landsliding/Steep Slopes

The City of Seattle Department of Planning and Development GIS website has identified localized steep slope areas along the eastern edge of the Talaris site, as well as along Talaris Way; however, no areas in the vicinity of the site have been identified as potential slide areas (City of Seattle; accessed October 6, 2017). The impact of landsliding is considered to be moderately low for Alternative 2 because the steep slope areas appear to be localized. Depending on the locations of the proposed improvements in relation to the steep slope areas, site-specific analyses of the project site may be needed prior to any construction to ensure compliance with City of Seattle requirements for setback and design.

Erosion

The soils at the Talaris site have been identified as peat, ice contact deposits, recessional outwash, and likely include undocumented fill. When unvegetated and/or disturbed (e.g., during construction activities), ice contact deposits, recessional outwash, and fill materials may experience severe to very severe erosion hazards on slopes exceeding 15 percent. Peat deposits are typically found on very shallow slopes or flat areas and would not be expected to be an erosion hazard however, depending on the composition of the peat, it may be erodible in unprotected cut slopes.

Portions of the site have slopes that exceed 15 percent and development under Alternative 2 in these areas will require analysis on a case-by-case basis and site-specific analyses would need to be performed for each structure to mitigate this impact. Additionally, construction on slopes would

include employing temporary erosion control measures and BMPs during construction to mitigate erosion impacts (see the Mitigation Measures section of this document for details).

Ground Shaking and Ground Motion Amplification

The entire Puget Sound region lies within a seismically active area, and moderate to high levels of ground shaking should be anticipated during the design life of the proposed development. Due to the presence of relatively thick peat deposits at the Talaris site, the site may be susceptible to amplified earthquake ground motions at various frequencies. Consequently, the near-surface soils at the Talaris site could affect the level of earthquake ground shaking felt in the area. Seismic design using current design codes (including the IBC as amended by the City of Seattle) and generally accepted engineering standards and practices would be conducted during the design phase of the future site improvements under Alternative 2.

Ground Rupture

The Talaris site is located about 5 miles north of the Seattle Fault Zone. The Seattle Fault Zone is about 3 to 4 miles wide and consists of a series of east-west trending faults. Future ground rupture may occur within the Seattle Fault Zone; however, the actual risk at the Talaris site posed by such ground rupture is considered to be relatively small given the relatively thick deposits of glacial soils and the distance between the site and the fault zone. Consequently, design to account for ground rupture will not be a significant part of the site-specific seismic design for future site improvements under Alternative 2.

Liquefaction

The Talaris site may be subjected to earthquake shaking and should be considered to have a moderate to high seismic risk. There is also potential for loss of soil strength (loss of bearing capacity for shallow foundations or the reduction in lateral and vertical capacities of deep foundations), ground surface settlement, and lateral displacement of soils supporting the future development structures under Alternative 2 where founded in or over liquefiable soils. The magnitude of settlement, soil movement, and loss of strength is a function of the soil thickness, soil quality, groundwater level, location, magnitude of the seismic event, and the specific foundation system of the structure.

Liquefaction can result in widespread structural damage if not properly mitigated. Damage caused by liquefaction can include: foundation rotation, slope failure, lateral spreading, and post-liquefaction ground subsidence (settlement).

Soil liquefaction, should it occur, would likely lead to consolidation of loose, saturated soil deposits, resulting in some surface settlement at the site. Because subsurface conditions vary across the site, overall settlement would vary, leading to differential settlements across the site and possibly differential settlements between adjacent foundation elements. Liquefaction-induced ground settlements could cause increased downdrag loading on deep foundations.

Impacts associated with soil liquefaction can be mitigated in a number of ways, as discussed in the Mitigation Measures section of this document. Examples of possible mitigation methods include ground improvement, use of deep foundations, or designing for the potential soil liquefaction impacts. The specific mitigation measures would be determined during site-specific design of future site improvements.

Seismically Induced Landslides

Flow liquefaction landslides are triggered when the shear stress required for static equilibrium of the soil mass is greater than the shear strength of the liquefied soil. While the Talaris site does contain deposits of liquefiable soil, the risk of flow liquefaction landslides is considered to be low because the liquefiable soils generally exist only on level portions of the site. Additionally, the slopes that border the site to the north, east, and west are generally composed of glacially overconsolidated and/or fine-grained materials that are typically not susceptible to liquefaction.

Non-liquefiable slopes can also experience slope failures as the dynamic shear stresses produced by earthquake shaking increase the load along a potential failure plane. Although the potential for deep-seated, earthquake-induced landslides at the Talaris site is relatively low, some sloughing and slope movement would likely occur within the loose surficial materials on the localized slopes during a large seismic event under Alternative 2. To address the potential impact of such slope movement, mitigation measures would include site-specific slope stability analyses and design of structures located in steep slope areas.

Landfill Areas

The City of Seattle Department of Planning and Development GIS website has identified the abandoned Montlake Landfill to the south and east of the site (City of Seattle; accessed October 6, 2017). While the Talaris site is within the 1,000-ft methane buffer, previous work by others (Shannon & Wilson 2013) has identified the risk of methane migrating from the abandoned landfill onto the property as being low. Because of this, it is anticipated that no mitigation measures associated with the abandoned landfill will be necessary for the Talaris site under Alternative 2.

Groundwater

Previous subsurface investigations conducted by others at the Talaris site (Shannon & Wilson 2013) have identified groundwater at depths ranging from 0 to 25 ft bgs. It is worth noting that two of the Shannon & Wilson borings, B-4-2001 and B-5-2001, encountered artesian groundwater conditions, indicating the presence of a confined aquifer beneath the ice contact deposits. It should be anticipated that groundwater will be encountered at shallow depths in the vicinity of the marsh and will be deeper in upland areas of the site.

The future site improvements, including new structures and infrastructure, under Alternative 2 will increase impervious surfaces from about 30 percent of the site to approximately 50 percent of the

site. Alternative 2 includes construction of sustainable stormwater control and landscape features, therefore some recharge to the regional aquifer can be expected.

While temporary excavation dewatering could potentially be required for certain structures and infrastructure under Alternative 2, the effect on groundwater would be temporary and localized (also see the Construction Dewatering section below).

Construction-Related Impacts

Many of the potential impacts due to geologic hazards could be mitigated by implementing effective design and construction techniques or selecting appropriate foundation types.

The development of Alternative 2 at the Talaris site would include removing some of the existing pavement and preparing subgrade soils by grading, placing, and compacting structural fill. Ground improvement and/or deep foundations may be necessary to properly mitigate liquefaction hazards.

Erosion During Construction

Construction associated with Alternative 2 could have erosion impacts on exposed soil and soil stockpiles, which could cause onsite and offsite transport of sediment. However, standard temporary erosion and sedimentation control measures and BMPs (as summarized in the Mitigation Measures section of this document) would be implemented during construction of future site improvements to reduce the potential for erosion-related impacts.

Construction Excavations

Temporary excavations will likely be required for the installation of future structures and infrastructure, including new/upgraded underground utilities under Alternative 2. Without mitigation, these excavations could have a potentially adverse effect on immediately adjacent existing and future structures (i.e., structures within a distance equal to about the depth of the excavation), utilities, and other improvements. However, standard construction measures, such as use of properly designed and installed temporary shoring systems, would reduce the potential for such adverse impacts.

Construction Dewatering

Groundwater may be encountered within excavations at relatively shallow depths under Alternative 2, particularly during the winter and spring months. Therefore, construction dewatering may be required to control groundwater flow into certain excavations. The process of excavation dewatering could potentially cause some ground settlement and damage to adjacent utilities and structures. The radius of influence of a dewatering system is related to the amount of drawdown of the water table. Site-specific analyses will determine what structures (existing or future, on site or off site) may be influenced by excavation dewatering; however, the potential for offsite impacts applies only to excavation dewatering for future development at the perimeter of the Talaris site. Examples of

mitigation measures to control the potential impact of excavation dewatering include minimizing the extent and duration of dewatering, and installing groundwater cut-off walls.

Placement of Structural Fill

Highly organic material such as the peat that underlies a large portion of the Talaris site will not be suitable for reuse as onsite fill. As a result, it is likely that any fill needed on site under Alternative 2 will have to be imported. All structural fill and backfill material placed as part of future site improvements would be densely compacted, which can cause vibrations and potential settlement of structures in the immediate vicinity of the construction work. Placement of large volumes of fill can also cause settlement/ground subsidence that could impact existing or future structures (on site or off site) in the immediate area of the fill; however, the potential for offsite impacts applies only to significant fills placed for future development at the perimeter of the Talaris site.

It is understood that under Alternative 2, the proposed structures would be designed to conform to the existing site topography and minimal grading would occur. Potential impacts to future onsite and existing offsite structures would be mitigated by site-specific analysis and design of fill placement near existing settlement-sensitive structures.

Construction/Excavation On or Adjacent to Landslide-Prone Areas

The City of Seattle has identified localized steep slope areas along the eastern edge of the Talaris site, as well as along Talaris Way; however, no areas in the vicinity of the site have been identified as potential slide areas.

Alternative 2 involves constructing approximately 238 housing units, 30,621 square feet of community facilities, and 295 parking spaces on the Talaris site. In the event that any of these structures are constructed in steep slope areas, site-specific slope stability analyses and design would mitigate the potential adverse effect of construction on the stability of these areas. Additionally, measures that can be used to reduce construction impacts on the stability of the slope would include employing temporary erosion control measures and BMPs during construction (see the Mitigation Measures section of this document).

Preloading

Preloading or surcharging a future building site prior to construction can be used to preconsolidate compressible foundation soils and reduce post-construction settlement impacts on spread foundation systems; however, preloading or surcharging would likely be effective only for lightly loaded structures (buildings less than about two stories). Consequently, preloading or surcharging would not apply to any of the residential structures proposed under Alternative 2 at the Talaris site. Preloading may be effective in areas of planned community facilities, assuming the structures are two stories or less. Impacts of preloading and placing surcharge fills (placing greater amounts of fill to accelerate ground settlements) are generally associated with increased quantities of earthwork to place and

remove the preload materials, and the potential for ground subsidence impacts to structures and utilities in the immediate area of the preloaded area. The potential impact of preload and surcharge fills will be addressed and mitigated by site-specific analysis and design, as it is dependent on the depth of poor soil, the height of the preload, the proximity of existing structures and utilities, and the sensitivity of the existing structures and utilities to settlement. Mitigation measures could include constructing temporary mechanically-stabilized earth walls at the edge of the preload/surcharge fills to limit the lateral extent and influence of the fill, conducting pre- and post-construction surveys of nearby structures, and monitoring of ground movements.

Ground Improvement

Ground improvement methods such as compaction grouting or the installation of stone columns could be used to reduce liquefaction hazard and increase the bearing capacity of compressible foundation soils under Alternative 2. Selection of the appropriate ground improvement technique is site-specific and would depend on a number of factors, including the soil type, weight of structure/level of improvement required, area and depth needing improvement, proximity of existing structures, and cost.

Impacts of ground improvement methods vary depending on the method selected, but can include vibrations and potential settlement of structures in the immediate vicinity, generating excessive spoils, and heave of existing structures and utilities. Mitigation measures could include conducting pre- and post-construction surveys of nearby structures and monitoring of ground movements.

Deep Foundations

Based on the presence of relatively deep deposits of compressible soils at the site, and the relatively high foundation loads associated with the conceptual building prototypes under Alternative 2, deep foundations would be required for support of most of these structures (heavy buildings more than about two stories). Actual pile foundation types to be used for future site improvements would be determined as part of the site-specific design of individual buildings, and could include driven piles or drilled piles, such as auger-cast concrete piles that are cast-in-place using a continuous-flight, hollow-stem auger.

The depth of pile foundations would be determined as part of the site-specific design of individual buildings, and would depend on various factors that include the pile type, the building loads, and site-specific soil conditions. The depth of pile foundations will vary across the site, and be up to at least 30 ft bgs.

Driven Piles

During installation of driven piles for foundation support of structures under Alternative 2, potential obstructions may be encountered, such as boulders and other debris that could obstruct pile driving and possibly result in damage to some of the piles.

Increased levels of noise and vibration can occur within about 50 to 100 ft of pile-driving activities. Peak particle velocities within 10 to 15 ft of pile driving can, in certain cases, exceed 2.0 ips, gradually diminishing with distance. Structural damage can occur at peak particle velocities of 2.0 ips and greater.

Soil densification can occur with driven displacement piles when peak particle velocities approach 0.20 ips, which is generally within about 100 ft of pile driving. Soil densification could potentially impact adjacent structures or utilities. The potential impact to existing or future adjacent structures or utilities is directly related to the intensity of the vibration, the diameter of the pile, the inherent density of the soil, and the sensitivity of the adjacent structure or utility to vibrations. The impact of vibrations is difficult to quantify and needs to be addressed on a case-by-case basis and may extend offsite for pile-supported structures located near the perimeter of the Fort Lawton site.

Drilled Shafts

Drilled shafts such as auger-cast piles could be used to support the proposed structures under Alternative 2 at the Talaris site. Construction of drilled shafts can be impacted by caving soils, soil heave, and large obstructions. The installation of drilled shafts generally does not produce significant vibrations; however, installation of temporary casing can produce ground vibrations and localized ground settlement around the shaft construction area. Drilled shafts create large volumes of spoils and may require dewatering. Potential mitigation measures for drilled shafts include using casing to control caving soils and monitoring the ground surface during construction.

Alternative 3: Public Park On Site; Affordable and Homeless Housing Off Site

Fort Lawton Site

The following sections describe impacts related to Alternative 3 at the Fort Lawton site.

Geologic Hazard Impacts

Geologic hazard impacts are discussed below in terms of how existing geologic conditions at the site could affect the Fort Lawton development under Alternative 3.

Settlement

The surficial soil anticipated at the Fort Lawton site is not expected to provide unfavorable settlement characteristics for the proposed development under Alternative 3.

Landsliding/Steep Slopes

There is a potential for landsliding of existing, steep, landslide–prone slopes in the northern and western portions of the Fort Lawton site. Landsliding could be triggered by a seismic event; the natural process of stabilization of a steep slope to a flatter profile; an increase in pore water pressure

from excessive rainfall that could destabilize the slope; or construction that traverses or cuts into a steep slope. The impact of landsliding is considered to be moderately low for Alternative 3 given that these portions of the site would be maintained as non-developed areas.

Erosion

The surficial geology at the Fort Lawton site has been identified as advance outwash and likely undocumented fill. When unvegetated and/or disturbed, advance outwash and fill materials may experience severe to very severe erosion hazards on slopes exceeding 15 percent.

Portions of the site have slopes that exceed 15 percent and development under Alternative 3 in these areas would require analysis on a case-by-case basis and site-specific analyses would need to be performed for each structure to mitigate this impact. Additionally, construction on slopes would include employing temporary erosion control measures and BMPs during construction to mitigate erosion impacts (see the Mitigation Measures section of this document for details).

Ground Shaking and Ground Motion Amplification

The entire Puget Sound region lies within a seismically active area, and moderate to high levels of ground shaking should be anticipated during the design life of the proposed Fort Lawton development. Due to the previous development at the Fort Lawton site, there is potential for undocumented near-surface deposits of relatively loose/soft fill soils that may be susceptible to amplified earthquake ground motions at various frequencies. Consequently, the near-surface soils at the Fort Lawton site could affect the level of earthquake ground shaking felt in the area. Seismic design using current design codes (including the IBC as amended by the City of Seattle) and generally accepted engineering standards and practices would be conducted during the design phase of the future site improvements under Alternative 3.

Ground Rupture

The Fort Lawton site is located about 6 miles north of the Seattle Fault Zone. The Seattle Fault Zone is about 3 to 4 miles wide and consists of a series of east-west trending faults. Future ground rupture may occur within the Seattle Fault Zone; however, the actual risk at the Fort Lawton site posed by such ground rupture is considered to be relatively small given the relatively thick deposits of glacial soils and the distance between the site and the fault zone. Consequently, design to account for ground rupture will not be a significant part of the site-specific seismic design for future site improvements under Alternative 3.

Liquefaction

Due to the glacially consolidated nature of the soils and deep depth to groundwater at the Fort Lawton site, it is not anticipated that liquefaction will pose a major hazard to the proposed site development under Alternative 3. While there may be undocumented fill at the site, it is unlikely that

it will be thick enough or saturated enough to pose a serious liquefaction threat to the proposed development.

Seismically Induced Landslides

Because Alternative 3 does not propose to develop any steep slope areas, it is not anticipated that seismically induced landslides will present a threat to the proposed development.

Landfill Areas

No landfills are known to exist on or adjacent to the Fort Lawton site; therefore, there is no anticipated need to mitigate landfill impacts under Alternative 3.

Groundwater

As previously discussed, the primary groundwater system at the Fort Lawton site consists of perched groundwater atop the relatively impermeable Lawton clay. Previous subsurface investigations conducted by others (CH2M HILL and Associated Firms 1989) have identified groundwater levels in the vicinity of the Fort Lawton site at a maximum of approximately 160 ft bgs. Previous analyses conducted by others (Booth et al. 2005) generally indicate groundwater flow laterally to the steep hillsides along the coast and deep ravines, such as the Interbay Trough, where groundwater ultimately discharges into Elliott Bay. Furthermore, it is anticipated that groundwater conditions will vary depending on local subsurface conditions, the season, recent weather patterns, and other factors.

The future site improvements under Alternative 3 are anticipated to reduce impervious surfaces from 18.5 acres to 9.3 acres; therefore, no significant loss of recharge to the perched aquifer is anticipated. Additionally, the project stormwater management system may include retention basins and rain gardens. Depending on the specific location and design of these facilities, there could be some recharge to the aquifer in the vicinity of these facilities.

While temporary excavation dewatering could potentially be required for certain infrastructure, the effect on groundwater would be temporary and localized (also see the Construction Dewatering section below).

Construction-Related Impacts

Many of the potential impacts due to geologic hazards could be mitigated by implementing effective design and construction techniques or selecting appropriate foundation types.

The development of Alternative 3 at the Fort Lawton site would include removing some of the existing pavement and all of the structures, except OMS Building 245, and preparing subgrade soils by grading, placing, and compacting structural fill.

Erosion During Construction

Construction associated with Alternative 3 could have erosion impacts on exposed soil and soil stockpiles, which could cause onsite and offsite transport of sediment. However, standard temporary erosion and sedimentation control measures and BMPs (as summarized in the Mitigation Measures section of this document) would be implemented during construction of future site improvements to reduce the potential for erosion-related impacts.

Construction Excavations

Temporary excavations may be required for construction of future infrastructure, including walkways, potential picnic structures, roadways, etc., under Alternative 3. Without mitigation, these excavations could have a potentially adverse effect on immediately adjacent existing and future structures (i.e., structures within a distance equal to about the depth of the excavation), utilities, and other improvements. However, standard construction measures, such as the use of properly designed and installed temporary shoring systems, would reduce the potential for such adverse impacts.

Construction Dewatering

The depth to groundwater at the Fort Lawton site is expected to be relatively deep; however, groundwater may be encountered at relatively shallow depths, particularly during the winter and spring months. Therefore, construction dewatering may be required to control groundwater flow into certain excavations under Alternative 3. The process of excavation dewatering could potentially cause some ground settlement and damage to adjacent utilities and structures. The radius of influence of a dewatering system is related to the amount of drawdown of the water table. If extensive dewatering is required, site-specific analyses will determine what structures (existing or future, on site or off site) may be influenced by excavation dewatering. Examples of mitigation measures to control the potential impact of excavation dewatering include minimizing the extent and duration of dewatering, and installing groundwater cut-off walls.

Placement of Structural Fill

It is anticipated that a substantial amount of surficial onsite soil that is excavated as part of site development will be suitable for reuse as onsite fill under Alternative 3, provided that the excavated material is properly handled and moisture-conditioned prior to placement and compaction. All structural fill and backfill material placed as part of future site improvements would be densely compacted, which can cause vibrations and potential settlement of structures in the immediate vicinity of the construction work. Placement of large volumes of fill can also cause settlement/ground subsidence that could impact existing or future structures (on site or off site) in the immediate area of the fill; however, the potential for offsite impacts applies only to significant fills placed for future development at the perimeter of the Fort Lawton site.

It is understood that under Alternative 3, the proposed improvements would be designed to conform to the existing site topography and minimal grading would occur. Potential impacts to existing onsite and offsite structures (such as the existing VA office off site and Maintenance Building-Building 245 on site), as well as to existing offsite structures, would be mitigated by site-specific analysis and design of fill placement near existing settlement-sensitive structures.

Construction/Excavation On or Adjacent to Landslide-Prone Areas

Based on the information available at the time this report was written, it is understood that proposed structures associated with Alternative 3 will not be located in the vicinity of any landslide-prone areas or their associated buffers. Therefore, it is not anticipated that construction activities will have an effect on slope stability in the area.

Talaris Site

The following sections describe impacts related to Alternative 3 at the Talaris site.

Geologic Hazard Impacts

Geologic hazard impacts are discussed below in terms of how existing geologic conditions at the site could affect the development of Alternative 3 at the Talaris site.

Settlement

Portions of the Talaris site are underlain by loose/soft compressible deposits. Constructing heavy structures or placing significant heights of fill directly on these soil types under Alternative 3 could cause foundation settlement, particularly in the southwest portion of the site where the depth to competent native soil is as much as 25 ft bgs. Such settlement could result in damage to structures and utilities. In order to preclude adverse settlement impacts, typical construction mitigation measures would be implemented, and could include using deep foundation systems for heavy structures or preloading a building site prior to construction of relatively light structures on spread foundations.

Landsliding/Steep Slopes

The City of Seattle Department of Planning and Development GIS website has identified localized steep slope areas along the eastern edge of the Talaris site, as well as along Talaris Way; however, no areas in the vicinity of the site have been identified as potential slide areas (City of Seattle; accessed October 6, 2017). The impact of landsliding is considered to be moderately low for Alternative 3 because the steep slope areas appear to be localized. Depending on the locations of the proposed improvements in relation to the steep slope areas, site-specific analyses of the project site may be needed prior to any construction to ensure compliance with City of Seattle requirements for setback and design.

Erosion

The soils at the Talaris site have been identified as peat, ice contact deposits, recessional outwash, and likely undocumented fill. When unvegetated and/or disturbed (e.g., during construction activities), ice contact deposits, recessional outwash, and fill materials may experience severe to very severe erosion hazards on slopes exceeding 15 percent. Peat deposits are typically found on very shallow slopes or flat areas and would not be expected to be an erosion hazard; however, depending on the composition of the peat, it may be erodible in unprotected cut slopes.

Portions of the site have slopes that exceed 15 percent and development under Alternative 3 in these areas would require analysis on a case-by-case basis and site-specific analyses would need to be performed for each structure to mitigate this impact. Additionally, construction on slopes would include employing temporary erosion control measures and BMPs during construction to mitigate erosion impacts (see the Mitigation Measures section of this document for details).

Ground Shaking and Ground Motion Amplification

The entire Puget Sound region lies within a seismically active area, and moderate to high levels of ground shaking should be anticipated during the design life of the proposed development under Alternative 3. Due to the presence of relatively thick peat deposits at the Talaris site, the site may be susceptible to amplified earthquake ground motions at various frequencies. Consequently, the near-surface soils at the Talaris site could affect the level of earthquake ground shaking felt in the area. Seismic design using current design codes (including the IBC as amended by the City of Seattle) and generally accepted engineering standards and practices would be conducted during the design phase of future site improvements.

Ground Rupture

The Talaris site is located about 5 miles north of the Seattle Fault Zone. The Seattle Fault Zone is about 3 to 4 miles wide and consists of a series of east-west trending faults. Future ground rupture may occur within the Seattle Fault Zone; however, the actual risk at the Talaris site posed by such ground rupture is considered to be relatively small given the relatively thick deposits of glacial soils and the distance between the site and the fault zone. Consequently, design to account for ground rupture will not be a significant part of the site-specific seismic design for future site improvements under Alternative 3.

Liquefaction

The Talaris site may be subjected to earthquake shaking and should be considered to have a moderate to high seismic risk. There is also potential for loss of soil strength (loss of bearing capacity for shallow foundations or reduction in lateral and vertical capacities of deep foundations), ground surface settlement, and lateral displacement of soils supporting the future development structures where founded in or over liquefiable soils. The magnitude of settlement, soil movement, and loss of strength

is a function of the soil thickness, soil quality, groundwater level, location, magnitude of the seismic event, and the specific foundation system of the structure.

Liquefaction can result in widespread structural damage if not properly mitigated. Damage caused by liquefaction can include: foundation rotation, slope failure, lateral spreading, and post-liquefaction ground subsidence (settlement).

Soil liquefaction, should it occur under Alternative 3, would likely lead to consolidation of loose, saturated soil deposits, resulting in some surface settlement at the site. Because subsurface conditions vary across the site, overall settlement would vary, leading to differential settlements across the site and possibly differential settlements between adjacent foundation elements. Liquefaction-induced ground settlements could cause increased downdrag loading on deep foundations.

Impacts associated with soil liquefaction can be mitigated in a number of ways, as discussed in the Mitigation Measures section of this document. Examples of possible mitigation methods include ground improvement, use of deep foundations, or designing for the potential soil liquefaction impacts. The specific mitigation measures would be determined during site-specific design of future site improvements.

Seismically Induced Landslides

Flow liquefaction landslides are triggered when the shear stress required for static equilibrium of the soil mass is greater than the shear strength of the liquefied soil. While the Talaris site does contain deposits of liquefiable soil, the risk of flow liquefaction landslides under Alternative 3 is considered to be low because the liquefiable soils generally exist only on level portions of the site. Additionally, the slopes that border the site to the north, east, and west are generally composed of glacially overconsolidated and/or fine-grained materials that are typically not susceptible to liquefaction.

Non-liquefiable slopes can also experience slope failures as the dynamic shear stresses produced by earthquake shaking increase the load along a potential failure plane. Although the potential for deep-seated, earthquake-induced landslides at the Talaris site is relatively low, some sloughing and slope movement would likely occur within the loose surficial materials on the localized slopes during a large seismic event. To address the potential impact of such slope movement, mitigation measures would include site-specific slope stability analyses and design of structures located in steep slope areas.

Landfill Areas

The City of Seattle Department of Planning and Development GIS website has identified the abandoned Montlake Landfill to the south and east of the site (City of Seattle; accessed October 6, 2017). While the Talaris site is within the 1,000-ft methane buffer, previous work by others (Shannon & Wilson 2013) has identified the risk of methane migrating from the abandoned landfill onto the

property as being low. Because of this, it is anticipated that no mitigation measures associated with the abandoned landfill will be necessary for the Talaris site under Alternative 3.

Groundwater

Previous subsurface investigations conducted by others at the Talaris site (Shannon & Wilson 2013) have identified groundwater at depths ranging from 0 to 25 ft bgs. It is worth noting that two of the Shannon & Wilson borings, B-4-2001 and B-5-2001, encountered artesian groundwater conditions, indicating the presence of a confined aquifer beneath the ice contact deposits. It should be anticipated that groundwater will be encountered at shallow depths in the vicinity of the marsh and will be deeper in upland areas of the site under Alternative 3.

The future site improvements under Alternative 3 would increase impervious surfaces from about 30 percent of the site to approximately 50 percent of the site; therefore, some loss of recharge to the perched aquifer is anticipated. However, Alternative 3 includes construction of sustainable stormwater control and landscape features. Therefore some recharge to the regional aquifer can be expected.

While temporary excavation dewatering could potentially be required for certain structures and infrastructure, the effect on groundwater would be temporary and localized (also see the Construction Dewatering section below).

Construction-Related Impacts

Many of the potential impacts due to geologic hazards could be mitigated by implementing effective design and construction techniques or selecting appropriate foundation types.

The development of Alternative 3 at the Talaris site would include removing some of the existing pavement and preparing subgrade soils by grading, placing, and compacting structural fill. Ground improvement and/or deep foundations may be necessary to properly mitigate liquefaction hazards.

Erosion During Construction

Construction associated with Alternative 3 could have erosion impacts on exposed soil and soil stockpiles, which could cause onsite and offsite transport of sediment. However, standard temporary erosion and sedimentation control measures and BMPs (as summarized in the Mitigation Measures section of this document) would be implemented during construction of future site improvements to reduce the potential for erosion-related impacts.

Construction Excavations

Temporary excavations will likely be required for the installation of future structures and infrastructure, including new/upgraded underground utilities under Alternative 3. Without mitigation, these excavations could have a potentially adverse effect on immediately adjacent existing and future

structures (i.e., structures within a distance equal to about the depth of the excavation), utilities, and other improvements. However, standard construction measures, such as the use of properly designed and installed temporary shoring systems, would reduce the potential for such adverse impacts.

Construction Dewatering

Groundwater may be encountered within excavations at relatively shallow depths under Alternative 3, particularly during the winter and spring months. Therefore, construction dewatering may be required to control groundwater flow into certain excavations. The process of excavation dewatering could potentially cause some ground settlement and damage to adjacent utilities and structures. The radius of influence of a dewatering system is related to the amount of drawdown of the water table. Site-specific analyses would determine what structures (existing or future, on site or off site) may be influenced by excavation dewatering; however, the potential for offsite impacts applies only to excavation dewatering for future development at the perimeter of the Talaris site. Examples of mitigation measures to control the potential impact of excavation dewatering include minimizing the extent and duration of dewatering, and installing groundwater cut-off walls.

Placement of Structural Fill

Highly organic material such as the peat that underlies a large portion of the site will not be suitable for reuse as onsite fill. As a result, it is likely that any fill needed on site under Alternative 3 would have to be imported. All structural fill and backfill material placed as part of future site improvements would be densely compacted, which can cause vibrations and potential settlement of structures in the immediate vicinity of the construction work. Placement of large volumes of fill can also cause settlement/ground subsidence that could impact existing or future structures (on site or off site) in the immediate area of the fill; however, the potential for offsite impacts applies only to significant fills placed for future development at the perimeter of the Talaris site.

It is understood that under Alternative 3, the proposed structures would be designed to conform to the existing site topography and minimal grading would occur. Potential impacts to future onsite and existing offsite structures would be mitigated by site-specific analysis and design of fill placement near existing settlement-sensitive structures.

Construction/Excavation On or Adjacent to Landslide-Prone Areas

The City of Seattle has identified localized steep slope areas along the eastern edge of the Talaris site, as well as along Talaris Way; however, no areas in the vicinity of the site have been identified as potential slide areas.

Alternative 3 involves constructing approximately 238 housing units, 30,621 square feet of community facilities, and 295 parking spaces on the Talaris site. In the event that any of these structures are constructed in steep slope areas, site-specific slope stability analyses and design would mitigate the potential adverse effect of construction on the stability of these areas. Additionally, measures that

can be used to reduce construction impacts on the stability of the slope would include employing temporary erosion control measures and BMPs during construction (see the Mitigation Measures section of this document).

Preloading

Preloading or surcharging a future building site prior to construction can be used to preconsolidate compressible foundation soils and reduce post-construction settlement impacts on spread foundation systems; however, preloading or surcharging would likely be effective only for lightly loaded structures (buildings less than about two stories). Consequently, preloading or surcharging would not apply to any of the residential structures proposed under Alternative 3 at the Talaris site. Preloading may be effective in areas of planned community facilities, assuming that the structures are two stories or less. Impacts of preloading and placing surcharge fills (placing greater amounts of fill to accelerate ground settlements) are generally associated with increased quantities of earthwork to place and remove the preload materials, and the potential for ground subsidence impacts to structures and utilities in the immediate area of the preloaded area. The potential impact of preload and surcharge fills would be addressed and mitigated by site-specific analysis and design, as it is dependent on the depth of poor soil, the height of the preload, the proximity of existing structures and utilities, and the sensitivity of the existing structures and utilities to settlement. Mitigation measures could include constructing temporary mechanically-stabilized earth walls at the edge of the preload/surcharge fills to limit the lateral extent and influence of the fill, conducting pre- and post-construction surveys of nearby structures, and monitoring of ground movements.

Ground Improvement

Ground improvement methods such as compaction grouting or the installation of stone columns could be used to reduce liquefaction hazard and increase the bearing capacity of compressible foundation soils under Alternative 3. Selection of the appropriate ground improvement technique is site-specific and would depend on a number of factors, including the soil type, weight of structure/level of improvement required, area and depth needing improvement, proximity of existing structures, and cost.

Impacts of ground improvement methods vary depending on the method selected, but can include vibrations and potential settlement of structures in the immediate vicinity, generating excessive spoils, and heave of existing structures and utilities. Mitigation measures could include conducting pre- and post-construction surveys of nearby structures and monitoring of ground movements.

Deep Foundations

Based on the presence of relatively deep deposits of compressible soils at the site, and the relatively high foundation loads associated with the conceptual building prototypes under Alternative 3, deep foundations would be required for support of most of these structures (heavy buildings more than about two stories). Actual pile foundation types to be used for future site improvements would be

determined as part of the site-specific design of individual buildings, and could include driven piles or drilled piles, such as auger-cast concrete piles that are cast-in-place using a continuous-flight, hollow-stem auger.

The depth of pile foundations would be determined as part of the site-specific design of individual buildings, and would depend on various factors that include the pile type, the building loads, and site-specific soil conditions. The depth of pile foundations would vary across the site, and be up to at least 30 ft bgs.

Driven Piles

During installation of driven piles for foundation support of structures under Alternative 3, potential obstructions may be encountered, such as boulders and other debris that could obstruct pile driving and possibly result in damage to some of the piles.

Increased levels of noise and vibration can occur within about 50 to 100 ft of pile-driving activities. Peak particle velocities within 10 to 15 ft of pile driving can, in certain cases, exceed 2.0 ips, gradually diminishing with distance. Structural damage can occur at peak particle velocities of 2.0 ips and greater.

Soil densification can occur with driven displacement piles when peak particle velocities approach 0.20 ips, which is generally within about 100 ft of pile driving. Soil densification could potentially impact adjacent structures or utilities. The potential impact to existing or future adjacent structures or utilities is directly related to the intensity of the vibration, the diameter of the pile, the inherent density of the soil, and the sensitivity of the adjacent structure or utility to vibrations. The impact of vibrations is difficult to quantify and needs to be addressed on a case-by-case basis and may extend offsite for pile-supported structures located near the perimeter of the Talaris site.

Drilled Shafts

Drilled shafts such as auger-cast piles could be used to support the proposed structures under Alternative 3 at the Talaris site. Construction of drilled shafts can be impacted by caving soils, soil heave, and large obstructions. The installation of drilled shafts generally does not produce significant vibrations; however, installation of temporary casing can produce ground vibrations and localized ground settlement around the shaft construction area. Drilled shafts create large volumes of spoils and may require dewatering. Potential mitigation measures for drilled shafts include using casing to control caving soils and monitoring the ground surface during construction.

Alternative 4: No Action Alternative

Fort Lawton Site

There are no anticipated earth-related impacts to the Fort Lawton site under Alternative 4.

Talaris Site

There are no anticipated earth-related impacts to the Talaris site under Alternative 4.

MITIGATION MEASURES

The following measures are proposed to address the potential earth impacts from construction and operation of the Fort Lawton Army Reserve Center project under Alternatives 1, 2, and 3.

Fort Lawton Site

Specific foundation support systems to be used for onsite improvements would be determined as part of the specific design and permitting of infrastructure and individual buildings associated with future site development. Site-specific studies and evaluations would be conducted in accordance with SMC requirements and the provisions of the current version of the IBC (ICC 2014) as amended by the City of Seattle. Methods are available to build out the Fort Lawton site development under each EIS alternative without resulting in significant unavoidable adverse impacts. Different foundation support options and their implications are summarized above in the Impacts section of this document. The mitigation measures to limit impacts from geologic hazards and foundation support options are summarized below.

Geologic Hazards

Settlement

With proper design and construction procedures, no additional mitigation measures would be required.

Landsliding/Steep Slopes

Development adjacent to or on the steeper slopes in the northern and western portions of the site would require site-specific slope stability analyses prior to construction on or adjacent to the slope. If needed due to soil and slope conditions in certain locations, deep foundations, such as pile- or pier-supported foundations, could be used to reduce impacts to steep slopes.

The installation of properly designed retaining walls that are constructed near landslide hazard areas in accordance with City of Seattle critical area and grading regulations would reduce impacts to steep slopes.

Erosion

During construction, contractors would employ temporary erosion and sedimentation control measures and BMPs to control erosion. These measures would be consistent with City of Seattle critical area and grading regulations, and could include the following:

- Minimize areas of exposure

- Schedule earthwork during drier times of the year
- Retain vegetation where possible, especially on the steeper slopes within the greenbelt area
- Seed or plant appropriate vegetation on exposed areas as soon as earthwork is completed
- Route surface water through temporary drainage channels around and away from disturbed soils or exposed slopes
- Use silt fences, temporary sedimentation ponds, or other suitable sedimentation control devices to collect and retain possible eroded material
- Cover exposed soil stockpiles and exposed slopes with plastic sheeting, as appropriate
- Use straw mulch and erosion control matting to stabilize graded areas and reduce erosion and runoff impacts to slopes, where appropriate
- Intercept and drain water from any surface seeps, if encountered
- Incorporate contract provisions allowing temporary cessation of work under certain, limited circumstances, if weather conditions warrant.

Ground Shaking and Ground Motion Amplification

With proper design and construction procedures, no additional mitigation measures would be required.

Ground Rupture

With proper design and construction procedures, no additional mitigation measures would be required.

Liquefaction

Due to the glacially consolidated nature of site soils, no mitigation measures are anticipated for soil liquefaction.

Lateral Spreading

Due to the glacially consolidated nature of site soils, no mitigation measures are anticipated for lateral spreading.

Seismically Induced Landslides

While the surficial soils at the Fort Lawton site are not considered to be liquefiable, slope failures may still result as the dynamic shear stresses produced by earthquake shaking increase the load along a potential failure plane. Site-specific analysis of development planned adjacent to or within the landslide hazard areas would be completed during the design and permit approval process to address specific methods to mitigate potential landslide impacts. The installation of properly designed retaining walls that are constructed near landslide hazard areas in accordance with City of Seattle

critical area and grading regulations would reduce impacts to steep slopes. (Also see the Landsliding/Steep Slopes section above.)

Landfill Areas

No active or former landfills have been identified in the vicinity of the Fort Lawton site; therefore, no mitigation measures are anticipated for landfill hazards.

Construction Excavations

Impacts from temporary construction excavations could be mitigated through the use of properly designed and constructed excavation shoring systems.

Construction Dewatering

The impacts associated with temporary excavation dewatering depend on the required drawdown of the water table. Because future below-grade construction will likely be relatively shallow and groundwater is anticipated to be very deep, the associated excavations and degree of drawdown required will likely be correspondingly relatively shallow. Site-specific analyses would determine what structures may be influenced by excavation dewatering. Mitigation measures to control the potential impact of excavation dewatering include minimizing the extent and duration of dewatering, monitoring for settlement, and installing groundwater cut-off walls.

Placement of Structural Fill

Ground subsidence impacts could be mitigated by designing the fill to control adjacent settlements. In addition, adjacent structures/surfaces should be monitored during construction to verify that no adverse settlement occurs. Potential impacts to existing onsite and offsite structures (such as the existing VA office off site and Maintenance Building (Building 245) on site) could be mitigated by limiting the amount of fill placed within 50 ft of these structures, or monitoring the structures during construction if it is necessary to place fill within 50 ft of these structures. It is anticipated that a substantial amount of surficial onsite soil that is excavated as part of site development will be suitable for reuse as onsite fill, provided that the excavated material is properly handled and moisture-conditioned prior to placement and compaction.

Construction/Excavation on or Adjacent to Landslide-Prone Areas

Impacts associated with construction/excavation activities on or adjacent to the landslide hazard areas apply only to Alternative 2, where residential units would be constructed in the vicinity of the steep slopes. These potential impacts would be mitigated by conducting site-specific slope stability analyses and design prior to any construction activity that excavates, fills, or traverses on or near the landslide hazard areas. In addition to implementing erosion control measures during construction, earth retention structures could be designed and constructed near the bottom of the steep slopes where needed.

Driven Piles

Steel pipe piles, potentially fitted with a "conical-shaped" driving point, or concrete piles fitted with a heavy-duty shoe, may be able to penetrate old buried logs or certain other buried debris. If an obstruction is encountered and the pile cannot be advanced, or if the pile becomes damaged, the pile could be abandoned and a replacement pile could be installed.

To limit the potential for adverse vibration impacts from pile driving on nearby structures, vibration monitoring should be conducted during the installation of test piles and selected production piles. The construction-related impacts from pile driving may extend up to about 50 to 100 ft off site for new onsite structures located near the perimeter of the Fort Lawton site. A site-specific vibration analysis could be conducted to more precisely determine the extent of potential vibration impacts due to pile driving. In addition, pile and pile hammer types should be matched to the specific subsurface conditions to achieve an optimal pile-driving operation, and vibratory hammers could be used instead of impact hammers, when appropriate. Pre- and post-construction inspections, ground elevation surveys, and photographic surveys of structures within about 100 ft of the pile-driving operation is recommended to help document site-specific conditions and the effectiveness of mitigation measures. If appropriate, drilled piles could be used to limit the vibration and ground settlement impacts associated with driven piles

Drilled Piles

Casings could be installed to control caving soils during drilled shaft installation. To minimize the potential for vibration impacts from drilled shaft installation, vibration monitoring and ground elevation surveys should be conducted in conjunction with pre- and post-construction inspections and photo surveys of settlement-sensitive structures located within about 50 ft of drilled shaft construction activities.

Spoils generated during drilled shaft installation should be disposed of in accordance with applicable local, state, and federal requirements.

Talaris Site

Specific foundation support systems to be used for onsite improvements will be determined as part of the specific design and permitting of infrastructure and individual buildings associated with future site development. Site-specific studies and evaluations would be conducted in accordance with SMC requirements and the provisions of the current version of the IBC (ICC 2014) as amended by the City of Seattle. Methods are available to build out the Talaris site development under each EIS alternative without resulting in significant unavoidable adverse impacts. Different foundation support options and their implications are summarized above in the Impacts section of this document. The mitigation measures to limit impacts from geologic hazards and foundation support options are summarized below.

Geologic Hazards

Settlement

For heavily-loaded structures (buildings more than about two stories), total and differential settlements could be accommodated by founding the structures on deep foundations. Preloading or ground improvement techniques could be used to reduce total and differential settlements to within tolerable levels for utilities and lightly-loaded structures (buildings less than two stories). Alternatively, lightly loaded structures could be founded on a mat foundation with flexible utility connections that would limit the potential adverse effect of differential settlement.

Landsliding/Steep Slopes

Development adjacent to or on the localized steeper slopes in the eastern portion of the site as well as those along the existing Talaris Way would require site-specific slope stability analyses prior to construction on or adjacent to the slope. Because of the localized nature of the steep slopes, landslide impacts at the Talaris site could be mitigated by regrading the area in the vicinity of the slopes.

Erosion

During construction, contractors would employ temporary erosion and sedimentation control measures and BMPs to control erosion. These measures would be consistent with City of Seattle critical area and grading regulations, and could include the following:

- Minimize areas of exposure
- Schedule earthwork during drier times of the year
- Retain vegetation where possible, especially on the steeper slopes within the greenbelt area
- Seed or plant appropriate vegetation on exposed areas as soon as earthwork is completed
- Route surface water through temporary drainage channels around and away from disturbed soils or exposed slopes
- Use silt fences, temporary sedimentation ponds, or other suitable sedimentation control devices to collect and retain possible eroded material
- Cover exposed soil stockpiles and exposed slopes with plastic sheeting, as appropriate
- Use straw mulch and erosion control matting to stabilize graded areas and reduce erosion and runoff impacts to slopes, where appropriate
- Intercept and drain water from any surface seeps, if encountered
- Incorporate contract provisions allowing temporary cessation of work under certain, limited circumstances, if weather conditions warrant.

Ground Shaking and Ground Motion Amplification

With proper design and construction procedures, no additional mitigation measures would be required.

Ground Rupture

With proper design and construction procedures, no additional mitigation measures would be required.

Liquefaction

Ground improvement techniques or deep foundations could mitigate liquefaction impacts. Several methods of ground improvement are available, including the installation of stone columns, vibro-compaction, vibro-replacement, deep soil mixing, compaction grouting, and others. Selection of the appropriate deep foundation or ground improvement technique is location-specific at the site and would depend on a number of factors, including the soil type, weight of structure/level of improvement required, area and depth needing improvement, proximity of existing structures, and cost. The specific method of ground improvement and foundation support would be determined as part of the design and permit approval process for each future onsite development project.

Seismically Induced Landslides

While the risk of flow liquefaction landslides at the Talaris site is considered to be low, slope failures may still result as the dynamic shear stresses produced by earthquake shaking increase the load along a potential failure plane. Site-specific analysis of development planned adjacent to or within the steep slope areas would be completed during the design and permit approval process to address specific methods to mitigate potential landslide impacts. (Also see Landsliding/Steep Slopes section above.)

Landfill Areas

While the Talaris site is within the 1,000-ft methane buffer, previous work by others (Shannon & Wilson 2013) has identified the risk of methane migrating from the abandoned landfill onto the property as being low. Because of this, it is anticipated that no mitigation measures associated with the abandoned landfill will be necessary for the Talaris site.

Construction Excavations

Impacts from temporary construction excavations could be mitigated through the use of properly designed and constructed excavation shoring systems.

Construction Dewatering

The impacts associated with temporary excavation dewatering depend on the required drawdown of the water table. Because future below-grade construction will likely be relatively shallow, the associated excavations and degree of drawdown required will likely be correspondingly relatively shallow. Site-specific analyses would determine what structures may be influenced by excavation dewatering. Mitigation measures to control the potential impact of excavation dewatering include minimizing the extent and duration of dewatering, monitoring for settlement, and installing groundwater cut-off walls.

Placement of Structural Fill

Ground subsidence impacts could be mitigated by designing the fill to control adjacent settlements. In addition, adjacent structures/surfaces should be monitored during construction to verify that no adverse settlement occurs. Potential impacts to existing onsite structures could be mitigated by limiting the amount of fill placed within 50 ft of these structures, or monitoring the structures during construction if it is necessary to place fill within 50 ft of these structures. It is anticipated that a substantial amount of surficial onsite soil that is excavated as part of site development will not be suitable for reuse as onsite fill.

Construction/Excavation on or Adjacent to Landslide-Prone Areas

Impacts associated with construction/excavation activities on or adjacent to the steep slope areas are anticipated to be minor given the localized nature of the steep slope areas on the Talaris site. These potential impacts would be mitigated by conducting site-specific slope stability analyses and design prior to any construction activity that excavates, fills, or traverses on or near the steep slopes.

Driven Piles

Steel pipe piles, potentially fitted with a “conical-shaped” driving point, or concrete piles fitted with a heavy-duty shoe, may be able to penetrate old buried logs or certain other buried debris. If an obstruction is encountered and the pile cannot be advanced, or if the pile becomes damaged, the pile could be abandoned and a replacement pile could be installed.

To limit the potential for adverse vibration impacts from pile driving on nearby structures, vibration monitoring should be conducted during installation of test piles and selected production piles. The construction-related impacts from pile driving may extend up to about 50 to 100 ft off site for new onsite structures located near the perimeter of the Talaris site. A site-specific vibration analysis could be conducted to more precisely determine the extent of potential vibration impacts due to pile driving. In addition, pile and pile hammer types should be matched to the specific subsurface conditions to achieve an optimal pile-driving operation, and vibratory hammers could be used instead of impact hammers, when appropriate. Pre- and post-construction inspections, ground elevation surveys, and photographic surveys of structures within about 100 ft of the pile-driving operation is recommended to help document site-specific conditions and the effectiveness of mitigation measures. If appropriate, drilled piles could be used to limit the vibration and ground settlement impacts associated with driven piles.

Drilled Piles

Casings could be installed to control caving soils during drilled pile installation. To minimize the potential for vibration impacts from drilled pile installation, vibration monitoring and ground elevation surveys should be conducted in conjunction with pre- and post-construction inspections and

photo surveys of settlement-sensitive structures located within about 50 ft of drilled pile construction activities.

Spoils generated during drilled pile installation should be disposed of in accordance with applicable local, state, and federal requirements.

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

With implementation of the mitigation measures identified above, no significant unavoidable adverse impacts have been determined for the earth element of the Fort Lawton EIS alternatives.

USE OF THIS REPORT

This screening-level study has been prepared for the use of the City of Seattle to support the preparation of an Draft Environmental Impact Statement for the Fort Lawton Army Reserve Center Redevelopment Project in Seattle, King County, Washington. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, Inc., shall be at the user's sole risk. Landau Associates warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

The conclusions and recommendations contained in this report are based in part upon our review of existing subsurface data in the vicinity of the project sites considered for this study. There may be some variation in subsurface soil and groundwater conditions at the project site, and the nature and extent of the variations may not become evident until construction. Accordingly, a contingency for unanticipated conditions should be included in the construction budget and schedule.

We appreciate the opportunity to provide geotechnical services on this project and look forward to assisting you during the final design phase of the project. If you have any questions or comments regarding the information contained in this report, or if we may be of further service, please call.

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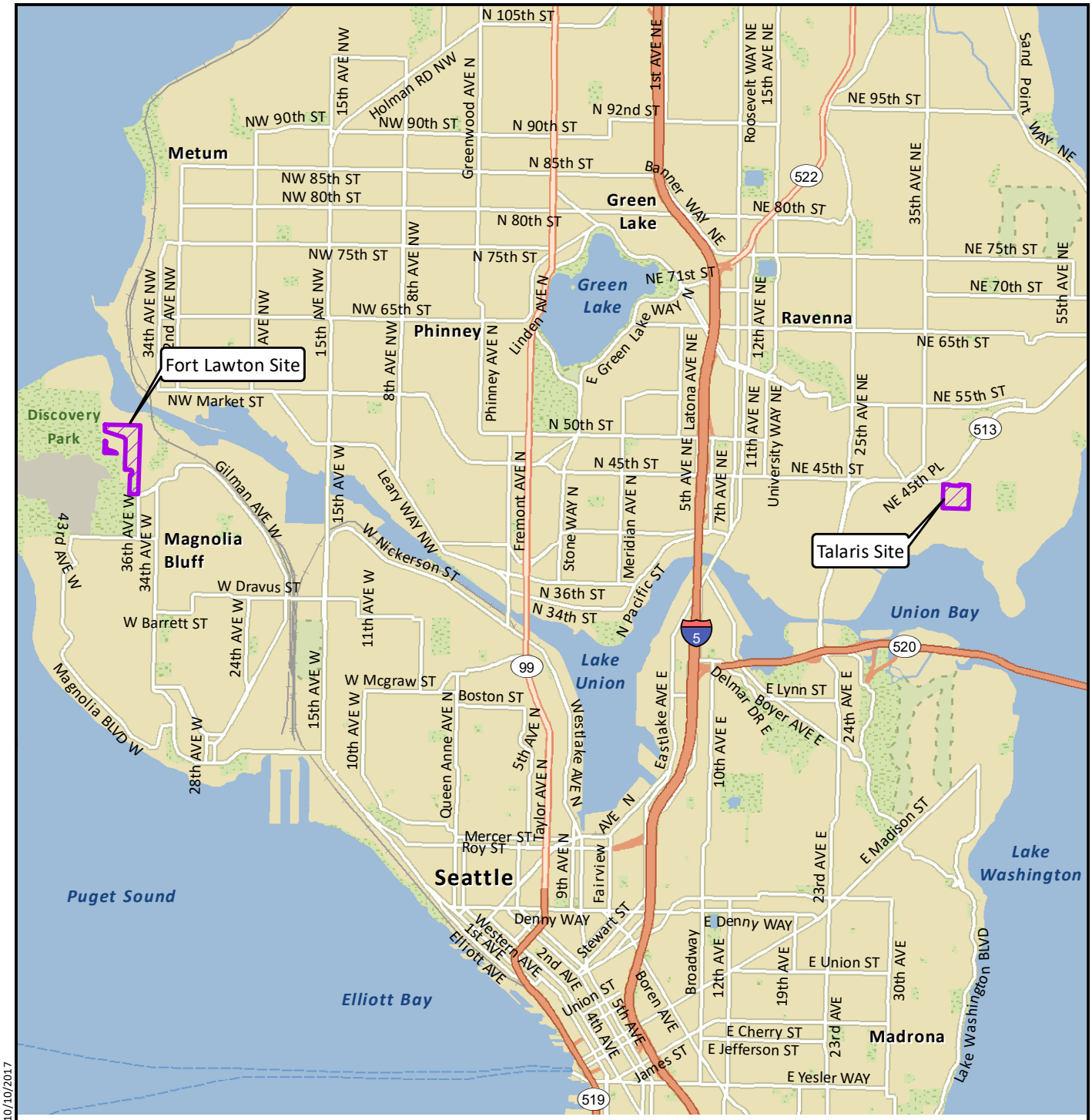

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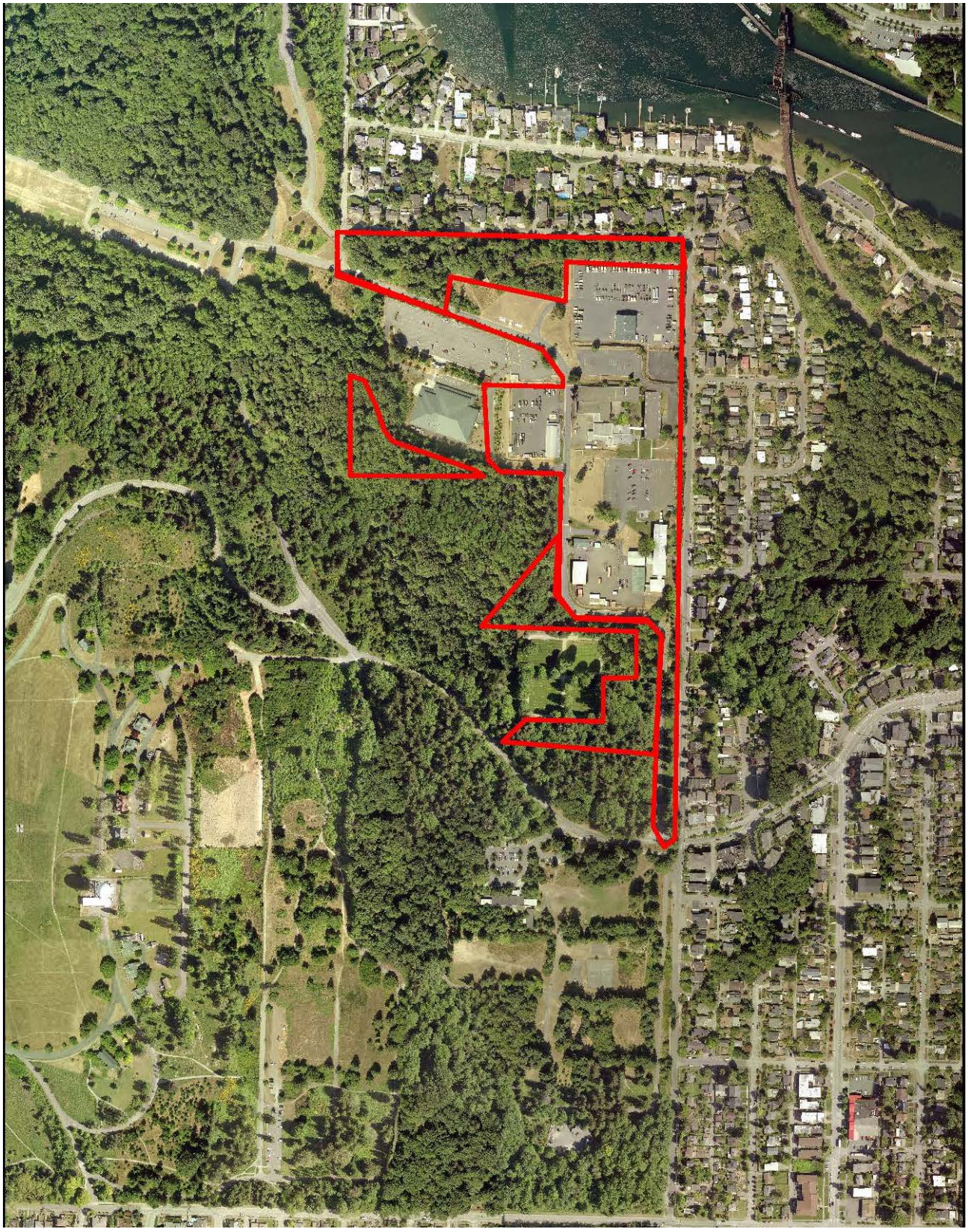
Fort Lawton Project Earth Element Technical Report Seattle, Washington	**Vicinity Map**	Figure 1



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Source: City of Seattle 2017

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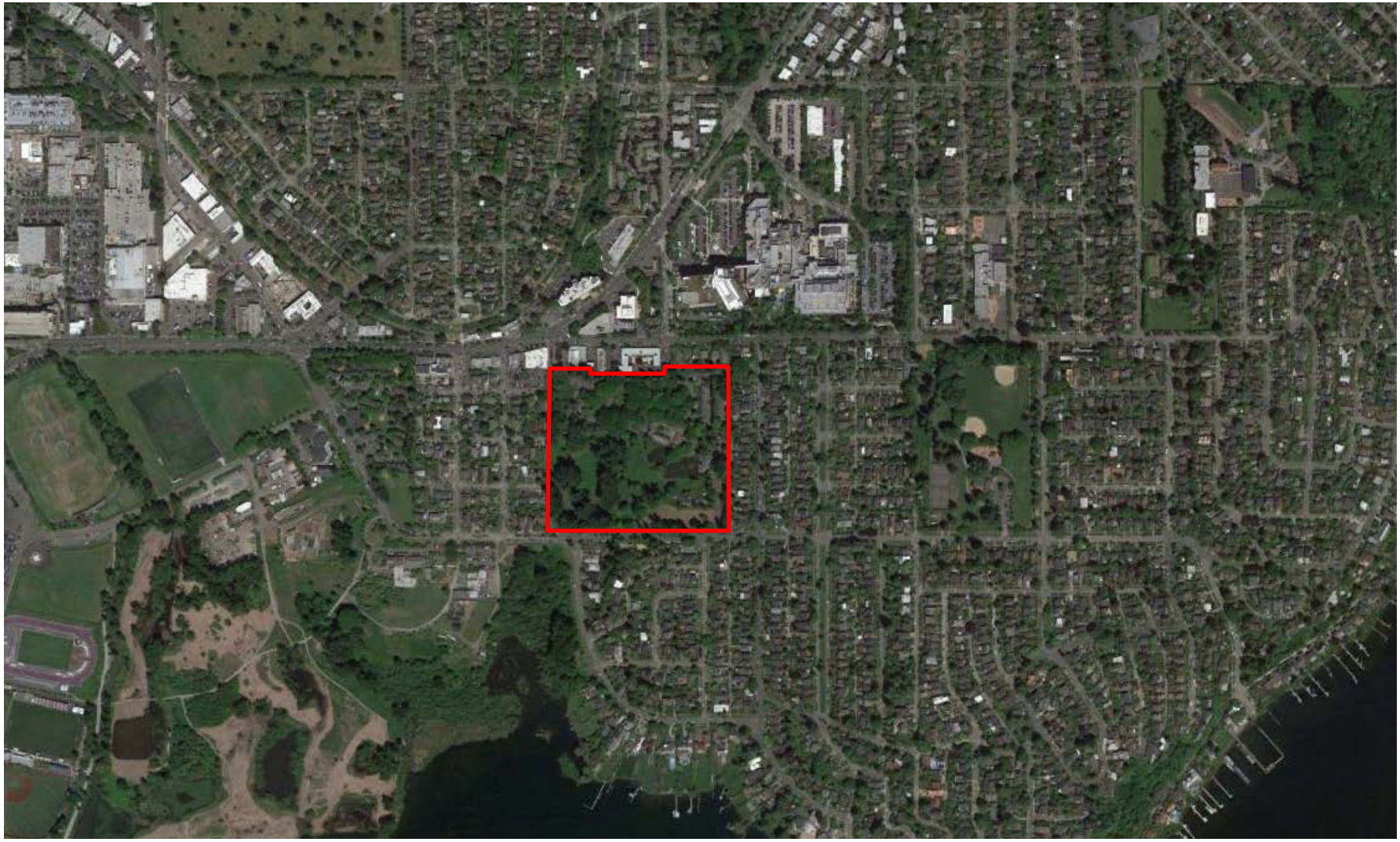
LANDAU ASSOCIATES

Fort Lawton Project Earth Element Technical Report Seattle, Washington	**Existing Fort Lawton Site Conditions**	Figure 2



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Source: Google Earth and EA Engineering 2017

Fort Lawton Project Earth Element Technical Report Seattle, Washington	**Existing Talaris Site Conditions**	Figure 3

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Appendix C

Biological Resources Report

BIOLOGICAL RESOURCES REPORT

Fort Lawton Army Reserve Center Redevelopment

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BIOLOGICAL RESOURCES

FORT LAWTON ARMY RESERVE CENTER REDEVELOPMENT

1 INTRODUCTION

This report describes the biological resources, and potential affects to those resources, by the *Fort Lawton Army Reserve Center Redevelopment Project* (hereafter "Fort Lawton Project") EIS alternatives to support the preparation of a Draft Environmental Impact Statement (DEIS) currently being prepared by EA Engineering, Science, and Technology. This report is based upon the description of the proposed action(s) and alternatives provided in a draft internal document titled *Chapter 2: Description of Proposed Action(s) and Alternatives* by EA Engineering, Science, and Technology on September 26, 2017.

The Fort Lawton Project includes the potential redevelopment of two sites: the Fort Lawton site as well as the Talaris site. Both sites have been reviewed and are described this report.

2 METHODOLOGY

Existing information was reviewed for wetlands and streams, vegetation, and wildlife that may be present on or near Fort Lawton and Talaris. Online sources utilized for review of wetlands and streams include the following:

- USDA Natural Resource Conservation Service – Web Soil Survey application,
- National Wetland Inventory (NWI) maps,
- Washington Department of Natural Resources (WA DNR) – Forest Practices Application Mapping Tool,
- BLM Land Status and Cadastral Survey Records,
- WA DNR – Wetlands of High Conservation Value Map Viewer,
- Google Earth aerial images,
- King County's GIS mapping website (iMap), and
- City of Seattle's GIS mapping website (SDCI GIS).

Washington Department of Fish and Wildlife (WDFW) interactive mapping programs (PHS on the Web and SalmonScape) were also used as a source of information on wildlife use of the potential project sites. Information and locations of rare plants was reviewed using WA DNR databases and NatureServe's LandScope Washington mapping application.

In addition to the online resources listed above, reports on previous studies conducted at both Fort Lawton and Talaris were reviewed; applicable reports are cited and referenced where appropriate.

One site visit was conducted on June 28, 2017, at Fort Lawton to verify the previously-reported lack of potential wetland and stream critical areas, assess existing vegetation, and note wildlife observations. Talaris was not visited.

2.1 Study Area

The study areas for the assessments made in this report are limited to the potential project area boundaries on the Fort Lawton and Talaris sites (i.e., areas of potential direct impacts) as well as the areas immediately adjacent, or within approximately 300 feet of the respective project area boundaries.

3 AFFECTED ENVIRONMENT

The Fort Lawton and Talaris study sites are located in the city of Seattle, north of downtown and the Seattle Center. They are surrounded by predominantly residential land uses. The study area and vicinity of both sites can be generally described as medium-density urban and mixed environs, characterized as containing light industry and high-density residential areas with the potential for isolated wetlands, streams, open spaces, and greenbelts to occur within this matrix (Johnson and O'Neil 2001).

3.1 Fort Lawton Site

Fort Lawton is located in the Magnolia neighborhood of Seattle, northwest of downtown. Fort Lawton is bordered by Discovery Park to the south and west, with residential properties surrounding the site immediately to the north and east. Also nearby, but not immediately adjacent, are the Kiwanis Memorial Preserve Park, Kiwanis Ravine Overlook (east) and Commodore Park (northeast). Salmon Bay is located to the northeast.

Fort Lawton contains existing development and some retained natural open space. Developed buildings and parking areas are no longer in use.

3.1.1 Wetlands and Streams

A review of online mapping resources does not indicate the presence of wetland or stream critical areas on or immediately adjacent to Fort Lawton. Wetlands, streams and associated riparian corridors mapped by City of Seattle are located in the vicinity in both Discovery Park and Kiwanis Memorial Preserve Park. However, topography of the north end of the property does indicate that water flow could be concentrated enough in some locations to form wetland or stream features.

The *Fort Lawton Redevelopment Plan* prepared in 2008 by the City of Seattle Office of Housing reports that in 2006, a wetland was identified on the north slope of the property during a wildlife corridor study. During the recent site visit in June 2017, a wetland biologist from The Watershed Company identified skunk cabbage (*Lysichiton americanus*), an obligate wetland plant, growing in a topographically low region south of W Lawton Street, generally consistent with the 2006 description of the wetland location. This potential wetland was not noted in the 2012 Corps Final Environmental Assessment cited previously. Additional studies, including collection of field data and possibly wetland delineation, flagging, classification and reporting, are needed to adequately document wetland or stream critical areas and their associated local, state and federal development implications in the northern portion of the Fort Lawton site (Figure 1).

The remaining portion of the Fort Lawton property is dominated by development, lawn and landscaped areas, and upland forested regions. No other areas are suspected of containing wetland or stream features.

3.1.2 Vegetation

Consistent with previous reports (City of Seattle 2008, U.S. Army Corps of Engineers 2012), remaining natural unmaintained vegetation present at Fort Lawton is generally located in two main areas located at the northern and southern limits of the property. The majority of wildlife habitat available at the site is located within these patches. Fort Lawton also abuts forests located in Discovery Park on the west side of the property and includes a narrow strip of established trees on the east side of the property. Plant species on the Fort Lawton site were recorded in a 2004 Floristic Survey by the U.S. Army Reserve and are provided in Appendix C of the Final Environmental Assessment for BRAC 05 Recommendations for Closure, Disposal, and Reuse of Fort Lawton (U.S. Army Corps of Engineers 2012). Overall, plant species are typical of urban non-wetland forests in the region. No sensitive or rare plants are known to occur in the project area or immediate vicinity.

North Forest

The forest located at the north bluff of Fort Lawton is dominated by deciduous tree species, mainly red alder (*Alnus rubra*) and bigleaf maple (*Acer macrophyllum*). Other tree species present include western red cedar (*Thuja plicata*), bitter cherry (*Prunus emarginata*), black hawthorn (*Crataegus douglasii*), and Oregon ash (*Fraxinus latifolia*) (City of Seattle 2008, U.S. Army Corps of Engineers 2012). Perimeter trees visible during the site visit generally consist of small- (10-14 inches measured four-and-a-half feet above the ground surface [DBH]) and medium- (15-19 inches DBH) sized trees. The tree canopy is a single layer and is estimated as moderately closed (40-69%) overall.

The understory is dominated by non-native invasive plant species including English ivy (*Hedera helix*), bindweed (*Convolvulus arvensis*), Himalayan blackberry (*Rubus armeniacus*), herb-robert geranium (*Geranium robertianum*), Scotch broom (*Cytisus scoparius*), and knotweed (*Polygonum* sp.), consistent with previous reports (City of

Seattle 2008, U.S. Army Corps of Engineers 2012). Some native understory shrubs and groundcover plants are present, but suppressed by the prevalence of invasive species listed previously. Special habitat features present in the north forest include, but are not limited to, downed wood, leaf litter, and dead parts of live trees (City of Seattle 2008).

The north forest is a designated Biodiversity Areas and Corridor and Great Blue Heron breeding area by WDFW (PHS on the Web).

South Forest

The south forest is located at the southern end of the project area, west of Texas Way and north of Discovery Park Boulevard. It connects/extends into forested areas of Discovery park offsite to the west. The south forest consists of a mix of deciduous and coniferous native trees species including Douglas-fir (*Pseudotsuga menziesii*), bigleaf maple, red alder, Pacific madrone (*Arbutus menziesii*), and western red cedar. The upper tree canopy mainly consists of large- (20-29 inches DBH) Douglas-fir trees; some exceeding 30 inches DBH also appear to be present to a lesser extent. Other trees that comprise the canopy are generally small and medium in size. The canopy is characterized as multi-story and considered closed (70-100%) on average.

Shade-tolerant invasive non-native plants are also present in this forested patch. These species include English ivy, English holly (*Ilex aquifolium*), cherry laurel (*Prunus laurocerasus*), and Himalayan blackberry. Documented native understory plants include osoberry (*Oemelaria cerasiformis*), red elderberry (*Sambucus racemosa*), beaked hazelnut (*Corylus cornuta*), native woodland rose (*Rosa* sp.), trailing blackberry (*Rubus ursinus*), and swordfern (*Polystichum munitum*) (City of Seattle 2008, U.S. Army Corps of Engineers 2012).

The south forest is part of a designated Biodiversity Areas and Corridor by WDFW (PHS on the Web).

Other Vegetated Areas

Other vegetated areas in Fort Lawton are generally maintained or managed landscapes that are often dominated by non-native species. These patches are located adjacent to buildings, roads, or parking lots. Vegetation often consists of either mowed herbaceous plants or small patches of trees that contain little to no understory vegetation. These areas offer relatively little habitat value when compared to other unmaintained forested patches in the project area and vicinity.

A narrow strip of native conifer trees is present on the eastern perimeter of the project area, between Texas Way and 36th Ave W. This narrow strip of vegetation, while disturbed and disconnected from other habitat areas, is briefly mentioned here because the presence of native conifers as well as a few snags contributes some habitat value to the site as a whole.

Offsite

Vegetation and habitat within approximately 300 feet of the project area was also generally evaluated to determine potential wildlife use of the project area. Discovery Park and Kiwanis Ravine Overlook / Kiwanis Memorial Park (hereafter collectively referred to as "Kiwanis Park") are located within approximately 300 feet of the project area.

In general, these city-owned parks are relatively contiguous forested areas expected to be dominated by native tree species of varying sizes and ages. Kiwanis Park appears to be dominated by deciduous tree species while forested areas of Discovery Park contain a mix of deciduous and coniferous tree species. Similar to habitat patches in the project area, non-native invasive plants are likely present or prevalent in places within these forested patches.

Offsite patches likely include a variety of special habitat features that wildlife species may utilize during some portion of their life cycle including downed wood, leaf litter, duff, shrub layer, moss, flowers, lichens, forbs, fungi, underground plant parts, herbaceous layer, snags, dead parts of live trees, tree cavities, bark, large live tree branches, live remnant trees, and fruits/seeds/nuts (Johnson and O'Neil 2001).

Discovery Park and Kiwanis Park are designated Biodiversity Areas and Corridors by WDFW (PHS on the Web). Kiwanis Park is also mapped as a Great Blue Heron breeding area by WDFW and City of Seattle. Both Discovery and Kiwanis Parks also contain streams with associated riparian corridors and wetland critical areas (SDCI GIS).

3.1.3 Fish and Wildlife

While the Fort Lawton site has been previously developed, remaining forested habitat functions as a valuable wildlife refuge in a very urban landscape. Potential for wildlife use of the site is increased particularly when considering the proximity or connectivity to habitat patches located in Discovery Park and Kiwanis Park.

Habitat patches on the Fort Lawton site are expected to be used by a variety of wildlife species. Wildlife use of the Fort Lawton project area and vicinity is fairly well documented. A total of 43 bird species were observed during winter 2004, and breeding point count surveys on the Fort Lawton site recorded by the U.S. Army Reserve are provided in Appendix C of the Final Environmental Assessment for BRAC 05 Recommendations for Closure, Disposal, and Reuse of Fort Lawton (U.S. Army Corps of Engineers 2012). These species consist of a mix of common urban bird species (i.e., American Crow, European Starling, House Sparrow) as well as species more suited to low-density urban environments (i.e., Bald Eagle, chickadees, juncos, woodpeckers, Great Blue Heron, kinglets, swallows) (Johnson and O'Neil 2001), likely a result of the preservation of large tracts of forest and other habitat areas contained in Discovery Park, west of the project area.

As stated previously, the north forest patch and Kiwanis Park are considered Great Blue Heron breeding areas by WDFW (PHS on the Web); they are also mapped as Heron Habitat Areas (with 500-foot buffers) and Wildlife Environmental Conservation Areas (ECAs) by the City of Seattle (SDCI GIS). In addition, outside of the study area, Bald Eagle breeding areas and a Purple Martin breeding site is mapped nearby (City of Seattle-SDCI GIS and WDFW-PHS on the Web, respectively).

Fish are not present on the Fort Lawton site or immediate vicinity due to a lack of fish habitat. Amphibians and reptiles are expected to be uncommon due to the surrounding roads and residences which disconnect onsite habitat from nearby vegetated areas and generally create movement barriers for these types of wildlife species. Terrestrial mammals that are expected to use habitat in the Fort Lawton study area include, but are not limited to mice, moles, voles, rats, squirrels, chipmunks, rabbits, raccoons, opossums, coyotes, deer, and bats. On occasion, larger mammals have used habitat in nearby Discovery Park, including a cougar in 2009 that was subsequently relocated (Clarridge and Turnbull 2009).

The following sensitive species are either species of local importance or priority species and have been determined to potentially utilize habitat present in the Fort Lawton study area or immediate vicinity. No state- or federally-listed species are known to occur on or immediately adjacent to the Fort Lawton site.

Great Blue Herons are regulated by the City of Seattle as a species of local importance. They are also considered a State Monitored species and Washington State Priority Species by WDFW (2008). A Great Blue Heron rookery has been located in Kiwanis Memorial Reserve Park in the past (U.S. Army Corps of Engineers 2012). Forests of Kiwanis Memorial Reserve Park and the north forest onsite are mapped as breeding areas by WDFW and SDCI-GIS. Currently, the nearest known heron rookery is located in Commodore Park next to Salmon Bay, approximately 800 feet from the Fort Lawton site. According to WDFW's website (WDFW n.d.), as of April 2014, the Kiwanis heron colony abandoned the Kiwanis site due to repeated bald eagle attacks and were not expected to return in the near future.

Great Blue Herons typically nest in the tops of trees near foraging habitat (e.g., streams, lakes, ponds, wetlands, saltwater shorelines, upland fields). The Fort Lawton site is considered to provide potential nesting habitat to Great Blue Herons, although no nests have been documented onsite presently or historically.

Pileated Woodpeckers are considered a State Candidate species and Washington State Priority Species by WDFW (2008). They most often nest in old-growth forest and mature forest stands. However, they are increasingly found in urban areas as long as there are large trees that can provide roosting and nesting

habitat. Forests in the Fort Lawton project area and greater project vicinity likely support breeding Pileated Woodpeckers. One individual was observed from Fort Lawton during the 2004 U.S. Army Reserve bird survey. No nests are known to be present the property, but potential nest sites are possible given the habitat available, particularly if sufficient standing dead wood is retained onsite. Pileated Woodpeckers are expected to use habitat on the Fort Lawton site for foraging or traveling.

Purple Martins are considered a State Candidate species and Washington State Priority Species by WDFW (2008). WDFW maps a breeding site approximately 0.3 miles northwest of the Fort Lawton site in Discovery Park. Purple Martins historically nested in tree cavities, but more often nest in man-made structures over water near urban areas in the lowlands of western Washington (Hays and Milner 2003). Purple Martins forage on flying insects often located near wet environments and may forage in open areas on the Fort Lawton property. No nest sites have been documented in the study area. However, there is potential for the presence or development of nest sites, presuming Pileated Woodpecker use of forested habitat and limited competition from more aggressive cavity-nesting species (Hays and Milner 2003).

Field sketch only. Features depicted are approximate and not to scale.

THE WATERSHED COMPANY

LEGEND:

- Onsite Habitat Areas
- Offsite Habitat Areas
- Approximate Potential Wetland
- Fort Lawton Site
- Study Area

Figure 1. Fort Lawton biological resources map and study area (imagery source: Google Earth)

3.2 Talaris Site

Talaris is located in the Laurelhurst neighborhood of Seattle, on the west side of Lake Washington north of WA-520 and Union Bay. Residential properties are present immediately surrounding the site on all sides. Seattle Children's Hospital is located to the northeast. The University of Washington campus is present in the vicinity to the southwest. Natural open spaces nearby include Union Bay Natural Area, Union Bay, and Washington Park Arboretum, all generally located to the south of the Talaris site.

The Talaris site is currently operated and managed as the Talaris Conference Center. The 17.8-acre property contains multiple buildings used to host overnight guests and provide meeting spaces. The conference center advertises its park-like setting, which includes a constructed pond, landscaped lawns, courtyards, and walking paths.

3.2.1 Wetlands and Streams

A *Wetland and Wildlife Study* (Raedeke Associates Inc. 2013; hereafter "Raedeke Study") documents the results of a 2013 evaluation of Talaris, the findings of which have been summarized here. The report concludes that one wetland (Wetland 1) is located in the southwest portion of the property. Wetland 1 is described as a depressional wetland that contains no outlet. It includes emergent and scrub-shrub vegetation classes generally dominated by non-native invasive plant species. At the time of the study, Wetland 1 rated as a Category II wetland using the Department of Ecology's (Ecology) *2004 Wetland Rating System for Western Washington* (publication #04-06-025).

A constructed pond is also located on the Talaris property. The pond was considered an artificial wetland in the Raedeke Study and was proposed to be considered exempt from regulation as a critical area at the time. Since wetland regulations vary across jurisdictions, including the definition of jurisdictional wetland, the exempt status of this feature should be verified by the applicable local, state and federal jurisdictions, particularly given the presence of an existing wetland and possible historic stream channel (see discussion below) nearby. The pond covers about three-quarters of an acre; therefore, if considered jurisdictional, it could have a significant impact on the redevelopment of the property.

One offsite wetland (Yesler Swamp) was also identified and estimated to be 175 feet south of the southwest property corner. The Yesler Swamp wetland could not be thoroughly assessed during the 2013 Raedeke Study, but was presumed to receive a dual rating of Category II/Category I using the Ecology *2004 Wetland Rating System for Western Washington* (publication #04-06-025).

While the findings of the 2013 Raedeke Study may still be accurate for general planning purposes, wetland delineations expire after five years and the City of Seattle has updated its Critical Areas Ordinance (CAO) including the wetland rating system used to

classify wetlands. Similarly, both state and federal agencies, principally Ecology and the Corps, now also require use of the 2014 rating system to support their permitting obligations. The wetlands discussed in the Raedeke Study will need to be re-rated using the appropriate classification system in order to satisfy current CAO requirements. Lastly, it is not clear if the wetland delineation was ever surveyed or otherwise accurately mapped. If no mapping occurred or if five years elapse (2018), the wetland boundaries will need to be re-delineated, flagged and surveyed.

A stream or riparian corridor is mapped by City of Seattle (SDCI GIS) on Talaris. Additionally, King County iMap and BLM Land Status and Cadastral Survey Records indicate the presence of a stream channel. However, the Raedeke Study notes this depicted feature is in fact a large stormwater pipe that lacks fish habitat "upstream" of the property and is therefore not considered a regulated critical area. This determination should be confirmed in subsequent site assessments. No other streams are known to exist on the study site.

3.2.2 Vegetation

The Raedeke Study also documents existing vegetation on the Talaris site. Existing vegetation at Talaris is located around buildings, walkways, paved access drives, and parking areas. It is characterized as "developed open space resembling a campus in a park-like setting" and mainly consists of large landscaped areas including lawns and large trees (Raedeke Associates Inc. 2013). The Talaris site landscaping has been designated an historic landmark by City of Seattle.

A mix of native and non-native ornamental trees species are present throughout the site including bigleaf maple, red alder, black cottonwood (*Populus balsamifera*), bitter cherry (*Prunus emarginata*), willow (*Salix* sp.), western red cedar, Douglas-fir, Lombardy poplar (*P. nigra*), weeping willow (*Salix babylonica*), ornamental pines (*Pinus* sp.), and ornamental oaks (*Quercus* sp.).

Understory vegetation is generally managed/landscaped with the exception of an area in the southwest portion of the site and along the eastern property line. These unmaintained areas contain understory vegetation dominated by non-native invasive plant species including Himalayan blackberry, English ivy, field bindweed (*Convolvulus arvensis*), bittersweet nightshade (*Solanum dulcamara*), patches of knotweed, and scattered English holly. Special habitat features noted by Raedeke Associates Inc. (2013) include downed logs, stumps, and snags (typically less than 10 inches DBH). These features were relatively few in number and overgrown by invasive plants. No sensitive or rare plants are known to occur in the project area or immediate vicinity.

Offsite

Vegetation and habitat within approximately 300 feet of the project area was also generally evaluated to determine potential wildlife use of the project area. Yesler Swamp, part of the Union Bay Natural Area (or Montlake Fill), is located southwest of

the Talaris site, on the south side of NE 41st Street. The natural area, a former landfill, is situated next to Union Bay and has various habitat types including forested, scrub-shrub, and open herbaceous areas interspersed with seasonal and permanent ponds. The various habitat types and high interspersion attract a variety of birds, making it a popular birding area within Seattle city limits.

WDFW has recorded a Purple Martin breeding area near Yesler Swamp and the University of Washington Center for Urban Horticulture (PHS on the Web). Additionally, the Union Bay Natural Area and associated lake shoreline are expected to provide habitat for other types of wildlife including fish, amphibians, reptiles, and some small mammals.

3.2.3 Fish and Wildlife

The Talaris site represents a comparatively undeveloped, or under-developed, patch of land in an otherwise highly developed urban landscape. The density of vegetation present onsite compared to surrounding areas is high. It is expected to function as a refuge for urban wildlife species in the area. However, wildlife use is likely limited by plant species composition, isolation from other habitat areas, noise and disturbance associated with existing facility operations, and pedestrian use of the property.

Due to wildlife movement restrictions in high-intensity zones, the most common wildlife in these areas are typically birds and small mammals tolerant of urban natural areas (Johnson and O'Neil 2001). Raedeke Associates Inc. observed American Crow, Bewick's Wren, Steller's Jay, Black-capped Chickadee, House Sparrow, and Northern Flicker onsite. They also observed woodpecker foraging sign in a small alder snag in the southwestern portion of the site. Other wildlife expected on the Talaris site include mice, rats, squirrels, raccoons, opossums, bats, and a variety of other birds like robins, thrushes, sparrows, towhees, juncos, ducks, hummingbirds, and some hawks. Coyote use of the property has been previously reported (Laurelhurst blog n.d.).

Native fish are not expected to be present on the Talaris property based on the lack of an above-ground stream feature or natural ponds. The created ponds could support stocked or introduced fish. Amphibians and reptiles are expected to be uncommon onsite due to the surrounding roads and residences which disconnect onsite habitat from nearby vegetated areas and generally create movement barriers to these less mobile wildlife species. However, breeding of some tolerant amphibian species may take place in the pond.

A Fish and Wildlife Habitat Conservation Area (FWHCA) associated with a known Bald Eagle nest site is mapped on the property by the City of Seattle (SDCI GIS) as a Wildlife ECA. The nest was observed by Raedeke Associates Inc. (2013) during field work activities in a stand of black cottonwoods in the southwest portion of the property. The current status of the nest is unknown, but activity was reported in the Raedeke Study in 2013 and again (although unconfirmed) in March 2015 (Laurelhurst blog n.d.). Bald

Eagles are no longer listed for protection by state or federal agencies; they have also been recently removed from Washington State's Priority Habitats and Species list. The mapped Wildlife ECA on Talaris is presumably based on the prior status of Bald Eagles as a Priority Species. Since this no longer applies, the City should be consulted to determine how the mapped Wildlife ECA would be regulated. Bald Eagle nests are still protected by the U.S. Fish and Wildlife Service under the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act.

No state- or federally-listed species, species of local importance, or priority species are known to utilize habitat onsite or are considered to have a close association with the habitat available on Talaris.

As stated previously, a Purple Martin breeding area is mapped by WDFW, approximately 700 feet southwest of the property (PHS on the Web) in the Union Bay Natural Area. Many other wildlife species are also expected to use the Union Bay Natural Area for some portion of their life cycle. In general, wildlife utilizing habitat in the natural area are not expected to regularly visit Talaris due to habitat fragmentation caused by roads and residences. Furthermore, the "park-like" habitat available onsite, in combination with the regular disturbance that the site receives, precludes use by certain wildlife species present in the Union Bay Natural Area. Purple Martins may forage or pass through Talaris while traveling. Suitable nesting habitat appears to be limited to the Union Bay Natural Area.

Field sketch only. Features depicted are approximate and not to scale.

THE WATERSHED COMPANY

LEGEND:

- Offsite Habitat Areas
- Approximate Wetland
- Constructed Pond
- Approximate Bald Eagle Nest
- Approximate Purple Martin Nest
- Talaris Site
- Study Area

Figure 2. Talaris biological resources map and study area (imagery source: Google Earth)

4 IMPACTS OF THE ALTERNATIVES

Four alternatives are being considered in the DEIS for the Fort Lawton Project. Each alternative is described in this section as it relates to potential impacts on biological resources. A summary of development proposed under each alternative is provided in Tables 1 and 2, below.

Table 1. Built and open space area on the Fort Lawton site per DEIS alternatives

	Alt. 1 (Ac.)	Alt. 2 (Ac.)	Alt. 3 (Ac.)	Alt. 4 (Ac.)
Built Area (Impervious Area)				
Buildings/Structure Footprints	2.2	7.1	0.2	2.3
Roadways/Sidewalks[1]	6.6	6.9	5.0	5.0
Surface Parking	4.4	0.0	4.2	11.2
Private Drive Paths	0.0	1.3	0.0	0.0
Subtotal	13.2	15.3	9.4	18.5
Open Space Area (Pervious Area)				
Landscaped Areas	2.6	12.7	0.0	5.9
Passive Open Space Areas[2]	13.0	0.0	17.0	9.6
Active Open Space Areas[3]	5.1	0.0	7.6	0.0
Undesignated Buffer Space	0.0	5.9	0.0	0.0
Subtotal	20.7	18.6	24.6	15.5
TOTAL	**33.9**	**33.9**	**33.9**	**33.9**

Source: Seattle Office of Housing, 2017.

[1] Includes paved area along the Texas Way W and 36th Avenue W rights of way.

[2] Passive open space areas under Alternatives 1 and 3 includes natural wooded areas and passive parks. Passive open space areas under Alternative 2 include natural wooded areas.

[3] Active open space areas under Alternatives 1 and 3 include multi-purpose fields.

Note: any discrepancies in the table are due to rounding.

Table 2. Summary of development per DEIS alternatives

	ALT. 1		ALT. 2		ALT. 3		ALT. 4	
	F.L. SITE	T. SITE	F.L. SITE	T. SITE	F.L. SITE	T. SITE	F.L SITE	T. SITE
HOUSING								
Number of Housing Units	238	0	113	238[2]	0	238[2]	0	0
Area of Housing (SF)	202,291	0	316,400	256,551	0	256,551	0	0
PARKS & RECREATION								
Number of Sports Fields	2	0	0	0	3	0	0	0
Area of Parks & Recreation (Ac)[1]	21.6	0	0	0	29.0	0	0	0
COMMUNITY FACILITIES								
Area of Community Facilities (SF)	0	0	0	30,621	0	30,621	0	0
PARKING								
Number of Parking Spaces	266	0	254	295	90	295	0	0
Area of Surface Parking (Ac)	4.4	0	0	3.3	4.2	3.3	0	0

Source: Seattle Office of Housing, 2017.

F.L. = Fort Lawton, T. = Talaris

[1] Includes active and passive parks, SPR maintenance facility and area dedicated to Discovery Park.

[2] For purposes of conservative analysis in this EIS, the same number of affordable and formerly homeless housing units are assumed on the Talaris site under Alternatives 2 and 3 as on the Fort Lawton site under Alternative 1.

4.1 Alternative 1 – Mixed Income Affordable Housing and Public Park Uses Onsite (Applicant's Preferred Alternative)

Under Alternative 1, 61 percent of the Fort Lawton site would be in open space including passive open space, active open space, and landscaped areas; the remaining 39 percent would be in built/impervious areas. By comparison, under existing conditions, 45 percent of the Fort Lawton site is open space/pervious and 55 percent is built/impervious areas. Therefore, more of the site would be in open space under than at present under this alternative. Existing forested habitat patches in the north and south parts of the site would be preserved in their natural condition with proposed development. Wildlife habitat and corridors for wildlife movement between Kiwanis Park and Discovery Park would be preserved with these natural areas. Up to 4.7 acres of forest land owned by the U.S. Army in the west portion of the site would be dedicated to Discovery Park and would also be preserved as natural area.

Proposed development on the Fort Lawton site under Alternative 1 would include residential buildings, parks/recreation areas, roadways/sidewalks, parking areas and landscaping, primarily in the central portion of the site. The landscaping would likely include a mix of ornamental plant species and native, noninvasive and drought-resistant plantings. The landscaped, more managed habitat would not provide substantial value for most wildlife species. Species adapted to the urban environment would continue to use these areas.

No direct impacts to critical areas (i.e., the potential wetland in the north forest area), vegetation that provides wildlife habitat (in the north and south portions of the site), or sensitive wildlife species (i.e., Great Blue Herons, Pileated Woodpeckers, and Purple Martins, which could use habitats onsite) would be expected at the Fort Lawton site under this alternative.

Construction activities on the Fort Lawton site would temporarily impact wildlife species within the immediate site area. Construction equipment and noise could potentially disturb wildlife and habitat. Urban-adapted wildlife are more tolerant of disturbance (e.g., finch, sparrows, starlings, crows, and small mammals), but those that are habitat-specific (e.g., birds of prey, woodpeckers and owls) may handle the displacement with difficulty when searching for suitable habitat in otherwise claimed territories. During breeding season, there is a greater potential for permanent loss of species.

Proposed development under Alternative 1 would indirectly impact retained habitat on the Fort Lawton site due to increased human activity; building, parking lot and roadway lighting; the potential use of fertilizers, pesticides, and herbicides in landscaped areas; and the introduction of "super predators" (e.g., domestic dogs and cats) in residential

areas that could impact native wildlife. However, activity, lighting, etc., from military use of the site in the past may also have impacted these species.

With implementation of the proposed temporary and permanent stormwater control systems on the Fort Lawton site, it is assumed that Alternative 1 will have no negative stormwater consequences to downstream biological resources; therefore, no indirect impacts to these resources are expected under Alternative 1.

Under Alternative 1, the Talaris site would not be altered and the biological resources on that site would continue as under existing conditions.

4.2 Alternative 2 – Market Rate Housing Onsite; Affordable/Homeless Housing Offsite

Fort Lawton Site

Under Alternative 2, the Fort Lawton site will be developed with market rate single family housing. Approximately 45 percent of the site would be covered in built/impervious areas and 55 percent would be in open space/pervious. This impervious-to-pervious surface ratio is consistent with existing site conditions. However, forested habitat areas onsite would be completely or partially developed under this alternative.

The north forest area would be partially developed with single-family residences located at the top of the slope, and access driveways connecting homes to W Lawton Street to the north. The south forest would be completely developed. In general, these established forest areas would be converted to single-family residences with associated landscaping vegetation. The landscaping would likely include a mix of ornamental plant species and native, noninvasive and drought-resistant plantings. The landscaped, more managed habitat would not provide substantial value for most wildlife species. Species adapted to the urban environment would continue to use these areas. No active or passive public parks would be provided at the Fort Lawton or Talaris sites under this alternative.

Direct impacts to biological resources would be expected at the Fort Lawton site under this Alternative. If the potential wetland area in the northwest portion of the site is determined to be jurisdictional, current site plans may require direct wetland impacts. However, local, state and federal regulations require demonstration of mitigation sequencing, and to comply, the project would have to show why impacts are not avoidable (see mitigation discussion, below). Furthermore, onsite forested vegetation that provides wildlife habitat would be removed or significantly altered, affecting wildlife species that utilize these areas. Existing habitat onsite has been determined to have the potential to support breeding populations of Great Blue Herons, Pileated Woodpeckers, and Purple Martins, although no nest sites have been documented on the property. Bald Eagles are present in the vicinity but not likely to nest on the Fort Lawton site. Removal and reduction of forested habitat areas, and replacement with single-

family residences would preclude use of onsite habitat by some wildlife species, including the sensitive species listed previously. Furthermore, wildlife currently using these habitat areas would be displaced or lost due to development under this alternative.

Temporary impacts to wildlife from construction activities would generally be consistent with those described under Alternative 1 (see Section 4.1). However, the area, magnitude, and duration of construction would be greater under this alternative based on site plans.

Similar to Alternative 1, proposed development under Alternative 2 would indirectly impact any remaining habitat due to increased human activity; building, parking lot and roadway lighting; the potential use of fertilizers, pesticides, and herbicides in landscaped areas; and the introduction of "super predators" (e.g., domestic dogs and cats) in residential areas that could impact native wildlife. However, past military use of the site would have had similar indirect impacts to wildlife. Additionally, should the potential wetland be preserved, indirect impacts from smaller buffers and adjacent development may alter the wetland character and ability to support local species.

With implementation of the proposed temporary and permanent stormwater control systems on the Fort Lawton and Talaris sites, it is assumed that Alternative 2 will have no negative stormwater consequences to downstream biological resources; therefore, no indirect impacts to these resources are expected under Alternative 2.

Talaris Site

Under Alternative 2, the Talaris site would be developed with affordable and formerly homeless housing. Some of the affordable and formerly homeless housing would occupy existing, renovated buildings, while other housing would be in newly constructed buildings. Approximately 50 percent of the site would be covered in built/impervious areas and 50 percent would be in open space/pervious. Talaris site landscaping has been designated as an historic landmark by the City of Seattle. As such, much of the existing landscaping, which contributes to the available onsite habitat, would be retained under this alternative.

Proposed development of the Talaris site would include renovation of existing buildings, construction of additional residential units, and additional parking stalls. Existing access drives and walkways would be utilized under proposed conditions.

Preliminary site plans appear to avoid direct impacts to the known wetland critical area present in the southwest portion of the Talaris site as well as the constructed pond. Site plans also avoid directly impacting the Bald Eagle nest tree and area within approximately 150 feet of the nest. Development of the site under this alternative is expected to alter existing vegetated areas that provide potential wildlife habitat, to a limited degree. Overall, a reduction in vegetation/potential habitat areas would be

expected. However, as stated previously, much of the existing landscaping would be retained. Any removal of vegetation has the potential to impact wildlife species that may utilize that vegetation for some portion of their life cycle. Redevelopment of the site, with retention of vegetation in the vicinity of wetland and Bald Eagle habitat areas, may provide opportunities for habitat enhancement through removal of invasive species and replacement with native or noninvasive, drought-tolerant plants.

Temporary impacts from construction activities have the potential to affect wildlife use of the Talaris site, as previously described for Fort Lawton in Section 4.1. Conducting construction activities during the nonbreeding season may limit temporary impacts to Bald Eagles.

Proposed development under Alternative 2 at the Talaris site would indirectly impact retained habitat due to increased human activity. Building, parking lot and roadway lighting; use of fertilizers, pesticides, and herbicides in landscaped areas; and introduction of "super predators" (e.g., domestic dogs and cats) are expected to be present to varying degrees presently, and would be increased under this alternative.

4.3 Alternative 3 – Public Park Onsite; Affordable/Homeless Housing Offsite

Fort Lawton Site

Under Alternative 3, the entire Fort Lawton site would be developed as a public park. Approximately 27 percent of the Fort Lawton site would be covered in built/impervious areas and 73 percent would be in open space/pervious. The existing maintenance building and associated parking area in the north part of the site would be retained to be used for parks maintenance purposes. The rest of the site would be used as passive or active park space, or retained as forested areas. Existing forested habitat patches in the north and south parts of the site would be preserved in their natural condition under this alternative. Wildlife habitat and corridors for wildlife movement between the Kiwanis Park and Discovery Park would be preserved with these natural areas. Like Alternative 1, up to 4.7 acres of forest land owned by the U.S. Army in the west portion of the site would be dedicated to Discovery Park and would also be preserved as natural area.

No direct impacts to critical areas (i.e., the potential wetland in the north forest area), vegetation that provides wildlife habitat (in the north and south portions of the site), or sensitive wildlife species (i.e., Great Blue Herons, Pileated Woodpeckers, and Purple Martins which could use habitats onsite) would be expected at the Fort Lawton site under this alternative.

Construction activities associated with removal of existing buildings and pavement at the Fort Lawton site have the potential to temporarily disturb wildlife species in the immediate vicinity. Urban-adapted wildlife are more tolerant of disturbance (e.g., finch,

sparrows, starlings, crows, and small mammals). Less tolerant species may relocate due to noise and activity associated with construction/deconstruction.

Increased recreational use of the site has the potential to indirectly impact wildlife use of adjacent habitat areas due to increased human activity and increased lighting associated with active recreational areas. Previous military use of the site would have contributed to these indirect impacts in the past.

With implementation of the proposed temporary and permanent stormwater control systems on the Fort Lawton and Talaris sites, it is assumed that Alternative 3 will have no negative stormwater consequences to downstream biological resources; therefore, no indirect impacts to these resources are expected under Alternative 3.

Talaris Site

Under Alternative 3, the Talaris site would be developed in the same manner as Alternative 2. Refer to Section 4.2 of this document.

4.4 Alternative 4 – No Action Alternative

Under a no action alternative, the Fort Lawton site would remain in its existing vacant condition, Seattle would terminate its lease of the property, and buildings and infrastructure would continue to deteriorate.

The Talaris site would presumably continue to operate as it does presently. In the future, the Fort Lawton and Talaris sites could be conveyed or sold to other entities and developed in accordance with respective zoning designations.

No direct, temporary, or indirect impacts to wetland critical areas, vegetation that provides wildlife habitat, or sensitive wildlife species would be expected at either site under this alternative.

5 MITIGATION MEASURES

Mitigation measures discussed in this section are driven by local, state, and federal regulations (as applicable) and best management practices. For example, the City of Seattle requires certain mitigation measures when working near environmentally critical areas, including wetlands and Fish and Wildlife Habitat Conservation Areas (FWHCAs), as well as significant trees in order to avoid adverse impacts to these biological resources. These requirements are discussed in this section.

Should direct, unavoidable wetland impacts be realized at either the Fort Lawton or Talaris sites, the project would need to comply with Sections 401 and 404 of the Clean

Water Act and with water quality requirements administered by the Washington State Department of Ecology.

5.1 Wetlands and Fish and Wildlife Habitat Conservation Areas

Wetlands and Fish and Wildlife Habitat Conservation Areas (FWHCAs) are regulated as critical areas under Seattle Municipal Code (SMC) Chapter 25.09 – Regulations for Environmentally Critical Areas. The stated intent of this chapter is:

> *…to promote safe, stable, and compatible development that avoids and mitigates adverse environmental impacts and potential harm on the parcel and to adjacent property, the surrounding neighborhood, and the related drainage basin.*

In general, projects located near wetland and/or FWHCAs must demonstrate that impacts have been avoided to the extent feasible through mitigation sequencing outlined in SMC 25.09.065.D.

Specific development standards for wetlands and associated buffers are provided in SMC 25.09.160. If after mitigation sequencing, disturbance is proposed in wetland or wetland buffer areas, mitigation is required. Mitigation may include restoration of degraded critical areas and/or their associated buffers. The following best management practices may also be required (Table 3).

Table 3. Best management practices to minimize development impacts on wetlands and wetland buffers from SMC 25.09.160

Disturbance type	Measures to mitigate impacts include but are not limited to
Lights	Direct lights away from wetland
Noise	Locate activity that generates noise away from wetland
Toxic runoff	Route all new, untreated runoff away from wetland while ensuring wetland is not dewatered Establish covenants limiting use of pesticides within 150 feet of wetland Apply integrated pest management
Stormwater runoff	Retrofit stormwater detention and treatment for roads and existing adjacent development Prevent channelized flow from lawns that directly enters the buffer
Change in water regime and presence of impervious surface	Infiltrate or treat, detain, and disperse into buffer new runoff from impervious surfaces and new lawns
Pets and human disturbance	Use privacy fencing; plant dense trees and vegetation to delineate buffer edge and to discourage disturbance using trees and vegetation appropriate for the ecoregion; place wetland and its buffer in a separate tract

Disturbance type	Measures to mitigate impacts include but are not limited to
Dust	Use best management practices to control dust

When development is proposed on a parcel that contains a FWHCA, consultation with WDFW is required in addition to the following mitigation measures:

a. Minimize development;

b. Locate development in areas that maximize the retention of trees and vegetation;

c. Establish a buffer zone to protect habitat and treed and vegetated areas;

d. Preserve important tree and vegetation and other habitat features;

e. Limit access to habitat areas;

d. Impose seasonal restriction of construction activities, and non-disturbance areas as appropriate to protect fish or wildlife species present on the site;

a) Preserve the ability for fish to pass between fish habitat in Type S, F, Np, and Ns waters upstream and downstream of the parcel. The application requirements and general conditions of this Chapter 25.09 and Sections 25.09.330 and 25.09.060 do not apply if the person responsible for development of the parcel has either a Hydraulic Project Approval from WDFW or a Section 404 permit under the federal Clean Water Act from the United States Army Corps of Engineers. Nothing in this subsection 25.09.200.B alters the rights of the owner of the pipe or culvert, if that person is not an applicant for a permit.

b) Require the developer to daylight a pipe or culvert defined in subsection 25.09.012.D.3.c, when the conditions in subsection 25.09.200.B.3.g.1 are met. When requiring daylighting, the Director is authorized to modify the conditions set out in subsection 25.09.200.B.3.g.2. Nothing in this subsection 25.09.200.B.3.g alters the rights of the owner of the pipe or culvert, if that person is not an applicant for a permit.

1) The Director may require daylighting under the following conditions:

a) The existing pipe or culvert cannot remain in its current location and provide an effective passage for anadromous fish due to the development.

b) Other methods for preserving fish passage such as pipe or culvert placement or site engineering are not feasible.

2) If daylighting is required, the applicant shall prepare a plan that demonstrates the following:

a) The ecological functions of the daylighted waters and resulting new riparian management area are compatible with and protect the functions of pipes and culverts upstream and downstream and the ecological functions of the existing riparian corridor upstream and downstream.

b) The daylighted waters do not contribute to flooding.

c) The ecological functions of the daylighted waters and resulting new riparian management area include preventing erosion, protecting water quality, and providing diverse habitat.

3) The Director shall determine whether daylighting the pipe or culvert and the impacts from the development to fish passage on the parcel are roughly proportionate.

4) When requiring daylighting, the Director is authorized to modify the following conditions:

a) Yard and/or setback requirements on the property may be reduced to provide sufficient area for daylighting and creating a riparian management area, unless reducing them is injurious to safety.

b) The riparian watercourse and riparian management area may count toward open space requirements for all multifamily or commercial zone requirements.

c) Required parking may be reduced up to 25 percent.

d) The riparian management area may be reduced to the extent needed to provide sufficient area for the plan described in subsection 25.09.200.B.3.g.2.

For sites located near Great Blue Heron colonies, a Great Blue Heron habitat management plan is required through the City of Seattle in coordination with WDFW. Recommendations for work occurring near Bald Eagle nest sites is provided in the U.S. Fish and Wildlife Service's National Bald Eagle Management Guidelines (2007).

5.2 Significant Trees

Trees located outside of critical areas are regulated in Chapter 25.11 (Tree Protection) of the SMC. This chapter regulates trees that fall into the following categories: trees that are six inches DBH or greater, exceptional trees, and trees with a DBH of two feet or greater.

Trees should be retained on a site to the extent feasible. To protect trees planned for retention, tree protection must be identified on site plans and implemented during construction. The basic tree protection area is located at the dripline of the tree.

If retention is not feasible, replacement trees may be required for trees planned for removal. In general, tree replacement is required for removal of exceptional trees or trees that are greater than two feet DBH. The quantity, size, and species required for replacement is not specified. Rather, replacement trees, once mature, should replace the canopy cover prior to tree removal.

5.3 Summary

The following measures are proposed to address the potential biological resource impacts from construction and operation of the Fort Lawton Army Project under Alternatives 1, 2 and 3.

Prior to Construction

- Delineate, survey, and rate wetlands to determine required buffers per SMC 25.09.160.
    - On the Talaris site, confirm jurisdictional status of constructed pond and previously-described stormwater pipe.
- Determine status of Talaris site Bald Eagle nest.
- Create Great Blue Heron Management Plan for Fort Lawton site per DPD Directors Rule 5-2007, including: that any clearing, grading or outside construction would be done outside of the nesting season (February 1st through July 31st).
- Identify significant trees in the development areas of the sites per SMC Chapter 25.11 and implement tree protection/replacement measures, as applicable.
- Limit development to the minimum necessary to meet project needs and demonstrate mitigation sequencing required by the City.
- Plan development in areas that limit impacts to wetland critical areas and associated buffers and maximize retention of trees and valuable habitat areas.
    - On the Fort Lawton site, retain north and south forested patches to the extent feasible to provide natural habitat and corridors for wildlife movement between Kiwanis Park and Discovery Park.

During Construction

- Install temporary and permanent stormwater control systems to limit water quality impacts on downstream resources.
- Install fencing at wetland buffer edges and around valuable habitat areas (i.e., Bald Eagle nest area at Talaris and/or forested habitat patches at Fort Lawton) to protect and preserve these critical areas.
- Avoid or limit vegetation removal and construction activities from February to July to minimize disturbances to nearby breeding birds, as feasible.
- Coordinate with WDFW when working near nesting habitat associated with known Great Blue Heron breeding areas, as applicable.
- Install and maintain tree protection fencing for the duration of construction activities.

- Plant native, drought tolerant species in landscaped areas.
- Compensate for any wetland impacts, through installation of an approved mitigation plan, per SMC 25.09.065.

During Operation

- Maintain permanent fencing at wetland buffer edges and at edges of habitat areas to discourage intrusions by people and pets.
- Direct lighting away from natural areas, use downcast lighting, and limit or exclude night lighting, where feasible.
- Maintain and monitor mitigation sites and retained/installed trees, as applicable.
- Limit use of fertilizers, pesticides and herbicides in developed areas.
- Consider installation of interpretive signs or distribution of information on biological resources for public education.

6 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

Under Alternatives 1 and 3, there could be a permanent minor displacement of certain wildlife species less tolerant of urban uses from the Fort Lawton site due to proposed development (e.g., from increased activity levels, use of landscape maintenance products and the introduction of pets). The past military use of the Fort Lawton site could also have impacted these species. Under Fort Lawton Alternative 2 and Talaris Alternatives 2 and 3, there could be a permanent displacement of certain wildlife species less tolerant of urban uses, due to proposed development (e.g., from the elimination of habitat, as well as increased activity levels, use of landscape maintenance products and the introduction of pets). The existing conference center uses at the Talaris site also likely impact these species. No other significant unavoidable adverse biological resources impacts are anticipated.

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Appendix D

Air Quality Report

Air Quality Technical Report
Fort Lawton Army Reserve Center Redevelopment Project
Seattle, Washington

October 16, 2017

Prepared for

EA Engineering, Science, and Technology, Inc.

On behalf of

City of Seattle

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Air Quality Technical Report
Fort Lawton Army Reserve Center Redevelopment Project
Seattle, Washington

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EXECUTIVE SUMMARY

The City of Seattle is proposing redevelopment of the former Fort Lawton Army Reserve Center, in the Magnolia neighborhood in northwest Seattle, Washington. This Air Quality report describes the current air quality conditions in the region, policies and regulations that govern air pollutant emissions, and regulations and policies that have been developed to reduce greenhouse gas (GHG) emissions. Impacts of four alternatives (action Alternatives 1 through 3 and no action Alternative 4) are analyzed. GHG emission rates generated by the four alternatives are forecast at a screening level.

The Fort Lawton project would include development at the Fort Lawton site in the Magnolia neighborhood in northwest Seattle under Alternatives 1, 2, and 3, as well as at the offsite Talaris site, located in the Laurelhurst neighborhood of Seattle under Alternatives 2 and 3. Existing development at the Fort Lawton site includes structures formerly used by the Army Reserve Center, most or all of which would be removed as part of the redevelopment of the area. Existing development at the Talaris site includes a conference center. Future development at the Fort Lawton and Talaris sites will include single- and multi-family housing, outdoor recreation and natural areas, and a park maintenance facility, depending on the Environmental Impact Statement alternative.

Seattle and King County are currently in attainment for ozone, nitrogen dioxide, particulate matter, and carbon monoxide. A carbon monoxide/ozone maintenance program based on vehicle emission standards is currently in effect in the Central Puget Sound area.

GHG emissions were estimated based on the number of single-family and multi-family housing units and aggregate square footages of medical office space (senior supportive services). GHG emission estimates for the three action alternatives were then compared to each other and to the No Action alternative. Vehicle miles traveled were estimated based on the number of trips associated with the planned development, including residences, support service offices, and active open spaces (sports fields).

The following air pollution impacts are common to all action alternatives:

- Construction-related dust, and emissions from diesel-powered construction equipment
- Vehicle tailpipe emissions associated with residential growth and support services
- Emissions generated by natural gas, fuel oil, and propane combustion used for space heating
- Emissions associated with electricity consumption through the lifespan of each building.

Direct and indirect impacts of the four alternatives would include the following:

- Alternative 1: The Fort Lawton site would be developed with affordable and formerly homeless multi-family housing, support service offices and active and passive open space; the Talaris site would not be developed. This alternative would result in larger increases in GHG emissions than the No Action alternative, but lower increases in GHG than Alternative 2. Total vehicle miles traveled (VMT) under this alternative would be lower than Alternatives 2 and 3.

- Alternative 2: The Fort Lawton site would be developed with market rate single-family housing; the Talaris site would be developed with affordable and formerly homeless multi-family housing and support service offices. This alternative would result in the largest total GHG emissions and the largest VMT due to the largest number of dwelling units constructed.
- Alternative 3: The Fort Lawton site would be developed with active and passive open spaces; the Talaris site would be developed with affordable and formerly homeless multi-family housing and support service offices. This alternative would result in similar GHG emission increases as Alternative 1, but slightly higher VMT, due to the larger amount of active open space than that in Alternative 1.
- Alternative 4: No additional GHG emissions or VMT would be associated with the No-Action alternative.

None of the action alternatives are forecast to exceed the Washington State Department of Ecology (Ecology) guidance of 25,000 metric tons CO_2e[1] in annual emissions.

1 To express the average emission rate and global warming potential of the combined constituents, GHG emission rates are commonly expressed as the equivalent amount of carbon dioxide (CO_2e).

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INTRODUCTION

At the request of the City of Seattle, Landau Associates, Inc. prepared this report, which provides background information and analysis to support the Air Quality section of the Draft Environmental Impact Statement for the Fort Lawton Army Reserve Center Redevelopment Project (Fort Lawton project) in King County, Washington.

The following sections describe the current air quality conditions in the region, policies and regulations that govern air pollutant emissions, and regulations and policies that have been developed to reduce greenhouse gas (GHG) emissions. Impacts of the four following alternatives are analyzed. GHG emission rates generated by the four alternatives are also forecast at a screening level.

- **Alternative 1**: 238 affordable and formerly homeless housing units and parks and recreation uses constructed on the Fort Lawton site; no redevelopment of the Talaris site.
- **Alternative 2**: 113 market-rate housing units constructed on the Fort Lawton site; 238 affordable and formerly homeless housing units constructed on the Talaris site.
- **Alternative 3**: Public park and recreation uses constructed on the Fort Lawton site; 238 affordable and formerly homeless housing units constructed on the Talaris site.
- **Alternative 4 (No Action)**: Fort Lawton site remains vacant; no redevelopment of the Talaris site.

Under Alternatives 1, 2, and 3, full buildout is expected to be complete by 2025. Under the No Action Alternative, this analysis assumes that no buildout will occur.

The study area for this evaluation is the former Fort Lawton Army Reserve Center in the Magnolia neighborhood in northwest Seattle, and nearby offsite locations, including Discovery Park and Kiwanis Memorial Preserve Park (Appendix A). The study area also includes the offsite location referred to as the "Talaris site," located in the Laurelhurst neighborhood of Seattle, approximately 5 miles east of the Fort Lawton site (Figure 1).

Current federal, state, and local air quality regulations regulate the construction and operation of new developments that would generate unacceptable air pollution emissions. However, population is expected to increase in the Puget Sound region regardless of which alternative is selected. Population increases are associated with expansion of residential, commercial, institutional, and industrial spaces and therefore increased air pollutant emissions in the region. Similarly, vehicle miles traveled (VMT) by vehicles used by residents and people who work in the region would also increase.

AFFECTED ENVIRONMENT

Existing Air Pollution Sources

Typical existing air pollution sources in Seattle include commercial and retail businesses, light industry, residential wood-burning devices (such as woodstoves), and vehicular traffic. On-road

vehicular traffic along major roadways and in existing institutional (school), commercial, and residential areas is expected to be the single largest contributor to criteria pollutant emissions from the project. Vehicles contribute most of the carbon monoxide (CO), nitrogen dioxide (NO_2), and GHGs. Stationary equipment used in commercial and industrial areas is a secondary source of emissions, and space heating (such as gas and diesel heating equipment) contributes air pollutant emissions as well.

Key Criteria Air Pollutants

The criteria pollutants, described below, are six key air pollutants produced in the combustion of fossil fuels and other processes.

Carbon Monoxide

CO is a product of incomplete combustion generated by mobile sources (such as vehicular traffic and heavy equipment), residential wood combustion, and industrial sources that burn fuel. Of all pollutants for which short-term health standards exist, CO is emitted in the greatest quantity. The impact of CO is usually limited to the local vicinity of its emission. Since CO is of particular concern with respect to vehicular traffic, the highest ambient concentrations tend to occur near congested roadways and intersections, particularly during wintertime periods of air stagnation.

Ozone

Ozone (O_3) is a highly reactive form of oxygen that is generated by an atmospheric chemical reaction with ozone precursors like nitrogen oxides and volatile organic compounds. These precursors are emitted directly from industrial and mobile sources. Transportation equipment such as automobiles and trucks also significantly contribute to ozone precursor emissions. Elevated ozone concentrations in the atmosphere is a regional issue rather than a localized problem, because the atmospheric reactions take time, and during this delay, ozone precursors may be dispersed far from their point of origin.

Particulate Matter (PM_{10} and $PM_{2.5}$)

Particulate matter is generated by industrial emissions, residential wood combustion, motor vehicle tailpipes, and fugitive dust from roadways, haul roads, and unpaved surfaces. There are federal standards for the emission of particulate matter less than or equal to 10 micrometers in size (PM_{10}) and particulate matter less than or equal to 2.5 micrometers in size ($PM_{2.5}$), because these sizes of particulate matter contribute the most to human health effects and regional haze. The highest ambient concentrations generally occur near the emission sources, which in King County would be from residential wood-burning stoves and motor vehicle tailpipes on major roads. $PM_{2.5}$ has a greater impact than PM_{10} at locations far from the emitting source because it remains suspended in the atmosphere longer and travels farther.

Lead

The main source of lead pollution has historically been the transportation sector, but tailpipe lead emissions have drastically declined since the US Environmental Protection Agency (EPA) implemented regulatory efforts to remove lead from on-road motor vehicle gasoline in 1995. The major emission sources of lead currently include lead smelters and metals processing plants and combustion of aviation gasoline.

Nitrogen Oxides and Sulfur Oxides

Nitrogen oxides (NO_x) and sulfur oxides (SO_x) are emitted by mobile sources and fuel-burning stationary sources. NO_x and SO_x pollution from tailpipe emissions form regional haze and acid deposition in the Olympic and Cascade Mountains surrounding Seattle, and NO_x is one of the ozone precursors that contributes to ongoing ozone issues in the Puget Sound region.

Greenhouse Gases

GHGs are a group of gases that, when present in the atmosphere, absorb or reflect heat that normally would radiate away from the earth, and thereby increases global temperature. Several GHG constituents are commonly evaluated: Carbon dioxide (CO_2), methane, nitrous oxide, water vapor, O_3, and halocarbons. CO_2 is the individual constituent that is normally emitted in the greatest amount and generally contributes the most to climate change. Each individual constituent has its own global warming potential. To express the average emission rate and global warming potential of the combined constituents, GHG emission rates are commonly expressed as the equivalent amount of carbon dioxide (CO_2e). The effects of GHG emissions are global rather than local, meaning the amount of GHG emitted is important, but not the specific location of the emissions.

Air Quality Regulations

Three agencies have jurisdiction over ambient air quality in the study area: the EPA, the Washington State Department of Ecology (Ecology), and the Puget Sound Clean Air Agency (PSCAA). The EPA established National Ambient Air Quality Standards (NAAQS), and specified future dates for states to develop and implement plans to achieve these standards. The standards are divided into primary and secondary standards; the former are set to protect human health within an adequate margin of safety, and the latter to protect environmental values, such as plant and animal life. Ecology established the Washington State Ambient Air Quality Standards (WAAQS) for the six criteria air pollutants that are at least as stringent as the national standards.

Air Quality Attainment Status

Based on monitoring information collected over a period of years, the EPA and Ecology designate regions as being attainment or non-attainment areas for regulated air pollutants. Attainment status indicates that air quality in an area meets the NAAQS, and non-attainment status indicates that air

quality in an area does not meet those standards. If the measured concentrations in a non-attainment area improve so they are consistently below the NAAQS, Ecology and the EPA can reclassify the non-attainment area to a maintenance area.

King County was in non-attainment for O_3 between 1992 and 1996, after which it became a maintenance area until 2005. In March 2008, the EPA lowered its 8-hour ozone standard from 0.08 parts per million (ppm) to 0.075 ppm to better protect public health. In January 2010, the EPA proposed a revision to the 2008 ozone standard, and put all area designations to the 2008 standard on hold. Until the revised standard is adopted, King County is still designated an attainment area for ozone.

Similarly, in 2010 the EPA enacted a new, more stringent 1-hour average ambient air quality standard for NO_2. At this time, it is not known which regions in the country will be redesignated based on the new standard. Therefore, as of this time, King County is still considered an attainment area for NO_2.

King County was in non-attainment for PM_{10} between 1990 and 2001, but is currently designated as an attainment area for both PM_{10} and $PM_{2.5}$.

The Central Puget Sound area (including King County) was designated non-attainment for CO in 1990. The EPA approved a CO maintenance plan for the Central Puget Sound area in 1996. In 2004, the EPA approved a second CO/ozone maintenance plan. As discussed above, vehicular emissions are the largest source of CO. The Central Puget Sound CO maintenance plan relies on Chapter 173-422 of the Washington Administrative Code (WAC), a vehicle inspection and maintenance program, to require vehicles in the region to conform to emission standards intended to reduce overall CO emissions in the region.

Air Toxics Issues

Existing development in the Fort Lawton and Talaris areas poses no special issues related to air toxics. According to the EPA's National Air Toxics Assessment 2011 database, the respiratory cancer risk in the Fort Lawton area is approximately 70×10^{-6} or 70 cancer cases per million population (U.S. Environmental Protection Agency 2015). This reported respiratory cancer risk is typical of other urban areas in Washington State and higher than the statewide respiratory cancer risk.

Puget Sound Regional Council Transportation Conformity Analysis

Within the region, all federal- or state-funded, significant transportation projects (including constructing or widening roadways and signalized intersections) that are proposed within non-attainment or maintenance areas are subject to the Transportation Conformity Regulations (Code of Federal Regulations, Title 40 [40 CFR], Parts 51 and 93; Chapter 173-420 WAC). These regulations ensure that transportation projects, plans, and programs will conform to existing plans and timetables

for attaining or maintaining NAAQS. The Fort Lawton and Talaris sites are located in a maintenance area for CO and ozone; however, the sites are not located in a non-attainment area.

Puget Sound Clean Air Agency Regulations

All construction sites in the Puget Sound region are required to implement rigorous emission controls to minimize fugitive dust and odors during construction, as required by PSCAA Regulation 1, Section 9.15, Fugitive Dust Control Measures. All construction work in Fort Lawton will implement these air quality emission controls.

The PSCAA regulates emissions from industrial and commercial sources; however, none of the proposed alternatives for the Fort Lawton project include industrial or commercial development; therefore emissions from industrial and commercial sources have not been included in this analysis.

Climate Change Policy

National Environmental Policy Act Requirement for Climate Change Analysis

On December 7, 2009, the EPA signed the Endangerment and Cause or Contribute Findings for GHGs under Section 202(a) of the federal Clean Air Act (U.S. Environmental Protection Agency 2009). Under the Endangerment Finding, the EPA determined that the current and projected concentrations of the six key GHGs—CO_2, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride—in the atmosphere threaten the public health and welfare of current and future generations. Under the Cause or Contribute Finding, the EPA determined that the combined emissions of these GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG emissions that threaten public health and welfare.

On February 19, 2010, the Council on Environmental Quality issued draft National Environmental Policy Act (NEPA) guidance on the consideration of the effects of climate change and GHG emissions (Council on Environmental Policy 2010). This guidance advises federal agencies to consider opportunities to reduce GHG emissions caused by federal actions, adapt their actions to climate change impacts throughout the NEPA process, and address these issues in their agency NEPA procedures. Where applicable, the scope of the NEPA analysis should cover the GHG emission effects of a proposed action and alternatives and the relationship of climate change effects to a proposed action or alternatives. However, this guidance document does not set numerical thresholds for what levels of GHG emissions would constitute a significant impact, nor does the guidance document specify what types of mitigation measures should be required by local municipalities.

State of Washington Greenhouse Gas Requirements

Washington State Executive Order 07-02 was issued in February 2007, establishing the following GHG reduction goals (Washington State Department of Ecology 2008):

- Reduce emissions to 1990 levels by 2020, 25 percent below 1990 levels by 2035, and 50 percent below 1990 levels by 2050.
- Increase "green economy jobs" in Washington State to 25,000 by 2020. The term "green economy jobs" means the design, manufacture, marketing, and installation of equipment to support sustainable development both within and beyond Washington State.
- Reduce expenditures on fuel imported into Washington State by 20 percent by 2020.

The above-noted GHG reduction goals apply statewide, but they do not specify any requirements for local government agencies to implement measures to reduce emissions in their jurisdictions.

Chapter 70.235 of the Revised Code of Washington (RCW), Limiting GHG Emissions, codifies the GHG reduction goals of Executive Order 07-02 and specifies them as "limits" rather than "goals." The new law also adds a fourth requirement to help achieve the GHG reduction targets:

- Decrease the annual per-capita VMT by 18 percent by 2020, 30 percent by 2035, and 50 percent by 2050.

The state law applies only to actions taken by Washington State agencies and local governments that receive state funds for their project. State regulations on GHG emissions include prerequisites for distribution of capital funds for infrastructure and economic development projects, where projects receiving funding must be evaluated for consistency with state and federal GHG limits and state VMT goals (RCW 70.235.070).

Ecology issued revised guidance in June 2011 for State Environmental Policy Act (SEPA) reviews regarding actions where Ecology is the SEPA lead agency (Washington State Department of Ecology 2013). Ecology's 2011 guidance for Ecology-led SEPA determinations sets the SEPA significance threshold to 25,000 metric tons per year of GHG emissions or a mitigation plan that anticipates 11 percent reduction on that GHG emission increase. The 2011 Ecology guidelines do not specify significance thresholds or mitigation requirements for local governmental actions for which a city is the SEPA lead agency. Regardless, the guidelines illustrate the importance of local actions to reduce GHG emissions.

In 2011, the Washington State Department of Commerce released an updated Washington State Energy Strategy for 2012 (Washington State Department of Commerce 2011), which includes short- and long-term policy options to meet the following goals:

1. Maintain competitive energy prices that are fair and reasonable for consumers and businesses and support Washington's continued economic success
2. Increase competitiveness by fostering a clean energy economy and jobs through business and workforce development
3. Meet the state's obligations to reduce GHG emissions.

The Washington State Energy Strategy outlines strategies to meet these goals in the categories of transportation efficiency, building efficiency, distributed energy, and pricing.

In September 2016, Ecology adopted emission standards (Chapter 173-442 WAC – Clean Air Rule) to cap and reduce GHG emissions from significant stationary sources, petroleum product producers, importers and distributors, and natural gas distributors. Parties operating in Washington that are covered under the new rule are required to reduce their GHG emissions by specific amounts on a designated timeline or obtain emission reductions from other covered parties, GHG emissions reduction projects, or out-of-state emissions market programs.

Puget Sound Clean Air Agency and Greenhouse Gases

In 2004, the PSCAA published its strategy document for climate change, entitled Roadmap for Climate Protection: Reducing GHG Emissions in Puget Sound (Puget Sound Clean Air Agency 2004). In this strategy document, the PSCAA recommended a broad range of GHG reduction measures including regional vehicle trip reduction, building energy efficiency improvements, solid waste reduction, forestry and agriculture practice improvements, and community education. This document also encouraged local municipalities to implement their own GHG reduction measures.

City of Seattle Climate Change Policies

In June 2013, the City of Seattle (City) adopted Resolution 31447, the Seattle Climate Action Plan (City of Seattle 2013). Additionally, in October 2013, Seattle published the Seattle Climate Action Plan Implementation Strategy (City of Seattle 2013). The Climate Action Plan provides a framework that focuses on reducing GHG emissions in road transportation, building energy, and waste sectors of the economy.

The Seattle 2035 Comprehensive Plan (City of Seattle 2017) outlines the City's goal of reducing GHG emissions by 58 percent from 2008 levels by 2030, and becoming carbon-neutral by 2050. The Comprehensive Plan also outlines policies related to transportation, building energy, waste, and the food system that are aimed at reducing the emission of GHGs.

IMPACTS

Impacts Common to All Action Alternatives

This section describes the qualitative air quality issues associated with all of the Fort Lawton project action alternatives (Alternatives 1, 2, and 3).

Methods

Greenhouse Gas Significance Threshold

For the purposes of this analysis, the GHG emissions are expressed in terms of the differences between the future no-action condition (Alternative 4) and future land-use conditions under the action alternatives (Alternatives 1 through 3). For this analysis, a tiered significance threshold was adopted based on Ecology's 2011 guidance. For any alternative, the GHG emissions are presumed to

be not significant if the alternative causes a "business as usual" increase of less than 25,000 metric tons per year of CO_2e compared to no action. If the alternative causes a "business as usual" emission increase greater than 25,000 metric tons per year, then the GHG emissions are presumed to be not significant if GHG reduction measures are implemented to reduce the "business as usual" increase by approximately 11 percent.

Greenhouse Gas Emission Calculation Methods

This section describes methods used for estimating projected GHG emissions based on the four alternatives. Screenshots of Greenhouse Gas Emission Calculation tools are included in Appendix B.

For this analysis, GHG emissions are expressed as metric tons of CO_2e per year. For the purposes of comparing alternatives and determining significance under SEPA, forecast GHG emission increases are based on comparing the future emission rates for each action alternative to the forecast future emission rate of Alternative 4, the No Action Alternative.

The "SEPA GHG Calculation Tool"—available through Ecology's "Guidance Document Including GHG Emission in SEPA Reviews" (Washington State Department of Ecology 2013)—was used to evaluate existing and projected future (2025, the assumed buildout year for the Fort Lawton project) GHG emissions for each action alternative. This analysis provides a screening-level estimate of life-cycle "business as usual" emissions for residential, institutional, commercial, and industrial land uses, not including individual large stationary industrial sources or any special project-level emission reduction measures or other mitigation measures.

The available input data used for the GHG emission calculations were limited to aggregate housing units for single- and multi-family housing, and medical offices (senior supportive services). Given the input limitation, this method of analysis is considered an adequate screening-level tool for the purpose of forecasting GHG emission rates. Because, as described above, GHG emissions result in global rather than localized impacts, land use impact estimates from the Fort Lawton and Talaris sites have been combined.

Three types of life-cycle emissions were estimated using the SEPA GHG Calculation Tool: stationary combustion equipment, energy, and transportation (Washington State Department of Ecology 2013).

Energy emissions are generated by stationary combustion (i.e., furnace combustion of natural gas for space heating) and electricity consumption throughout the lifespan of a building. These emission estimates are based on the US Energy Information Administration's residential and commercial energy consumption surveys.

Transportation emissions include tailpipe emissions generated by on-road vehicles used by particular building occupants. This evaluation accounts for transportation emissions for the residents, delivery vehicles, and other visitors in residential areas. The transportation emissions do not account for

vehicles passing through the study area unless they are directly associated with the buildings being evaluated.

For projections of 2025 transportation emissions, the default value for the average fuel economy in the calculations listed above was 43.6 miles per gallon (mpg). This value reflects the EPA's proposed corporate automobile fuel economy vehicle mileage standard for cars and light trucks for 2025 (54.5 mpg), reduced by 20 percent to reflect real-world CO_2 emission rates (U. S. Environmental Protection Agency, Office of Transportation and Air Quality 2012).

"Soil Carbon" Greenhouse Gas Emissions from Permanent Removal or Restoration of Biomass

The general term "soil carbon GHG emissions" refers to the effect of permanently removing vegetation for the purpose of constructing new development. This exacerbates global climate change by two mechanisms. First, the biomass consisting of aboveground vegetation and underground root mass is immediately removed and disposed of, which immediately causes the biomass to decay and release carbon dioxide to the atmosphere. Second, the aboveground vegetation that was permanently removed is no longer available to remove CO_2 from the atmosphere during natural photosynthesis. Likewise, the restoration and replanting of vegetation in areas that have already been cleared of vegetation is a way to recapture carbon by locking the carbon into the plant structure and releasing oxygen into the atmosphere.

Proposed development under Alternatives 1, 2, and 3 will require removal of some of the existing vegetation, which will lead to soil carbon GHG emissions. However, at the Fort Lawton site, under Alternatives 1 and 3, existing wooded areas in the northern and southern parts of the site would be preserved and forest land in the western portion of the site would be dedicated to the adjacent Discovery Park. Under Alternatives 1, 2, and 3, more vegetated area would be created in the form of landscaping, passive open space and active open space, than would be removed. Due to the net increase in vegetated area at the Fort Lawton site, soil carbon is not expected to be a significant contributor to GHG emissions under these alternatives.

At the Talaris site, as much of the existing landscaping would be retained as possible, but no new open space is planned. Any modifications to the existing landscaping would comply with the requirements of the site's historic landmark designation.

Land-Use Values for Greenhouse Gas Calculations

For the purposes of this analysis, the GHG emissions are expressed in terms of increase in GHG emissions over the pre-development condition for each alternative. Action alternatives are compared to each other and to the No Action alternative. Table 1 lists the projected land-use values used for calculating GHG emissions for each alternative. The baseline land use is assumed to be the undeveloped land, prior to any development. The values listed for each alternative represent the increase compared to the pre-development condition.

Table 1: Increase in Land Use and Population Growth for Greenhouse Gas Emissions Calculations

			Net Above Pre-Development [a]			
Land Use Category		**Unit**	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4 (NA)**
Residential						
	Single Family	#DU	0	113	0	0
	Multi-Family	#DU	238	238	238	0
Office						
	Medical[b]	1,000 sq ft	29.9	29.9	29.9	0

[a] Values are approximate.
[b] Senior Support Services are represented by the Medical Office land use category.
DU = Dwelling unit
Source: EA Engineering

Construction Impacts

During demolition and construction, dust from excavation and grading could cause temporary, localized increases in the ambient concentrations of fugitive dust and suspended particulate matter. Construction activity must comply with PSCAA regulations requiring reasonable precautions to minimize dust emissions (Regulation I, Section 9.15). Regardless, construction activity could cause localized fugitive dust impacts at homes and businesses near the construction site.

Construction activities would likely require the use of diesel-powered, heavy trucks and smaller equipment such as generators and compressors. These engines would emit air pollutants that could slightly degrade local air quality in the immediate vicinity of the activity. However, these emissions would be temporary and localized, and the resulting construction tailpipe emissions would likely be far outweighed by emissions from existing traffic in the region.

Some construction activities could cause odors detectable to some people in the vicinity of the activity, especially during paving operations using tar and asphalt. Such odors would be short-term and localized. Stationary equipment used for the construction activities must comply with PSCAA regulations requiring the best available measures to control the emissions of odor-bearing air contaminants (Regulation I, Section 9.11).

Construction equipment and material hauling could temporarily increase traffic flow on city streets adjacent to a construction area. If construction delays traffic enough to significantly reduce travel speeds in the area, general traffic-related emissions would increase.

Development under Alternatives 1, 2, and 3 will require removal of some of the existing vegetation. As described above, removal of vegetation leads to soil carbon GHG emissions. At the Fort Lawton site, under Alternatives 1 and 3, existing wooded areas in the northern and southern parts of the site would be preserved, forest land in the western portion of the site would be dedicated to the adjacent Discovery Park. Under Alternatives 1 through 3, more vegetated area would be created in the form of landscaping, passive and active open space, than would be removed, resulting in a net increase in

vegetation at the Fort Lawton site. At the Talaris site, as much of the existing landscaping would be retained as possible, but no new open space is planned.

Operational Impacts

No new commercial or industrial development is planned for the Fort Lawton project; therefore, only impacts from residential development have been considered. Impacts from residential development include heating, wood-burning, and transportation-related impacts described below.

Regional Air Quality Impacts

Photochemical smog (the regional haze produced by ozone and fine particles) is largely caused by regional tailpipe emissions of cars and trucks traveling on public streets throughout the Puget Sound region, rather than localized emissions from any individual neighborhood. Tailpipe emissions caused by each alternative would be proportional to the regional VMT caused by each alternative. Alternatives 1, 2, and 3 would increase regional VMT, which would contribute to tailpipe emissions throughout the Puget Sound area. When added to the forecast population and economic growth throughout the Puget Sound region, the increased emissions caused by development at the Fort Lawton or Talaris sites may slightly contribute to future worsening of regional air quality. However, the change in tailpipe emissions for all of the action alternatives would be very small relative to the overall regional tailpipe emissions in the Puget Sound air basin.

Photochemical smog was a serious concern in the Puget Sound region before the late 1980s, but federal tailpipe emission regulations have reduced vehicular emissions to the point that the region is currently a designated attainment area for ozone.

The Puget Sound Regional Council (PSRC) set regional transportation emission budgets for three pollutants: CO, NO_x, and $PM_{2.5}$. The corresponding PSRC air quality conformity analyses concluded that its forecast regional emissions for the 2040 planning year will be far below the allowable budgets (Puget Sound Regional Council 2010). Because the change in tailpipe emissions associated with the Fort Lawton project under Alternatives 1, 2, and 3 is expected to be small compared to the overall tailpipe emissions in the Puget Sound region and because the region is currently designated an attainment area, it is concluded that none of the action alternatives would result in a significant impact on regional air quality.

Mobile Source Air Toxics

Development of the Fort Lawton or Talaris sites would include the addition of roadways and improvements to existing roadways. When a street is widened and, as a result, moves closer to receptors, the localized level of mobile source air toxics emissions could be higher. On a regional basis, the EPA's vehicle and fuel regulations (coupled with ongoing future fleet turnover) will over time cause substantial reductions that will cause region-wide mobile source air toxics levels to be significantly lower than today in most cases.

Emissions from Vehicle Travel

Tailpipe emissions from vehicles traveling on public roads would be the major source of air pollutant emissions associated with development at the Fort Lawton and Talaris sites. Potential air quality impacts caused by increased tailpipe emissions are divided into two general categories: CO hotspots caused by localized emissions at heavily congested intersections and regional photochemical smog caused by combined emissions throughout the Puget Sound region.

Development under Alternatives 1, 2, and 3 would increase vehicle travel on existing public roads. However, it is unlikely that the increased traffic and congestion would cause localized air pollutant concentrations at local intersections to form a hotspot (i.e., a localized area where air pollutant concentrations exceed NAAQS). The PSCAA operates ambient air pollution monitors at some of the most heavily congested intersections in the Puget Sound region, and none of those monitors have indicated exceedances over the past several years.

Furthermore, EPA motor vehicle regulations have steadily decreased tailpipe emissions from individual vehicles. Continuing decreases from individual vehicle emissions are expected to more than offset the increase in vehicle traffic, leading to a decrease in total GHG emissions from transportation sources, even as populations increase. For these reasons, it is unlikely that air quality impacts at local intersections would be significant.

Space Heating Emissions at Residential Buildings

Emissions would be generated by natural gas, fuel oil, and/or propane combustion used for space heating (stationary combustion) at new dwellings. However, per-building space heating emissions are expected to decrease in response to energy conservation issues and as future residents purchase more fuel-efficient furnaces. Therefore, future space heating emissions at the Fort Lawton or Talaris sites are not expected to cause significant air quality impacts in the Puget Sound region.

Residential Wood Burning

Residential wood-burning appliances elevate concentrations of particulate matter and toxic air pollutants especially when heavy wood burning is combined with stagnant weather conditions. The ambient air pollutant concentrations caused by residential wood combustion generally occur in the immediate vicinity of the wood-burning appliance.

The PSCAA and Washington State have regulations in place to improve regional air quality by limiting $PM_{2.5}$ emissions from woodstoves.

Continued enforcement of these regulations and policies ensures that future emissions from residential wood combustion would prevent ambient pollutant concentrations in heavily populated areas from approaching health-based NAAQS limits.

Indirect/Cumulative Impacts

Development facilitated by the action alternatives would result in indirect effects on air quality. For example, additional people and vehicles in and around the Fort Lawton and Talaris sites could lead to greater concentrations of pollutants that could adversely affect air quality.

All of the action alternatives would increase local VMT. However, compared to other population and economic growth throughout the region, infill housing such as the Fort Lawton project is intended to result in fewer VMT than equivalent housing in suburban areas farther from employment centers and public transportation.

All future development in the Puget Sound region would also contribute to worldwide emissions of GHG, which would contribute to potential future effects caused by global climate change (e.g., changes in seasonal temperature, seasonal precipitation, and local sea level rise).

Impacts of Alternative 1

The direct and indirect impacts of Alternative 1 caused by construction emissions, localized stationary source emissions, localized CO hotspots, and regional tailpipe emissions would be the same as described under Impacts Common to All Action Alternatives.

The annual GHG emissions for Alternative 1 are calculated based on the future land use listed in Table 1. Table 2 lists the life-cycle GHG emission increases caused by combined future development at the Fort Lawton and Talaris sites under each alternative. Because GHG impacts are not specific to the location where the GHG is emitted, emission estimates for the two sites have been combined.

Table 2: Comparison of Annual GHG Emissions

GHG Emissions Estimates	Projected Average Annual GHG Emissions (metric tons CO_2e per year)			
	Alt 1	**Alt 2**	**Alt 3**	**Alt 4 (NA)**
Forecast Emissions				
Emissions (Stationary Combustion)	965	1,415	965	0
Emissions (Electricity)	929	1,541	929	0
Emissions (Transportation)	2,118	2,993	2,118	0
Total Emissions	4,012	5,949	4,012	0
Difference From No Action	**4,012**	**5,949**	**4,012**	**0**

Source: (Washington State Department of Ecology 2013)

As listed in Table 2, Alternative 1 would result in larger increases in GHG emissions than the No Action Alternative 4, but a smaller increase in GHG emissions than Alternative 2. This difference is because Alternative 1 includes fewer dwelling units than Alternative 2.

Development under the Alternative 1 is not expected to result in annual GHG emissions that exceed 25,000 metric tons CO_2e, which is Ecology's threshold for potential significance. Additionally, total

gross GHG emissions for Washington State are forecast to exceed 114,100,000 metric tons CO_2e per year in 2035 (Washington State Department of Ecology 2010). The GHG emissions increase associated with Alternative 1 is only a small fraction of total statewide annual GHG emissions and no single project emits enough GHGs to solely influence global climate change.

Table 3 shows the future contribution to VMT from the Fort Lawton project. Alternative 1 would result in fewer VMT than Alternative 2 because Alternative 1 includes fewer total dwelling units than Alternative 2. Alternative 1 results in fewer VMT than Alternative 3 because Alternative 3 includes both residential development at the Talaris site, and active and passive open space at the Fort Lawton site, which is anticipated to attract more visitors than the existing vacant site.

Table 3: Comparison of Vehicle Miles Traveled

	Alt 1	Alt 2	Alt 3	Alt 4
Daily VMT (2025)				
Puget Sound 2025 daily VMT	92,000,000	92,000,000	92,000,000	92,000,000
Project-related VMT	6,779	8,500	7,801	0
Forecast Total Regional VMT	92,006,779	92,008,500	92,007,801	92,000,000
Contribution of Increase to Regional Tailpipe Emissions	0.01%	0.01%	0.01%	0.00%

Sources: (Overby 2017), (Puget Sound Regional Council 2016), (Heffron Transportation Inc. 2017)

Impacts of Alternative 2

The direct and indirect impacts of Alternative 2 caused by construction emissions, localized stationary source emissions, localized CO hotspots, and regional tailpipe emissions would be the same as described under Impacts Common to All Action Alternatives.

As listed in Table 2, Alternative 2 would increase GHG emissions more than all other action alternatives. This difference is due to Alternative 2 including residential development at both the Fort Lawton and Talaris sites.

Development under Alternative 2 is not expected to result in annual GHG emissions that exceed 25,000 metric tons CO_2e, which is Ecology's threshold for potential significance. Additionally, total gross GHG emissions for Washington State are forecast to exceed 114,100,000 metric tons CO_2e per year in 2035 (Washington State Department of Ecology 2010). The GHG emissions increase associated with Alternative 2 is only a small fraction of total statewide annual GHG emissions and no single project emits enough GHGs to solely influence global climate change.

As shown in Table 3, Alternative 2 would result in more VMT than Alternatives 1, 3, or 4, because Alternative 2 would have the greatest number of total dwelling units of the four alternatives.

Impacts of Alternative 3

The direct and indirect impacts of Alternative 3 caused by construction emissions, localized stationary source emissions, localized CO hotspots, and regional tailpipe emissions would be the same as described under Impacts Common to All Action Alternatives.

As listed in Table 2, Alternative 3 would result in larger increases in GHG emissions than the No Action Alternative 4, but a smaller increase in GHG emissions than Alternative 2. This difference is because Alternative 3 includes fewer dwelling units than Alternatives 2.

Development under Alternative 3 is not expected to result in annual GHG emissions that exceed 25,000 metric tons CO_2e, which is Ecology's threshold for potential significance. Additionally, total gross GHG emissions for Washington State are forecast to exceed 114,100,000 metric tons CO_2e per year in 2035 (Washington State Department of Ecology 2010). The GHG emissions increase associated with Alternative 3 is only a small fraction of total statewide annual GHG emissions and no single project emits enough GHGs to solely influence global climate change.

As shown in Table 3, Alternative 3 would result in fewer VMT than Alternative 2 but more VMT than Alternative 1, because Alternative 3 includes both residential development at the Talaris site, and active and passive open space at the Fort Lawton site, which is anticipated to attract more visitors than the existing vacant site.

Impacts of Alternative 4 (No Action)

Under Alternative 4, no development would occur at the Fort Lawton or Talaris sites at this time. While construction emissions, localized stationary source emissions, localized CO hotspots, and regional tailpipe emissions in the surrounding neighborhoods would be similar to the impacts described under Impacts Common to All Action Alternatives, no new emissions would be caused by the project.

Alternative 4 would result in no new residential dwelling units, no active or passive open space, and no support service offices. Therefore, Alternative 4 would not increase localized GHG emissions in the study areas. Alternative 4 would also not result in any additional VMT.

MITIGATION MEASURES

The following mitigation measures could contribute to a reduction in GHG associated with all action alternatives.

Incorporated Plan Features

The following features currently incorporated into the Fort Lawton project plan would contribute to a reduction in GHG from the project:

- Under all action alternatives, affordable housing developed on the Fort Lawton or Talaris sites would comply with the Evergreen Sustainable Development Standards (ESDS), which include the following GHG reduction measures:
  - Walkable neighborhoods (resulting in lower transportation-related emissions)
  - Reductions in energy use and increased insulation (resulting in lower emissions related to space heating)
- Under all action alternatives, sidewalks and trails would be located throughout the site, to provide opportunities for non-motorized circulation.
- Under Alternatives 1 and 3, King County Metro transit bus stops would be provided at two locations along Texas Way West in Fort Lawton, to encourage mass-transit use between the Fort Lawton site and offsite services.

Applicable Regulations and Commitments

Additionally, all development in Seattle is required to comply with the following regulations.

- **National Ambient Air Quality Standards**: As described above in National Ambient Air Quality Standards, the EPA establishes NAAQS and specifies future dates for states to develop and implement plans to achieve these standards.
- **State Ambient Air Quality Standards**: Ecology establishes state ambient air quality standards for the same six GHG pollutants that are at least as stringent as the national standards; in the case of sulfur dioxide, state standards are more stringent.
- **Indoor Burning Smoke Reduction Zone**: PSCAA's and Ecology's regulatory framework for wood smoke, includes:
  - More stringent emission standards for new wood-burning devices than the federal EPA standards
  - Opacity standards for wood-burning appliances
  - Prohibitions on burning of certain materials or the use of non-certified wood stoves
  - Burn ban wood smoke curtailment program
  - Special attainment area provisions.
- **Outdoor Burning**: The PSCAA enforces state outdoor burning regulations required by RCW 70.94.743.
- **Puget Sound Clean Air Agency Regulations**: All construction sites in the Puget Sound region are required to implement rigorous emission controls to minimize fugitive dust and odors during construction, as required by PSCAA Regulation 1, Section 9.15: Fugitive Dust Control Measures. All industrial and commercial air pollutant sources in the Puget Sound region are required to register with the PSCAA. Facilities with substantial emissions are required to obtain a Notice of Construction air quality permit before construction is allowed to begin.
- **State of Washington GHG Laws**: As described above in State of Washington Greenhouse Gas Requirements, Washington enacted a new law establishing GHG reduction limits.

Construction Emission Control

All construction contractors should be required to implement air quality control plans for construction activities at the Fort Lawton and Talaris sites. Developers should be required to prepare a dust control plan that commits the construction crews to implement all reasonable control measures described in the Guide to Handling Fugitive Dust from Construction Projects (Associated General Contractors of Washington and Fugitive Dust Task Force 1997). Copies of that guidance document are distributed by the PSCAA. The air quality control plans should include best management practices (BMPs) to control fugitive dust and odors emitted by diesel construction equipment.

The following BMPs would be used to control fugitive dust:

- Use water sprays or other non-toxic dust control methods on unpaved roadways
- Minimize vehicle speed while traveling on unpaved surfaces
- Prevent track-out of mud onto public streets
- Cover soil piles when practicable
- Minimize work during periods of high winds when practicable.

The following mitigation measures should be used to minimize air quality and odor issues caused by tailpipe emissions:

- Maintain the engines of construction equipment according to manufacturers' specifications
- Minimize idling of equipment while the equipment is not in use
- If there is heavy traffic during some periods of the day, scheduling haul traffic during off-peak times (e.g., between 9:00 a.m. and 4:00 p.m.) would have the least effect on traffic and would minimize indirect increases in traffic-related emissions.

Burning of slash or demolition debris will not be permitted without express approval from the PSCAA. No slash burning is anticipated for any construction projects at the Fort Lawton or Talaris sites.

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

No significant unavoidable adverse impacts on regional or local air quality are anticipated. Temporary, localized dust and odor impacts could occur during construction activities. The regulations and mitigation measures described above are adequate to mitigate any adverse impacts anticipated to occur as a result of the Fort Lawton project.

LIMITATIONS

The conclusions made in this report are based on the results of a qualitative analysis of planning documents that did not include field measurements or incorporation of detailed site-specific information. While this review allows for a preliminary assessment of potential impacts, it does not constitute a site-specific study.

USE OF THIS REPORT

This screening-level study has been prepared for the use of the City of Seattle to support the preparation of an Environmental Impact Statement for the Fort Lawton Army Reserve Center Redevelopment Project in Seattle, King County, Washington. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, Inc., shall be at the user's sole risk. Landau Associates warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

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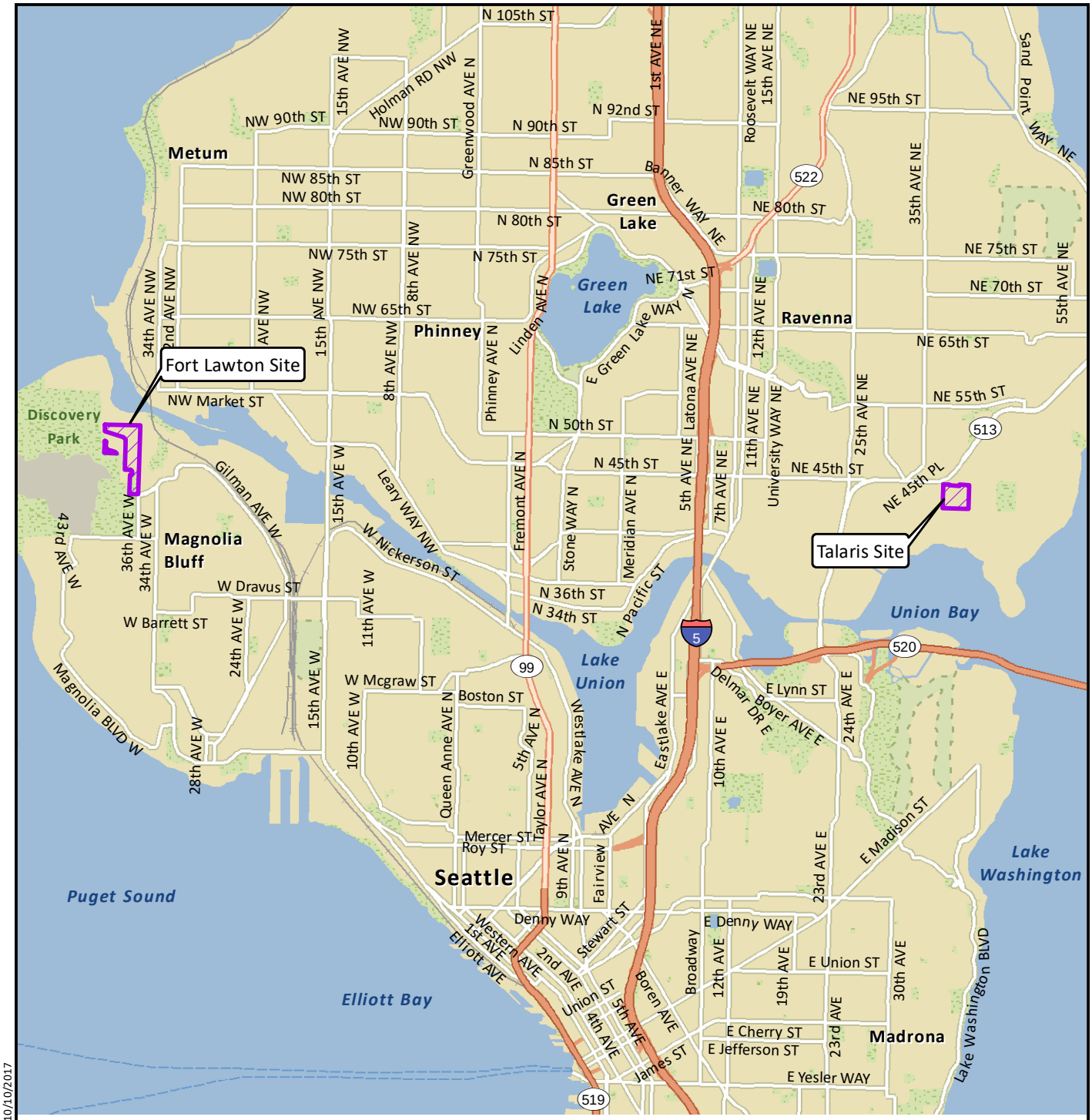

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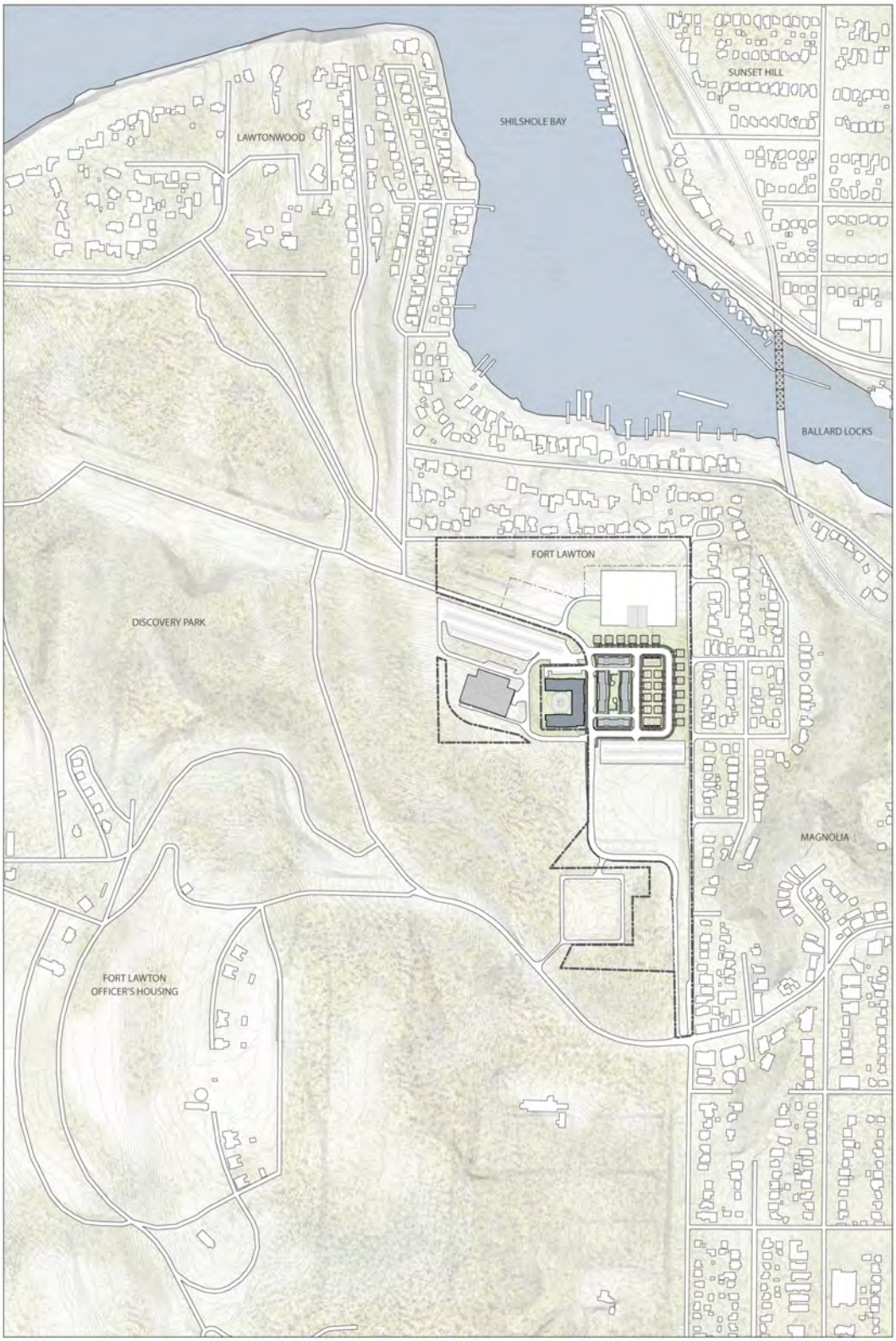
LANDAU ASSOCIATES

Fort Lawton Project Air QualityTechnical Report Seattle, Washington	**Vicinity Map**	Figure 1

APPENDIX A

Alternatives 1 through 4: Selected Figures

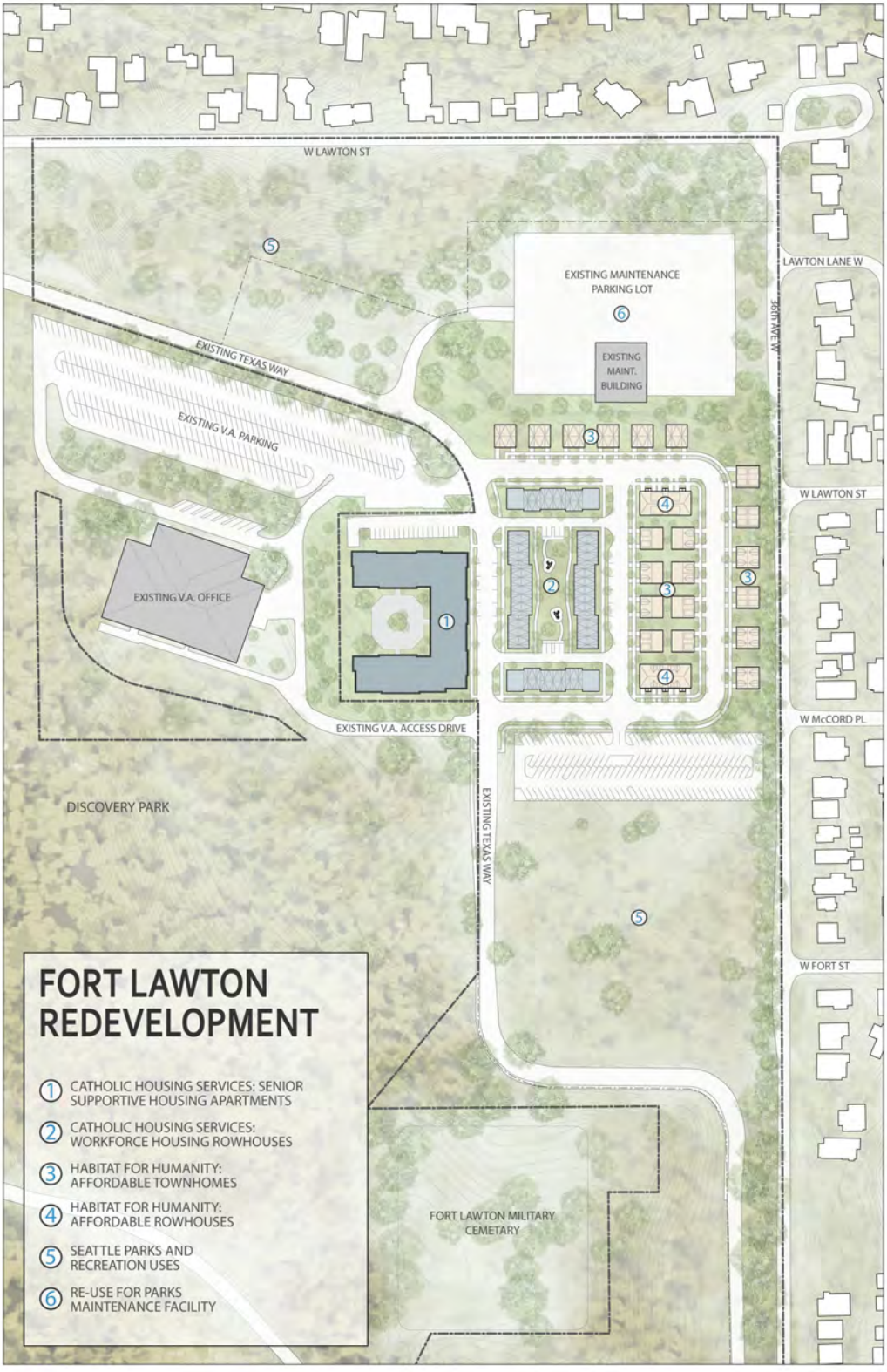


Note: This figure is not to scale

Source: SMR Architects, 2017.

EA Engineering, Science, and Technology, Inc., PBC

Figure 2-6A
Fort Lawton Site Plan—Alternative 1



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Source: SMR Architects, 2017.

EA Engineering, Science, and Technology, Inc., PBC

Figure 2-6B
Fort Lawton Site Plan—Alternative 1

Matches project area in Fort Lawton USARC Environmental Assessment (2012)

North

Note: This figure is not to scale

Source: SMR Architects, 2017.

EA Engineering, Science, and Technology, Inc., PBC

Figure 2-10

Fort Lawton Site Plan—Alternative 2

Note: This figure is not to scale

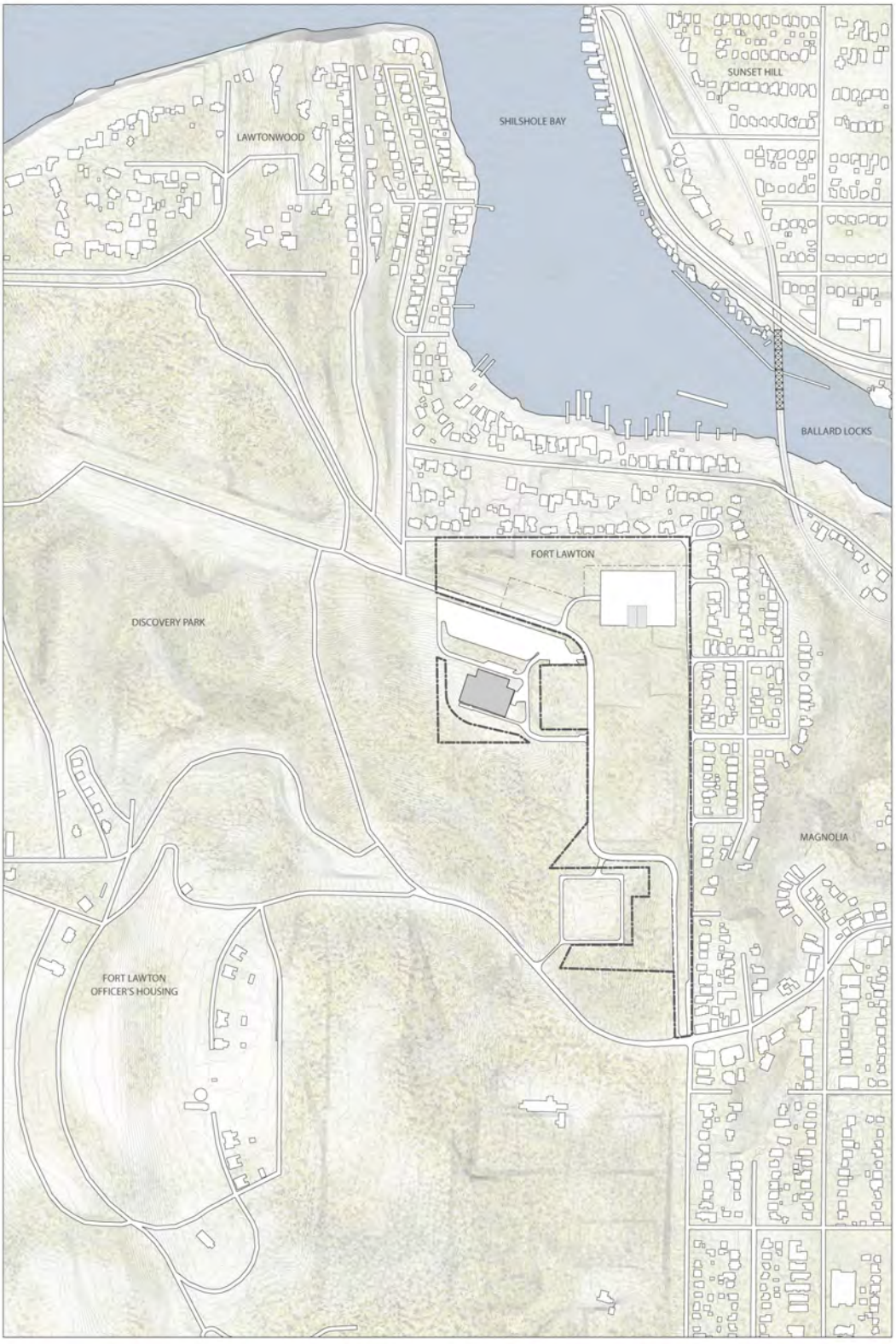
North

Source: SMR Architects, 2017.

EA Engineering, Science, and Technology, Inc., PBC

Figure 2-11

Talaris Site Plan—Alternatives 2 and 3



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Source: SMR Architects, 2017.

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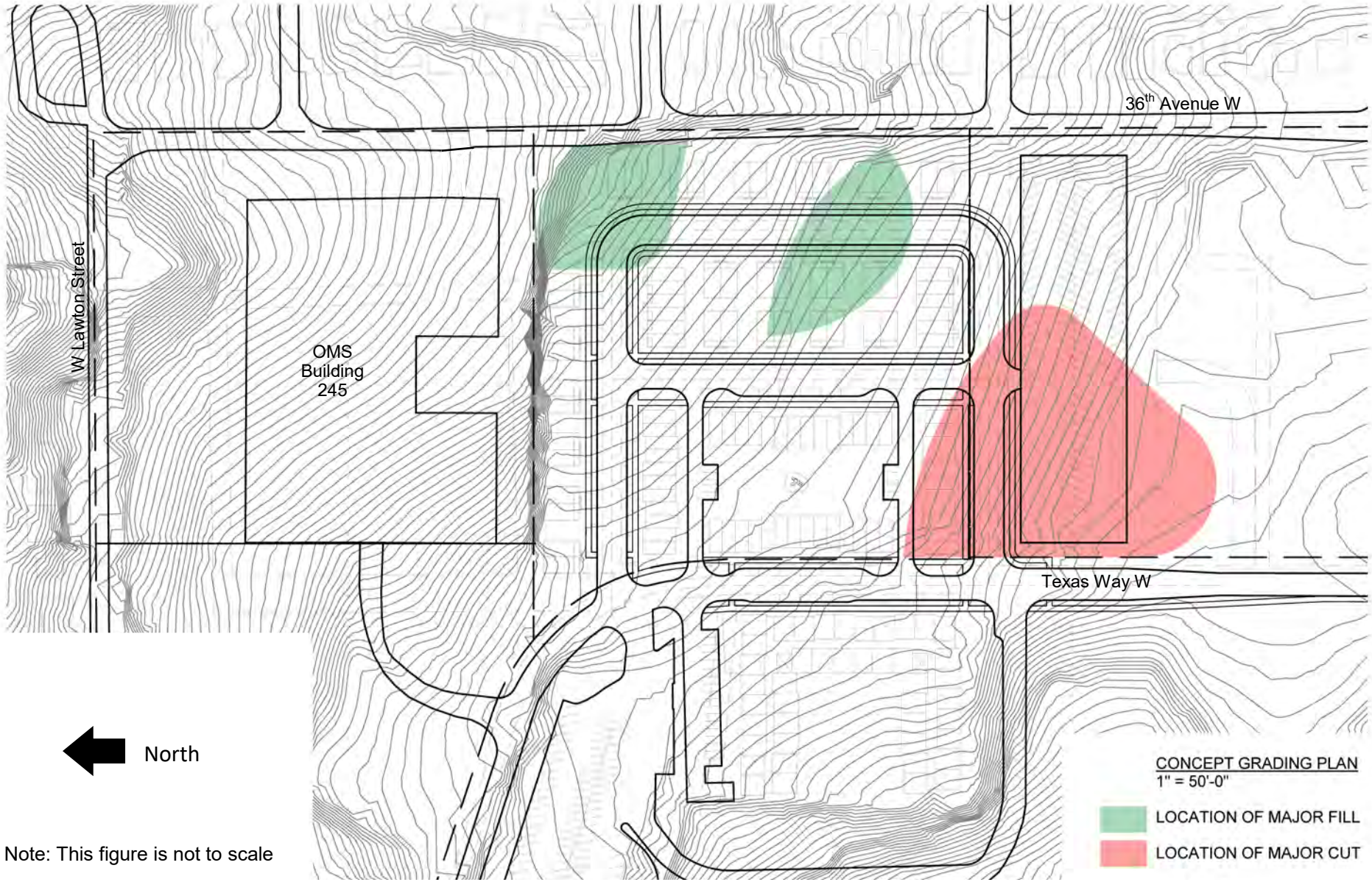
Figure 2-12A
Fort Lawton Site Plan—Alternative 3



Source: SMR Architects, 2017.

EA Engineering, Science, and Technology, Inc., PBC

Figure 3.1-1

Fort Lawton Grading Plan—Alternative 1

APPENDIX B

Greenhouse Gas Calculation Summary Tables

SEPA Greenhouse Gas Calculation Tool

Inputs

Ecology Method		Existing	Alt 1	Alt 2	Alt 3	Alt 4 No Action
Land Use Category	Unit of Measure	Total	Total	Total	Total	Total
Residential						
Single Family	#homes	0	0	113	0	0
Multi-Family	#dwelling units	0	238	238	238	0
Offices						
Medical	1000 sq ft	0	29.88	29.88	29.88	0

Alternative 1

Project Emissions Summary

	Stationary Combustion	Electricity Use	Transportation	Non-Combustion Emissions	Total
Emissions Summary (MTCO2e)	965	929	2,118	0	4,012

Enter Data
Select From Dropdown Menu
Automatic Calculation (No Input Necessary)

Stationary Combustion Method 3 - The size and land use of a proposed develop can be used to estimate operational stationary combustion emissions. This method uses national average fuel use rates for different land uses.

Building Name	Sector	Land Use	Building Unit	Data	Annual GHG Emission (MT CO2e)
	Residential	Single Family (ITE 210)	# Homes	-	0
	Residential	Multi-Family (ITE 220)	# Units	238	883
	Office Space	Medical (ITE 720)	ksf	30	82
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
				Subtotal	**965**

Electricity Use Method 2 - The size and land use of a proposed develop can be used to estimate operational electricity production emissions. This method uses national average energy use rates for different land uses.

Building Name	Sector	Land Use	Building Unit	Data	Annual GHG Emission (MT CO2e)
	Residential	Single Family (ITE 210)	# Homes	-	0
	Residential	Multi-Family (ITE 220)	# Units	238	731
	Office Space	Medical (ITE 720)	ksf	30	198
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
				Subtotal	**929**

Transportation Method 3 -The size and land use of a proposed develop can be used to estimate operational transportation emissions. This method uses estimated trip generation rates in the Puget Sound for different land uses.

Sector	Land Use	Building Unit	Data	Annual GHG Emission (MT CO2e)
Residential	Single Family (ITE 210)	# Homes	-	0
Residential	Multi-Family (ITE 220)	# Units	238	1,299
Office Space	Medical (ITE 720)	ksf	30	820
(select option)	(select option)	-		-
(select option)	(select option)	-		-
(select option)	(select option)	-		-
(select option)	(select option)	-		-
(select option)	(select option)	-		-
			Subtotal	**2,118**

Alternative 2

Project Emissions Summary

	Stationary Combustion	Electricity Use	Transportation	Non-Combustion Emissions	Total
Emissions Summary (MTCO2e)	1,415	1,541	2,993	0	5,949

Enter Data
Select From Dropdown Menu
Automatic Calculation (No Input Necessary)

Stationary Combustion Method 3 - The size and land use of a proposed develop can be used to estimate operational stationary combustion emissions. This method uses national average fuel use rates for different land uses.

Building Name	Sector	Land Use	Building Unit	Data	Annual GHG Emission (MT CO2e)
	Residential	Single Family (ITE 210)	# Homes	113	450
	Residential	Multi-Family (ITE 220)	# Units	238	883
	Office Space	Medical (ITE 720)	ksf	30	82
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
				Subtotal	**1,415**

Electricity Use Method 2 - The size and land use of a proposed develop can be used to estimate operational electricity production emissions. This method uses national average energy use rates for different land uses.

Building Name	Sector	Land Use	Building Unit	Data	Annual GHG Emission (MT CO2e)
	Residential	Single Family (ITE 210)	# Homes	113	611.9
	Residential	Multi-Family (ITE 220)	# Units	238	730.7
	Office Space	Medical (ITE 720)	ksf	30	197.9
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
				Subtotal	**1,541**

Transportation Method 3 -The size and land use of a proposed develop can be used to estimate operational transportation emissions. This method uses estimated trip generation rates in the Puget Sound for different land uses.

Sector	Land Use	Building Unit	Data	Annual GHG Emission (MT CO2e)
Residential	Single Family (ITE 210)	# Homes	113	875
Residential	Multi-Family (ITE 220)	# Units	238	1,299
Office Space	Medical (ITE 720)	ksf	30	820
(select option)	(select option)	-		-
(select option)	(select option)	-		-
(select option)	(select option)	-		-
(select option)	(select option)	-		-
(select option)	(select option)	-		-
			Subtotal	**2,993**

Alternative 3

Project Emissions Summary

	Stationary Combustion	Electricity Use	Transportation	Non-Combustion Emissions	Total
Emissions Summary (MTCO2e)	965	929	2,118	0	4,012

Enter Data
Select From Dropdown Menu
Automatic Calculation (No Input Necessary)

Stationary Combustion Method 3 - The size and land use of a proposed develop can be used to estimate operational stationary combustion emissions. This method uses national average fuel use rates for different land uses.

Building Name	Sector	Land Use	Building Unit	Data	Annual GHG Emission (MT CO2e)
	Residential	Single Family (ITE 210)	# Homes	-	0
	Residential	Multi-Family (ITE 220)	# Units	238	883
	Office Space	Medical (ITE 720)	ksf	30	82
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
				Subtotal	**965**

Electricity Use Method 2 - The size and land use of a proposed develop can be used to estimate operational electricity production emissions. This method uses national average energy use rates for different land uses.

Building Name	Sector	Land Use	Building Unit	Data	Annual GHG Emission (MT CO2e)
	Residential	Single Family (ITE 210)	# Homes	-	0
	Residential	Multi-Family (ITE 220)	# Units	238	731
	Office Space	Medical (ITE 720)	ksf	30	198
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
				Subtotal	**929**

Transportation Method 3 -The size and land use of a proposed develop can be used to estimate operational transportation emissions. This method uses estimated trip generation rates in the Puget Sound for different land uses.

Sector	Land Use	Building Unit	Data	Annual GHG Emission (MT CO2e)
Residential	Single Family (ITE 210)	# Homes	-	0
Residential	Multi-Family (ITE 220)	# Units	238	1,299
Office Space	Medical (ITE 720)	ksf	30	820
(select option)	(select option)	-		-
(select option)	(select option)	-		-
(select option)	(select option)	-		-
(select option)	(select option)	-		-
(select option)	(select option)	-		-
			Subtotal	**2118**

Alternative 4 (No Action)

Project Emissions Summary

	Stationary Combustion	Electricity Use	Transportation	Non-Combustion Emissions	Total
Emissions Summary (MTCO2e)	0	0	0	0	0

Enter Data
Select From Dropdown Menu
Automatic Calculation (No Input Necessary)

Stationary Combustion Method 3 - The size and land use of a proposed develop can be used to estimate operational stationary combustion emissions. This method uses national average fuel use rates for different land uses.

Building Name	Sector	Land Use	Building Unit	Data	Annual GHG Emission (MT CO2e)
	Residential	Single Family (ITE 210)	# Homes	-	0
	Residential	Multi-Family (ITE 220)	# Units	-	0
	Office Space	Medical (ITE 720)	ksf	-	0
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
				Subtotal	**0**

Electricity Use Method 2 - The size and land use of a proposed develop can be used to estimate operational electricity production emissions. This method uses national average energy use rates for different land uses.

Building Name	Sector	Land Use	Building Unit	Data	Annual GHG Emission (MT CO2e)
	Residential	Single Family (ITE 210)	# Homes	-	0
	Residential	Multi-Family (ITE 220)	# Units	-	0
	Office Space	Medical (ITE 720)	ksf	-	0
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
	(select option)	(select option)	-		-
				Subtotal	**0**

Transportation Method 3 -The size and land use of a proposed develop can be used to estimate operational transportation emissions. This method uses estimated trip generation rates in the Puget Sound for different land uses.

Sector	Land Use	Building Unit	Data	Annual GHG Emission (MT CO2e)
Residential	Single Family (ITE 210)	# Homes	-	0
Residential	Multi-Family (ITE 220)	# Units	-	0
Office Space	Medical (ITE 720)	ksf	-	0
(select option)	(select option)	-	-	
(select option)	(select option)	-	-	
(select option)	(select option)	-	-	
(select option)	(select option)	-	-	
(select option)	(select option)	-	-	
		Subtotal		**0**

Appendix E

Noise Report

Noise Technical Report
Fort Lawton Army Reserve Center Redevelopment Project
Seattle, Washington

October 16, 2017

Prepared for

EA Engineering, Science, and Technology, Inc.

On behalf of

City of Seattle

LANDAU ASSOCIATES

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Noise Technical Report
Fort Lawton Army Reserve Center Redevelopment Project
Seattle, Washington

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EXECUTIVE SUMMARY

The City of Seattle is proposing redevelopment of the former Fort Lawton Army Reserve Center, in the Magnolia neighborhood in northwest Seattle, Washington. This Noise Technical report describes the current noise conditions in the region, and policies and regulations that govern noise sources. Impacts of four alternatives (action Alternatives 1 through 3 and no action Alternative 4) are analyzed.

The study area is defined as the former Fort Lawton and adjacent noise-sensitive receiver locations, including nearby Discovery Park, Kiwanis Memorial Preserve Park, and existing residential land uses. The study area also includes the potential offsite location referred to as the "Talaris site," located in the Laurelhurst neighborhood of Seattle, approximately 5 miles east of the Fort Lawton site. The study includes the temporary effects of noise from construction, and long-term effects from noise from residential land use. Local onsite roadway noise was qualitatively evaluated as part of this study. Noise-sensitive "uses" considered for this evaluation include residences, parks, and community gathering places located throughout the study area.

Existing noise sources in the study area include the following:

- Ongoing activities associated with residential, institutional, and commercial activities in the vicinity of Fort Lawton
- Ongoing activities associated with residential, institutional, and commercial activities in the vicinity of the Talaris site.

Noise effects of the Fort Lawton redevelopment on existing and planned uses in Fort Lawton, Talaris, and surrounding communities were considered for the following elements:

- Temporary construction noise
- Long-term operational noise associated with residential, park, and roadway use and maintenance
- Local traffic noise on the planned Texas Way and existing Discovery Park Boulevard in Fort Lawton, the existing NE 41st Street in Talaris, and other local streets using a screening-level traffic noise model.

The three action alternatives include residential development, senior support service offices, and a park maintenance facility. Existing noises described above are expected to apply to all action alternatives to a similar extent. Full buildout is expected to be complete by 2025.

The Seattle Municipal Code regulates noise in the Fort Lawton and Talaris areas. The code establishes noise limits based on time of day and type of noise source and noise receptor. Modeled peak-hour traffic noise increases at full buildout would not exceed the Washington State Department of Transportation (WSDOT) substantial increase impact threshold of 10 A-weighted decibels dBA at any representative receiver locations under any of the alternatives. No significant impacts are expected.

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INTRODUCTION

At the request of the City of Seattle, Landau Associates, Inc. prepared this report under contract to EA Engineering, which provides background information and analysis to support the Noise section of the Draft Environmental Impact Statement for redevelopment for the Fort Lawton Army Reserve Center Redevelopment Project (Fort Lawton project) in King County, Washington (see Appendix A).

The following sections evaluate the study area, defined as the Fort Lawton site, adjacent noise-sensitive receiver locations, including Discovery Park, Kiwanis Memorial Preserve Park, and existing residential land uses for potential community noise impacts. The study area also includes the potential offsite location referred to as the "Talaris site," located in the Laurelhurst neighborhood of Seattle, approximately 5 miles east of the Fort Lawton site (Figure 1). The study includes the temporary effects of noise from construction, and long-term effects from noise from residential land use and park use. Local onsite roadway noise was qualitatively evaluated as part of this study.

Impacts of the four alternatives (as described below) are analyzed in this evaluation. The study area for this evaluation is Fort Lawton, Talaris and surrounding areas in Seattle (see Appendix A).

FORT LAWTON AND TALARIS REDEVELOPMENT AREAS

The former Fort Lawton US Army Reserve Center is an approximately 34-acre site located in the Magnolia neighborhood in northwest Seattle, King County, Washington. Fort Lawton was used as an US Army reserve center until the facility was closed in 2005. The property has been vacant but maintained pending possible conveyance of the property from the Army to the City of Seattle.

Discovery Park, Kiwanis Memorial Preserve Park, and existing residential land uses lie outside the boundaries of Fort Lawton, but are specific areas of concern identified in the public scoping process for the redevelopment project.

The approximately 18-acre Talaris site is approximately 5 miles east of the Fort Lawton site, in the Laurelhurst neighborhood of Seattle. The site contains structures formerly used as an education and research facility and is currently used as a conference center.

Table 1 shows the planned land use for the four alternatives. The alternatives are summarized below.

- **Alternative 1:** 238 affordable and formerly homeless housing units and park/recreation uses constructed on the Fort Lawton site, no redevelopment of the Talaris site
- **Alternative 2:** 113 market-rate housing units constructed on the Fort Lawton site; 238 affordable and formerly homeless housing units constructed on the Talaris site
- **Alternative 3:** Public park/recreation uses constructed on the Fort Lawton site; 238 affordable and formerly homeless housing units constructed on the Talaris site
- **Alternative 4 (No Action):** Fort Lawton site remains vacant; no redevelopment of the Talaris site.

Under Alternatives 1, 2, and 3, full buildout is expected to be complete by 2025. Under the No Action Alternative, this analysis assumes that no buildout will occur.

Table 1: Planned Land Use for Four Alternatives

Land Use Category	Unit	Alt 1		Alt 2		Alt 3		Alt 4	
		F.L.	T.	F.L.	T.	F.L.	T.	F.L.	T.
Residential									
Single Family	#DU	0	0	113	0	0	0	0	0
Multi-Family									
Senior Support Apartments	#DU	86	0	0	86	0	86	0	0
Affordable Rental (Rowhouses)	#DU	100	0	0	100	0	100	0	0
Affordable Ownership (Townhouses)	#DU	40	0	0	40	0	40	0	0
Affordable Ownership (Rowhouses)	#DU	12	0	0	12	0	12	0	0
Senior Support Services									
Medical and Office Space[b]	SF	29,875	0	0	29,875	0	29,875	0	0
Open Space									
Landscaped Areas	acres	2.6	0	12.7	[a]	0	[b]	5.9	0
Passive Open Space Areas	acres	13.0	0	0	[a]	17.0	[b]	9.6	0
Active Open Space Areas	acres	5.1	0	0	[a]	7.6	[b]	0	0
Undesignated Buffer Space	acres	0	0	5.9	[a]	0	[b]	0	0

Notes:

Values are approximate.

[a] Under Alternatives 2 and 3, much of the existing landscaping at the Talaris site would be retained. Any modifications to the existing landscaping would comply with the requirements of the site's historic landmark designation.

[b] Senior Support Services are represented by the Medical Office land use category.

F.L. = Fort Lawton, T. = Talaris

DU = Dwelling unit

SF = Square feet

Source: EA Engineering, Science, and Technology, Inc., PBC

CHARACTERISTICS OF SOUND AND NOISE

For the purposes of this analysis, noise can be described as sound that is undesired, in terms of its loudness (amplitude) and frequency (pitch). Magnitudes of typical noise levels are presented below.

NOISE SOURCE OR ACTIVITY		SUBJECTIVE IMPRESSION	RELATIVE LOUDNESS (human judgment of different sound levels)
Jet aircraft takeoff from carrier (50 feet)	140	Threshold of pain	64 times as loud
50-horsepower siren (100 feet)	130		32 times as loud
Loud rock concert near stage Jet takeoff (200 feet)	120	Uncomfortably loud	16 times as loud
Float plane takeoff (100 feet)	110		8 times as loud
Jet takeoff (2,000 feet)	100	Very loud	4 times as loud
Heavy truck or motorcycle (25 feet)*	90		2 times as loud
Garbage disposal (2 feet) **Pneumatic drill (50 feet)**	80	**Moderately loud**	**Reference loudness**
Vacuum cleaner (10 feet) Passenger car at 65 mph (25 feet)*	70		1/2 as loud
Typical office environment	60		1/4 as loud
Light auto traffic (100 feet)*	50	Quiet	1/8 as loud
Bedroom or quiet living room Bird calls	40		1/16 as loud
Quiet library, soft whisper (15 feet)	30	Very quiet	
High quality recording studio	20		
Acoustic test chamber	10	Just audible	
	0	Threshold of hearing	

Sources: (Beranek 1988); (EPA 1974).

Since the human ear is not equally sensitive to sound at all frequencies, a frequency-dependent rating relates noise to human hearing sensitivity. This is called the A-weighted decibel (dBA) scale. This scale accounts for the human perception of a doubling of loudness as an increase of 10 dBA. Therefore, a 70-dBA sound level will sound twice as loud as a 60-dBA sound level. People generally cannot detect differences of 1 to 2 dBA between noise sources of a similar nature (e.g., an increase in traffic noise compared to existing traffic noise); however, under ideal listening conditions, differences of 2 or 3 dBA can be detected by some people. Most people under normal listening conditions would probably perceive a 5-dBA change in noise of a similar nature. However, if an intruding noise is of a different nature than background noise (e.g., backup alarms in a quiet neighborhood), many people can perceive the intruding noise even if it increases the overall dBA noise level by less than 1 dBA.

A measure used to represent the average sound energy occurring over a specified time period is the equivalent sound level (Leq). Leq is the steady-state sound level that would contain the same acoustical energy as the time-varying sound that actually occurs during the monitoring period. The 1-hour A-weighted equivalent sound level (Leq 1 h) is the energy average of A-weighted sound levels occurring during a 1-hour period.

When distance is the only factor considered, sound levels from isolated point sources of noise typically decrease by about 6 dBA for every doubling of distance from the noise source. When the noise source is a continuous line, sound levels decrease by about 3 dBA for every doubling of distance; however, an attenuation rate of 4.5 dBA per doubling of distance is often used when intervening ground is effective in absorbing sound (e.g., ground vegetation, scattered trees, and clumps of bushes).

Noise levels at different distances can also be affected by several factors other than the distance from the noise source. Topographic features and structural barriers that absorb, reflect, or scatter sound waves can affect the decreasing noise levels. Atmospheric conditions (wind speed and direction, humidity levels, and temperatures) can also affect the degree to which sound is attenuated over distance.

Echoes off topographical features or buildings can sometimes result in higher sound levels (lower sound attenuation rates) than normally expected. Temperature inversions and altitudinal changes in wind conditions can also refract and focus sound waves toward a location at considerable distance from the noise source. As a result, the existing noise environment can be highly variable depending on local conditions.

AFFECTED ENVIRONMENT

Existing noise-generating uses at Fort Lawton consist only of vehicle traffic traversing the site. Existing noise-generating uses in the surrounding areas include traffic on local streets, use and maintenance of the Fort Lawton Army Reserve Complex building and military cemetery, commercial development near West Government Way, south of Fort Lawton, and noise from residential development north and east of Fort Lawton.

Existing noise-generating uses at Talaris include vehicle traffic and human noise associated with conference center use. Existing noise-generating uses in the surrounding areas include traffic on local streets, commercial development along NE 45th Street and Sand Point Way NE, university development to the west and southwest of Talaris, and noise from residential development surrounding Talaris. Typical daytime noise levels for urban and suburban residential areas range from approximately 45 dBA (noise of “normal living”) to 60 dBA (a noisy lawn mower at 10 meters), with occasional noises as loud as 70 dBA (noise level associated with a main road during daytime) (City of Seattle n.d., Wyle Laboratories 1971).

Noise-Sensitive Receiver Locations

Noise-sensitive receiver locations considered for this evaluation include existing nearby residences and planned residences, parks, and community gathering places located throughout the study area, which includes Fort Lawton, Discovery Park, Kiwanis Memorial Preserve Park (Figure 2), Talaris, and other adjacent areas (Figure 3).

In general, new and existing residential areas within and surrounding the Fort Lawton and Talaris sites are most likely to be affected by construction noise during the development process. Noise sources and receptors specific to each alternative are discussed in more detail below.

In addition to the Fort Lawton and Talaris sites, noise impacts to surrounding areas were considered, including Discovery Park, Kiwanis Memorial Preserve Park, and existing residential receiver locations. These areas may be affected by short-term residential construction noises, but are not expected to be affected by onsite roadway noise.

Although no sound level measurements were taken as part of this evaluation, noise levels are anticipated to comply with the noise regulatory criteria discussed below.

Seattle Municipal Code

The Seattle Municipal Code (SMC) has regulations that limit noise from construction and from other noise sources within the city. The applicable chapters of the SMC that regulate noise in the city are summarized below.

Seattle Municipal Code Chapter 25.08 – Noise Control

The SMC defines three districts, based on land use and established maximum permissible noise levels, as follows:

- "Residential District" includes zones defined as residential zones and NC1 zones in the Land Use Code of the City of Seattle, Title 23.
- "Commercial District" includes zones designated as NC2, NC3, SM, SM-SLU, SM-D, SM-NR, C1, C2, DOC1, DOC2, DRC, DMC, PSM, IDM, DH1, DH2, PMM, and IB in the Land Use Code of the City of Seattle, Title 23.
- "Industrial District" includes zones designated as IG1, IG2, and IC in the Land Use Code of the City of Seattle, Title 23.

Chapter 25.08.410 of the SMC sets forth maximum permissible environmental noise levels for each district (Table 2). The code states that "Between the hours of 10 p.m. and 7 a.m. during weekdays, and between the hours of 10 p.m. and 9 a.m. on weekends and legal holidays [nighttime], the exterior sound level limits [listed below] are reduced by 10 dB(A) where the receiving property lies within a residential district of the City."

Table 2: Seattle Maximum Permissible Noise Levels

District of Sound Source		District of Receiving Property (dBA)(Leq)		
	Residential (daytime)	Residential (nighttime)	Commercial	Industrial
Residential	55	45	57	60
Commercial	57	47	60	65
Industrial	60	50	65	70

Additionally, the SMC states the following:

> *For any source of sound that has a pure tone component, the exterior sound level limits established by this subchapter are reduced by 5 dB(A); provided, however, this 5 dB(A) reduction shall not be imposed on any electrical substation.*
>
> *For any source of sound that is impulsive and not measured with an impulse sound level meter, the exterior sound level limits established by this subchapter are reduced by 5 dB(A).*

Chapter 25.08.425 of the SMC addresses sounds created by construction and maintenance equipment. The sound levels listed above may be exceeded by 15 to 25 dBA, depending on the type of equipment, during the following times:

> *Within Lowrise, Midrise, Highrise, Residential-Commercial, and Neighborhood Commercial zones, between 7 a.m. and 7 p.m. on weekdays and between 9 a.m. and 7 p.m. on weekends and legal holidays, except that for parking lot maintenance or if the equipment is being used for a public project, then between 7 a.m. and 10 p.m. on weekdays and between the hours of 9 a.m. and 10 p.m. on weekends and legal holidays.*
>
> *Within all other zones, between 7 a.m. and 10 p.m. on weekdays and between 9 a.m. and 10 p.m. on weekends and legal holidays.*

Additional exemptions apply to types of equipment that create impulse sound or impact sound or are used as impact equipment, such as pavement breakers, piledrivers, jackhammers, or sandblasting tools.

Seattle Municipal Code Chapter 25.08.490

In addition to the noise pollution control rules described above, public nuisance noises are regulated by Chapter 25.08.490 of the SMC. Noises can be considered public disturbance noises if they are unreasonable noises that disturb another person. Loud and raucous, and frequent, repetitive, or continuous sounds made by animals, horns or sirens, musical instruments, motor vehicles, or the amplified or unamplified human voice can be considered nuisance noises.

Washington State Noise Regulations

Chapter 173-60 of the Washington Administrative Code (WAC) restricts noise within the state by establishing maximum permissible noise levels for various environments, similar to the SMC regulations explained above. Construction and maintenance activities under all alternatives would be subject to these provisions. Chapter 176-60 WAC also allows local jurisdictions to further regulate nuisance noise in addition to the regulations set forth by the state.

IMPACTS

Noise-Generating Uses

Noise impacts of the action alternatives on existing and planned uses of Fort Lawton, Talaris, and surrounding communities were considered for the following elements: Temporary construction noise, long-term (operational) noise from residential development, parks/recreation uses, senior support service offices and maintenance facilities. Local traffic noise on local streets is qualitatively addressed in this study.

Impacts Common to All Action Alternatives

Temporary Construction Noise

Clearing and grading activities, and demolition of existing structures and construction of new infrastructure and housing are usually accompanied by temporary increases in noise due to the use of heavy equipment and hauling of construction materials. Noise impacts depend on the background sound levels, the type of construction equipment being used, and the amount of time it is in use.

Chapter 25.08.425 of the SMC limits construction activity within residential zones, such as those on and adjacent to the Fort Lawton and Talaris sites, to daytime hours (7 a.m. to 7 p.m. on weekdays and 9 a.m. to 7 p.m. on weekends and legal holidays). This would prevent construction noise impacts during periods when most people are at home sleeping. Construction noise may still have a temporary, localized impact on nearby residences, businesses, schools, and parks, although construction noise produced during the day has higher noise limits than those imposed on other noise sources.

Local Roadway Noise

All action alternatives would result in increased traffic on local roadways, within and around Fort Lawton and Talaris. Residential traffic on local roads will include residents/visitors entering, leaving and traveling within Fort Lawton and Talaris, as well as delivery and service vehicles entering, leaving and traveling within Fort Lawton and Talaris.

Use of federal funds for roadway or intersection improvements would trigger the WSDOT requirement to model traffic noise impacts and evaluate traffic noise abatement, and to present the results of the

noise abatement analysis in National Environmental Policy Act environmental documentation for any roadway projects. No federal funds are currently anticipated for roadway/intersection improvements for the proposed project.

Traffic Modeling Methods

For this assessment, traffic noise impacts caused by increased traffic on the following roads, were evaluated for existing homes and noise-sensitive receivers (receiver locations are shown on Figures 2 and 3):

Fort Lawton

- Texas Way (Fort Lawton Cemetery and Kiwanis Memorial Preserve Park/R-2)
- 40th Avenue West (Existing Residence; R-1)
- West Government Way (Existing Residences; R-3 and R-5)
- 34th Avenue West (Existing Residence; R-4)

Talaris

- Mary Gates Memorial Drive NE (University of Washington Sports Field [Field])
- NE 41st Street (Existing Residence; R-1)
- NE 45th Street (Existing Residence; R-2).

Traffic along Discovery Park Boulevard was not modeled because the project is not expected to increase traffic volume on this road.

Peak-hour traffic volumes along these streets in the project vicinity under the existing conditions and projected for each alternative are listed in Table 3. Peak-hour traffic volume forecasts were provided by Heffron Transportation Inc. (Heffron 2017).

Table 3: Weekday Peak-Hour Automobile and Heavy Truck Traffic Volumes in Project Vicinity

Representative Receiver Location	Existing (2017)	Alt 1 (2030)	Alt 2 (2030)	Alt 3 (2030)	Alt 4 No Action (2030)
Fort Lawton					
Discovery Park and Fort Lawton Military Cemetery near Texas Way (Cemetery)[a]	78 (3)	270 (8)	132 (4)	276 (9)	91 (4)
Existing residences along 40th Avenue West, between West Lawton Street and West Commodore Way (R-1)	77 (3)	118 (5)	100 (4)	106 (4)	87 (3)
Kiwanis Memorial Preserve Park and existing residences along 36th Avenue West, north of West Government Way (R-2)[b]	78 (3)	270 (8)	132 (4)	276 (9)	91 (4)
Existing residences along West Government Way between 36th Avenue West and 34th Avenue West (R-3)	380 (9)	594 (14)	470 (11)	596 (14)	432 (10)
Existing residences along 34th Avenue West, south of West Government Way (R-4)	505 (6)	660 (8)	596 (7)	655 (8)	572 (7)
Existing residences along West Government Way, east of 34th Avenue West (R-5)	717 (17)	893 (21)	832 (20)	900 (21)	818 (19)
Talaris					
Park on Mary Gates Memorial Drive NE, south of NE 45th Street (Field)	677 (13)	766 (14)	797 (15)	797 (15)	766 (14)
Existing residences along NE 41st Street, west of 41st Avenue NE (R-1)	374 (1)	424 (1)	464 (1)	464 (1)	424 (1)
Existing residences along NE 45th Street, east of 40th Avenue NE (R-2)	506 (14)	579 (16)	593 (17)	593 (17)	579 (16)

XX= Automobile traffic volume

(XX)=Heavy truck traffic volume (Heffron 2017)

Traffic volume measured in vehicles per hour (combined vehicles in all directions).

[a] Cemetery receiver location is modeled at a distance of 90 feet from the western edge of Texas Way.

[b] Based in change of traffic volume on Texas Way and modeled at a distance of 100 feet from the eastern edge of Texas Way. Traffic volume on 36th Avenue West has no forecast project-related traffic impacts (Heffron 2017).

The Federal Highway Administration Traffic Noise Model Version 2.5 (USDOT FHWA 2004) was used to predict existing and future noise levels during peak hours under the screening-level assumptions listed below. The model was configured as follows for the roads listed above.

- No field measurements were performed for this screening-level noise study.
- It was assumed that all receivers have a direct line-of-sight to impacted roadways; barrier analysis was not conducted.
- Traffic was assumed to travel at 25 miles per hour on all roadways (Heffron 2017).
- The surface between the street and nearby residences consists mainly of landscaped areas; therefore, the ground surface type was defined as “lawn.”
- All receiver locations were modeled at a distance of 10 feet from the nearest edge of the roadway, unless otherwise noted.
- Traffic volumes were assumed to increase 1 percent each year, independent of the proposed project (Heffron 2017).

- The higher traffic volume, which consistently occurred during evening peak-hour values, was used for analysis.
- All roads were modeled as straight lines; the model was not configured to account for existing or proposed topography, roadway improvements, or configuration changes resulting from the project.

The modeled noise levels for the roadways described above, under the existing conditions and all four alternatives, are shown in Table 4. Table 4 lists the modeled daytime Leq noise levels at each representative receiver location for the existing conditions, Alternative 4 (no action), and the difference between traffic-related noise levels and the No Action Alternative for Alternatives 1, 2, and 3. The largest traffic noise impacts are expected to occur along Texas Way, due to the low volume of existing traffic along that road and the relatively high volume of project-related traffic expected on Texas Way. The modeled peak-hour traffic noise increase at full buildout would not exceed the WSDOT substantial increase impact threshold of 10 dBA at any representative receiver locations under any of the alternatives.

Table 4: Estimated Traffic-Related Noise Levels

Representative Receiver Location	Modeled Noise Impact in dBA				
		Difference from No-Action Alternative			
	Existing (2017)	Alt 1 (2030)	Alt 2 (2030)	Alt 3 (2030)	Alt 4 No Action (2030)
Fort Lawton					
Cemetery	48	4	1	4	49
R-1	56	2	1	1	56
R-2 / Kiwanis Park	47	4	1	4	48
R-3	61	2	<1	2	62
R-4	62	1	<1	1	62
R-5	64	<1	<1	<1	65
Talaris					
Field	64	-	<1	<1	64
R-1	59	-	<1	<1	60
R-2	63	-	<1	<1	64

Notes: Alternative 1 includes no development at the Talaris site; therefore, no project-related changes in traffic volume are forecast. Development at the Talaris site is identical under Alternatives 2 and 3; therefore, project-related traffic volumes are forecast to be the same under both alternatives.
Noise impacts are rounded to the nearest whole decibel, consistent with WSDOT traffic noise modeling guidance. Values indicated as "<1" not shown due to rounding.

Alternative 1

Under Alternative 1, no development would occur at the Talaris site; therefore, no noise impacts would occur in the Talaris area.

Temporary Construction Noise

Temporary construction noise impacts at Fort Lawton under Alternative 1 would be as described in the Impacts Common to All Action Alternatives section of this document and would result from site clearing and grading, the demolition of existing structures and construction of homes and park areas throughout the development, until full buildout in 2025.

Local Roadway Noise

Noise impacts from traffic on local roadways would be as described in the Impacts Common to All Action Alternatives section of this document. The modeled noise level increase for the roadways described above under the existing conditions and all four alternatives are shown in Table 4. The increase of traffic noise is expected to range from less than 1 to 4 dBA. This increase is greater for Alternative 1 than Alternatives 2 or 4, due to the larger volume of traffic forecast for this alternative. The increase of traffic noise associated with Alternative 1 is expected to be similar to the increase expected for Alternative 3, with the exception of receiver location R-1, where the increase associated with Alternative 1 is slightly greater.

Operational Noise

Operational noise under Alternative 1 would include multi-family residences, parks/recreation spaces, senior support service offices, and maintenance facilities at the Fort Lawton site. Noise associated with residences and senior support service offices is expected to be minimal. Active open space can produce noise associated with maintenance, and amplified and unamplified human voices, which is regulated by Chapter 25.08.490 of the SMC. No amplification systems are planned for the Fort Lawton project.

Alternative 2

Temporary Construction Noise

Temporary construction noise impacts at Fort Lawton under Alternative 2 would be as described in the Impacts Common to All Action Alternatives section of this document and would result from clearing/grading, the demolition of existing structures and construction of homes and park areas throughout the development, until full buildout in 2025.

Temporary construction noise impacts from Talaris under Alternative 2 would be associated with the clearing/grading, and construction of multi-family residences and senior support service offices, until full buildout in 2025.

Local Roadway Noise

Noise impacts from traffic on local roadways under Alternative 2 would be as described in the Impacts Common to All Action Alternatives section of this document. The modeled noise level increase from

traffic described above under the existing conditions and all four alternatives are shown in Table 4. Traffic noise at representative receiver locations near the Fort Lawton site is expected to range from less than 1 to 1 dBA, which is lower than Alternatives 1 or 3, due to the smaller increase in traffic volume forecast for this alternative.

Traffic noise increase associated with Talaris would be less than 1 dBA greater than Alternatives 1 or 4 because Talaris would be developed with multi-family housing structures under Alternative 2, which would result in slightly higher traffic volumes. Traffic noise increase associated with Alternatives 2 and 3 would be the same because the same development is planned for both alternatives.

Operational Noise

Operational noise under Alternative 2 would include single-family residences at the Fort Lawton site. Noise associated with residences is expected to be minimal. Noise impacts from the Talaris site, including multi-family residences and senior support service offices, are expected to be minimal. No active open spaces are planned for the Talaris site.

Alternative 3

Temporary Construction Noise

Temporary construction noise impacts at Fort Lawton under Alternative 3 would be as described in the Impacts Common to All Action Alternatives section of this document and would result from the clearing/grading, demolition of existing structures and construction of parks/recreation uses throughout the development, until full buildout in 2025.

Talaris will also be impacted by temporary construction noise under Alternative 3, associated with the clearing/grading and construction of multi-family residences and senior support service offices, until full buildout in 2025.

Local Roadway Noise

Noise impacts from traffic on local roadways under Alternative 3 would be as described in the Impacts Common to All Action Alternatives section of this document. The modeled noise level increase from traffic for roadways described above under the existing conditions and all four alternatives are shown in Table 4. Traffic noise level increase is expected to range from less than 1 to 4 dBA, which is higher for Alternative 3 than Alternatives 2 or 4, due to the presence of sports fields, which are expected to draw larger volumes of traffic during peak PM hours. The increase of traffic noise associated with Alternative 3 is expected to be similar to the increase expected for Alternative 1, with the exception of receiver location R-1, where the increase associated with Alternative 3 is slightly smaller.

Traffic noise level increase associated with Talaris will be less than 1 dBA greater than Alternatives 1 or 4 because Talaris will be developed with multi-family housing structures under Alternative 3, which

would result in slightly higher traffic volumes. Traffic noise increase associated with Alternatives 2 and 3 would be the same because the same development is planned for both alternatives.

Operational Noise

Operational noise from Alternative 3 would include active and passive open spaces and maintenance facilities at the Fort Lawton site. Active open space can produce noise associated with maintenance, and amplified and unamplified human voices, which is regulated by Chapter 25.08.490 of the SMC. No amplification systems are planned for the Fort Lawton project.

Noise impacts at the Talaris site, including multi-family residences and senior support service offices, are expected to be minimal. No active open spaces are planned for the Talaris site.

Alternative 4 – No Action

Under Alternative 4, no development is proposed for the Fort Lawton or Talaris sites at this time. No temporary clearing/grading, demolition or construction noise would occur. Local roadway noise is expected to increase slightly to correspond with an expected 1 percent per year increase in traffic volumes (Heffron 2017), resulting in a modeled increase of noise associated with traffic ranging from less than 1 to 1 dBA. No project-related operational noises would occur.

MITIGATION MEASURES

The following mitigation measures are proposed to address the potential impacts from construction and operation of the project under Alternatives 1 through 3.

Construction and Demolition

Construction noise could be reduced by using enclosures or walls to surround noisy stationary equipment, installing mufflers on engines, substituting quieter equipment or construction methods, minimizing time of operation, and locating equipment as far as practicable from sensitive receivers. To reduce construction noise at nearby receivers, the following mitigation measures could be incorporated into construction plans and contractor specifications:

- Locate stationary equipment away from receiving properties
- Erect portable noise barriers around loud stationary equipment located near sensitive receivers
- Turn off idling construction equipment
- Require contractors to rigorously maintain all equipment
- Train construction crews to avoid unnecessarily loud actions (e.g., dropping bundles of rebar onto the ground or dragging steel plates across pavement) near noise-sensitive areas.

State and local regulations require limiting construction activities to between the hours of 7 a.m. and 10 p.m. during weekdays, and between the hours of 9 a.m. and 10 p.m. on weekends.

A qualitative evaluation of project impacts indicates no adverse impacts will occur to noise-sensitive receivers in the study area.

Traffic and Operational Noise

Under Alternatives 1 and 3, existing wooded areas in the northern and southern parts of the Fort Lawton site would be preserved and forest land in the western portion of the site would be dedicated to the adjacent Discovery Park. Vegetation along the eastern edge of the Fort Lawton site would be maintained and potentially enhanced to serve as a noise buffer between the site and the adjacent neighborhood under these alternatives as well. Woodland and vegetated buffers would assist in reducing the impact of noise from the Fort Lawton site on the surrounding areas.

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

Compared to pre-development noise levels, noise levels will likely increase in the study area from short-term clearing/grading, demolition and construction noise and long-term traffic and human noise sources. However, the impact of noise from residential development and parks/recreation uses is expected to be minimal and no significant impacts are expected.

LIMITATIONS

The conclusions made in this report are based on the results of a qualitative analysis of planning documents that did not include field measurements or incorporation of detailed site-specific information. While this review allows for a preliminary assessment of potential impacts, it does not constitute a site-specific noise study.

USE OF THIS REPORT

This screening-level noise study has been prepared for the use of the City of Seattle to support the preparation of the Noise section of the Environmental Impact Statement for the Fort Lawton Army Reserve Center Redevelopment Project in Seattle, King County, Washington. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, Inc. shall be at the user's sole risk. Landau Associates warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

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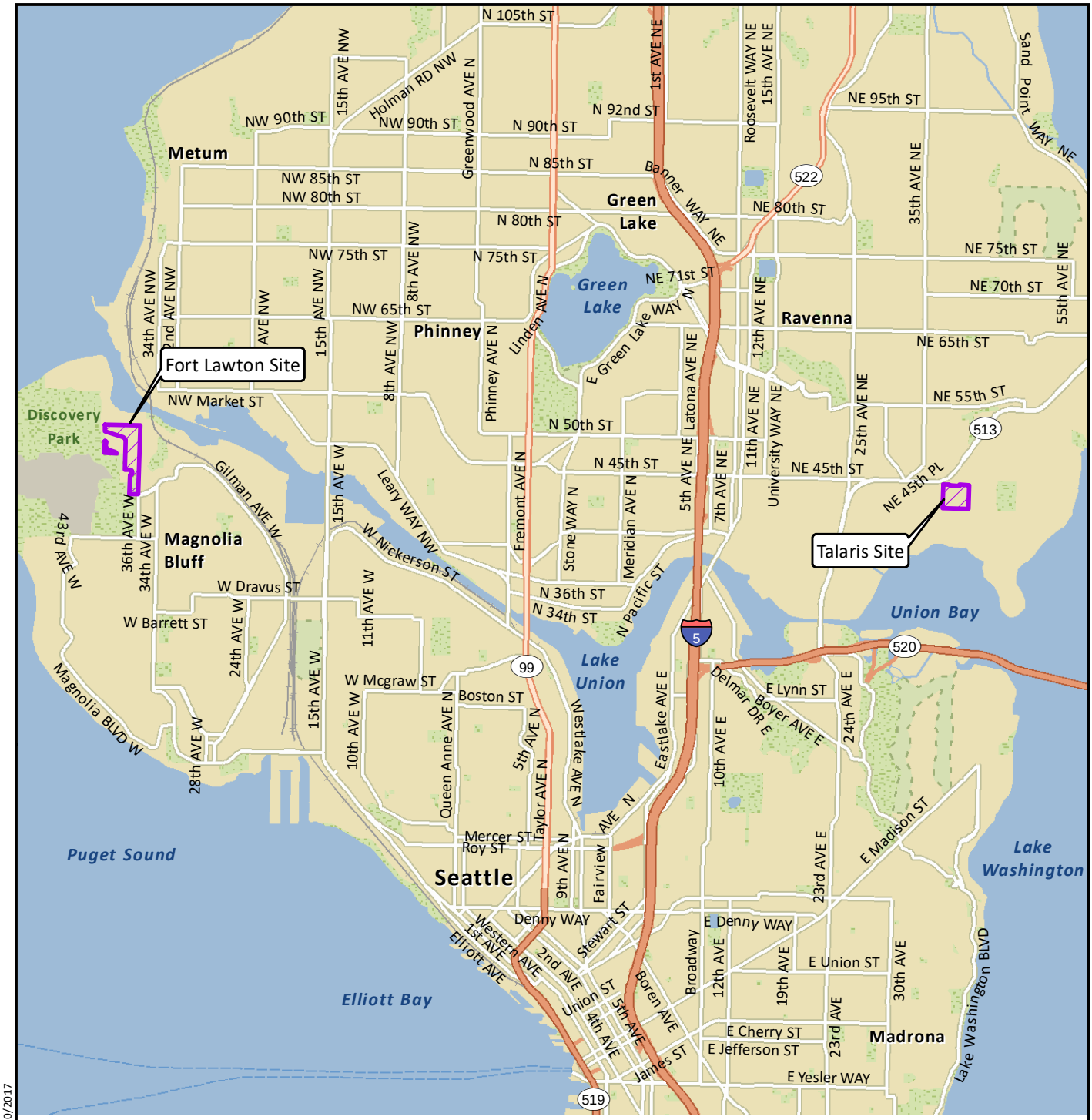

Data Source: Esri 2012

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LANDAU ASSOCIATES

Fort Lawton Project Noise Technical Report Seattle, Washington	**Vicinity Map**	Figure 1

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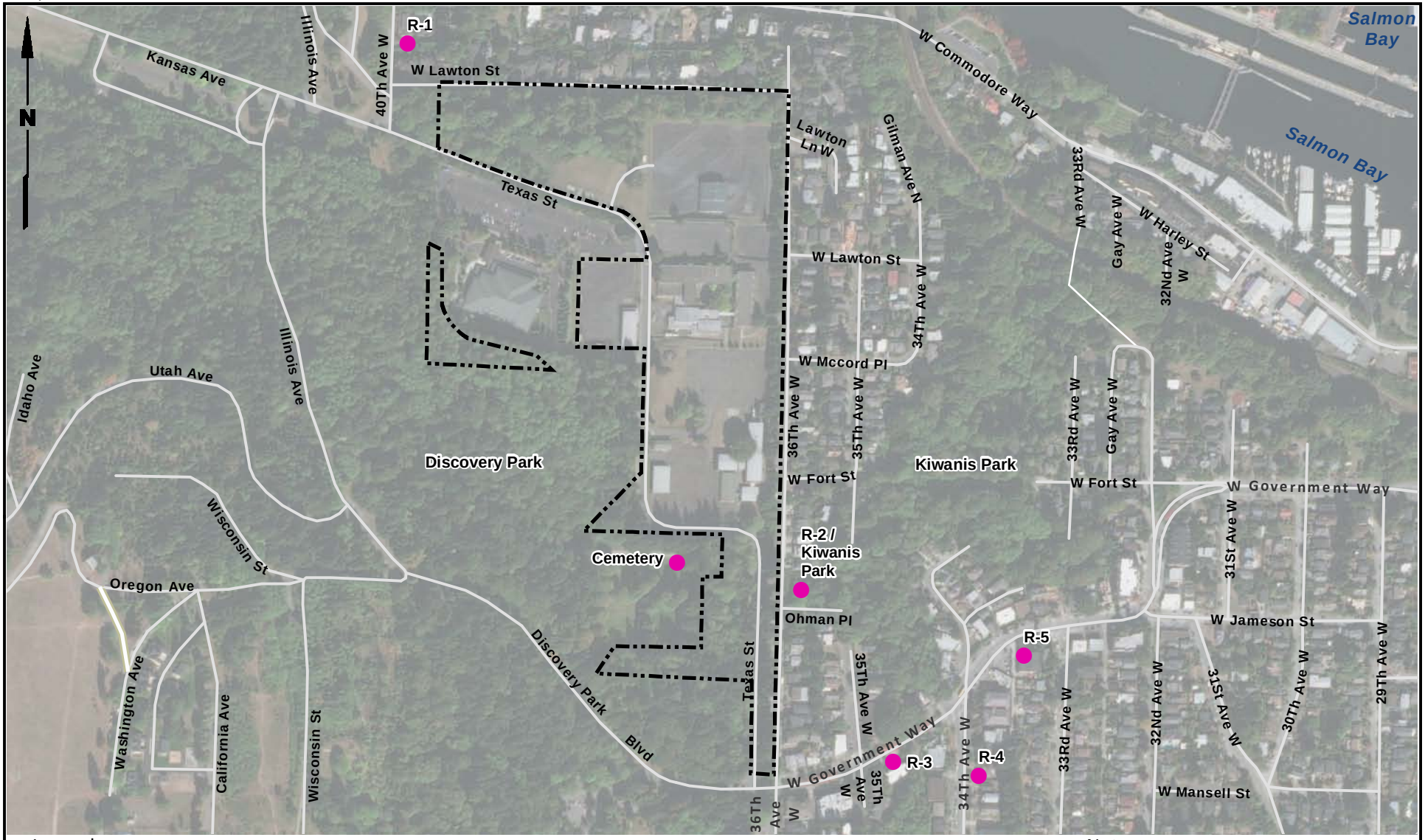

Legend

- Receiver Location
- Project Area

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Source: Esri World Imagery

0 500 1,000

Scale in Feet

LANDAU ASSOCIATES

Fort Lawton Project Noise Technical Report Seattle, Washington	**Representative Receiver Locations Fort Lawton Site**	Figure 2

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Legend

- Receiver Location
- Project Area

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Source: Esri World Imagery

0 400 800

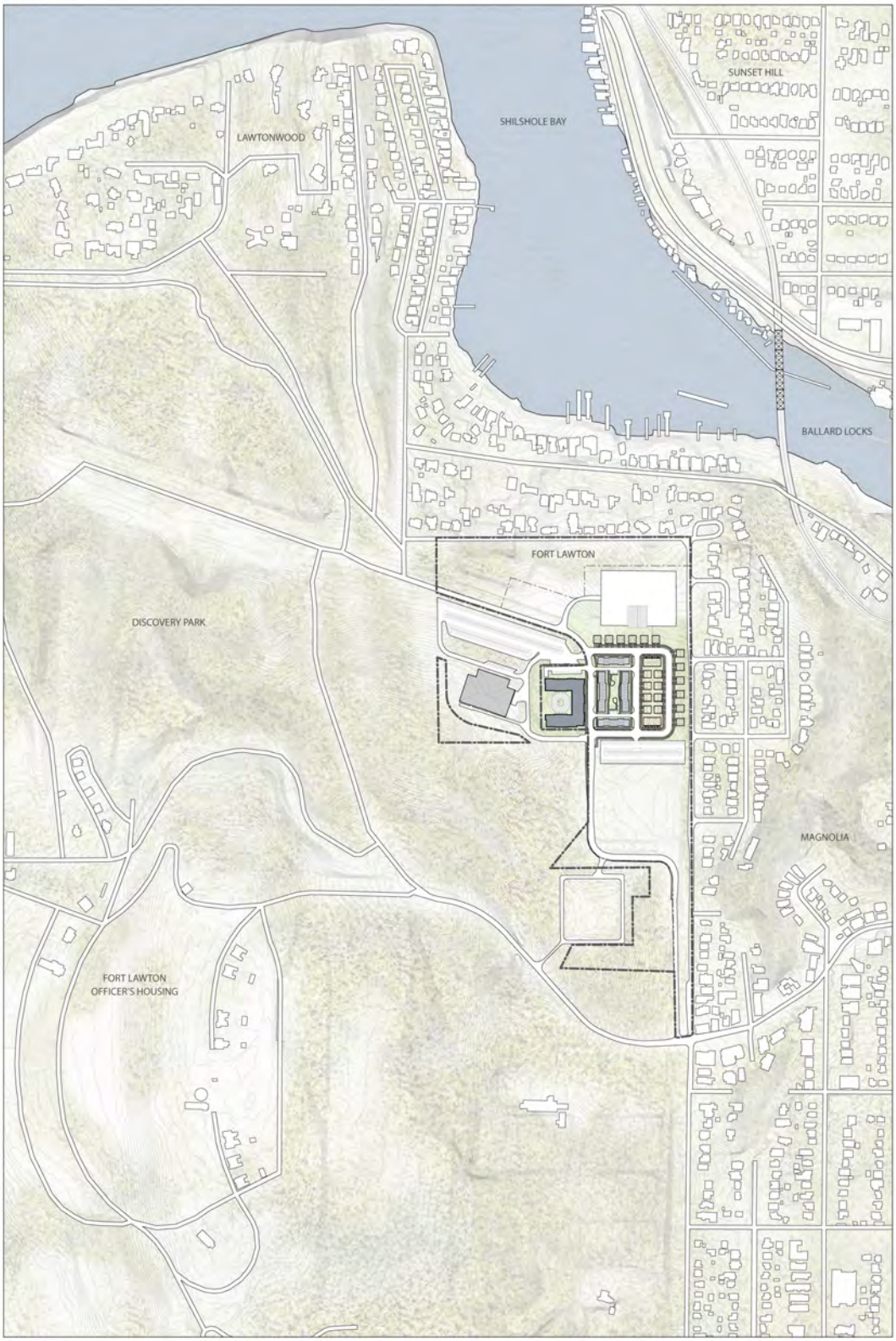
Scale in Feet

LANDAU ASSOCIATES

Fort Lawton Project Noise Technical Report Seattle, Washington	**Representative Receiver Locations Talaris Site**	Figure 3

APPENDIX A

Fort Lawton: Selected Figures



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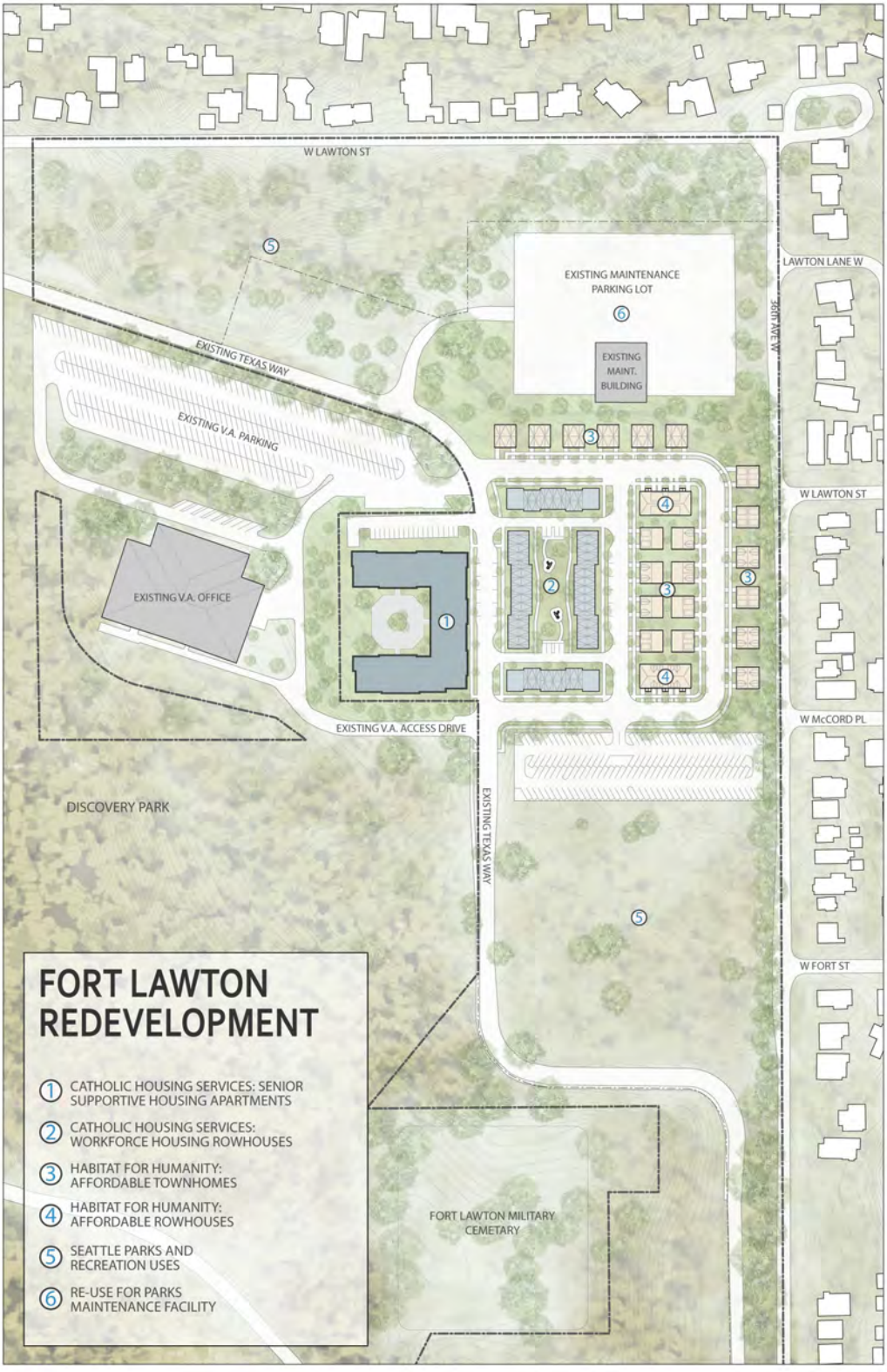
Source: SMR Architects, 2017.

EA Engineering, Science, and Technology, Inc., PBC

Figure 2-6A
Fort Lawton Site Plan—Alternative 1



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Source: SMR Architects, 2017.

EA Engineering, Science, and Technology, Inc., PBC

Figure 2-6B
Fort Lawton Site Plan—Alternative 1

Matches project area in Fort Lawton USARC Environmental Assessment (2012)

North

Note: This figure is not to scale

Source: SMR Architects, 2017.

EA Engineering, Science, and Technology, Inc., PBC

Figure 2-10

Fort Lawton Site Plan—Alternative 2

Note: This figure is not to scale

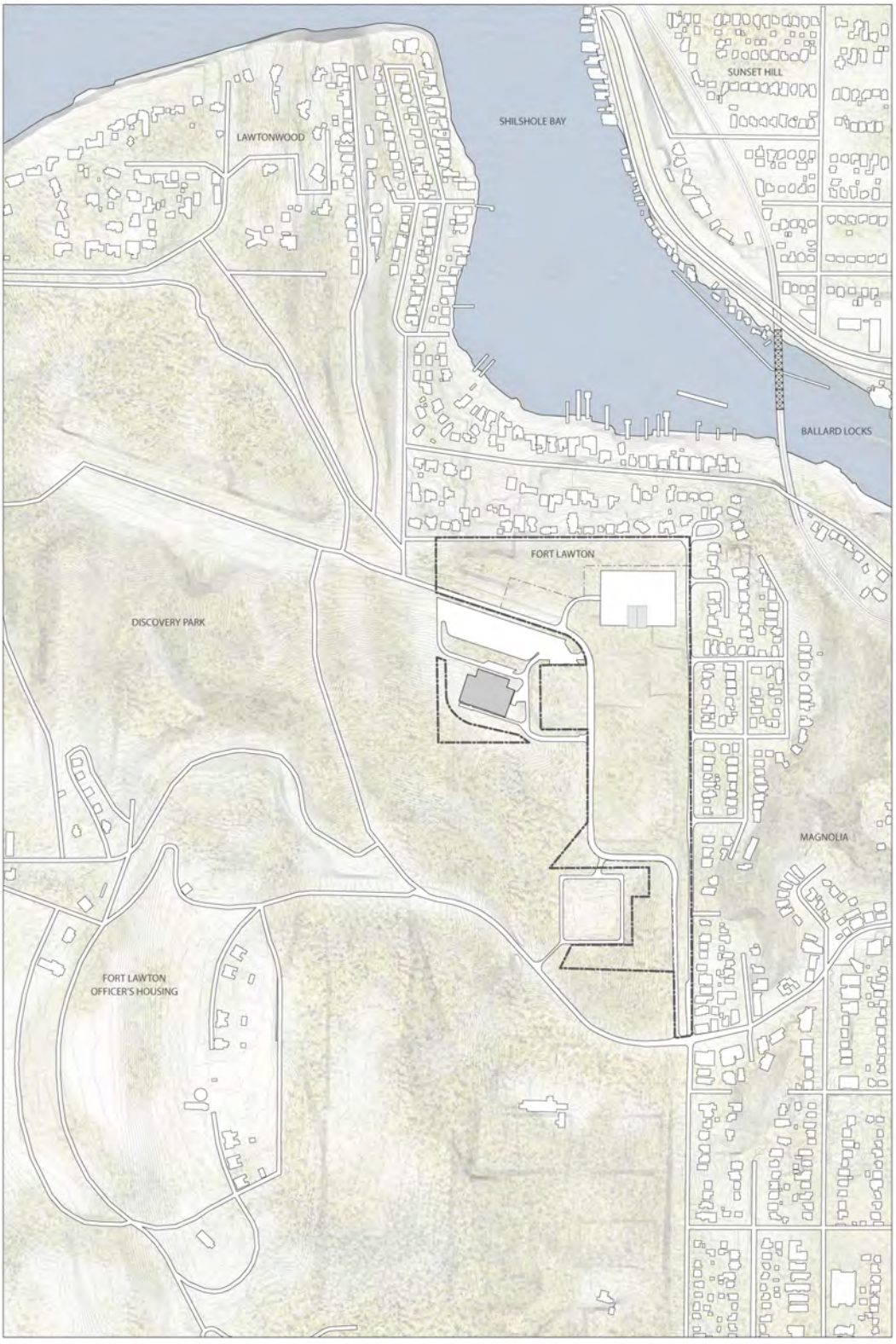
North

Source: SMR Architects, 2017.

EA Engineering, Science, and Technology, Inc., PBC

Figure 2-11

Talaris Site Plan—Alternatives 2 and 3

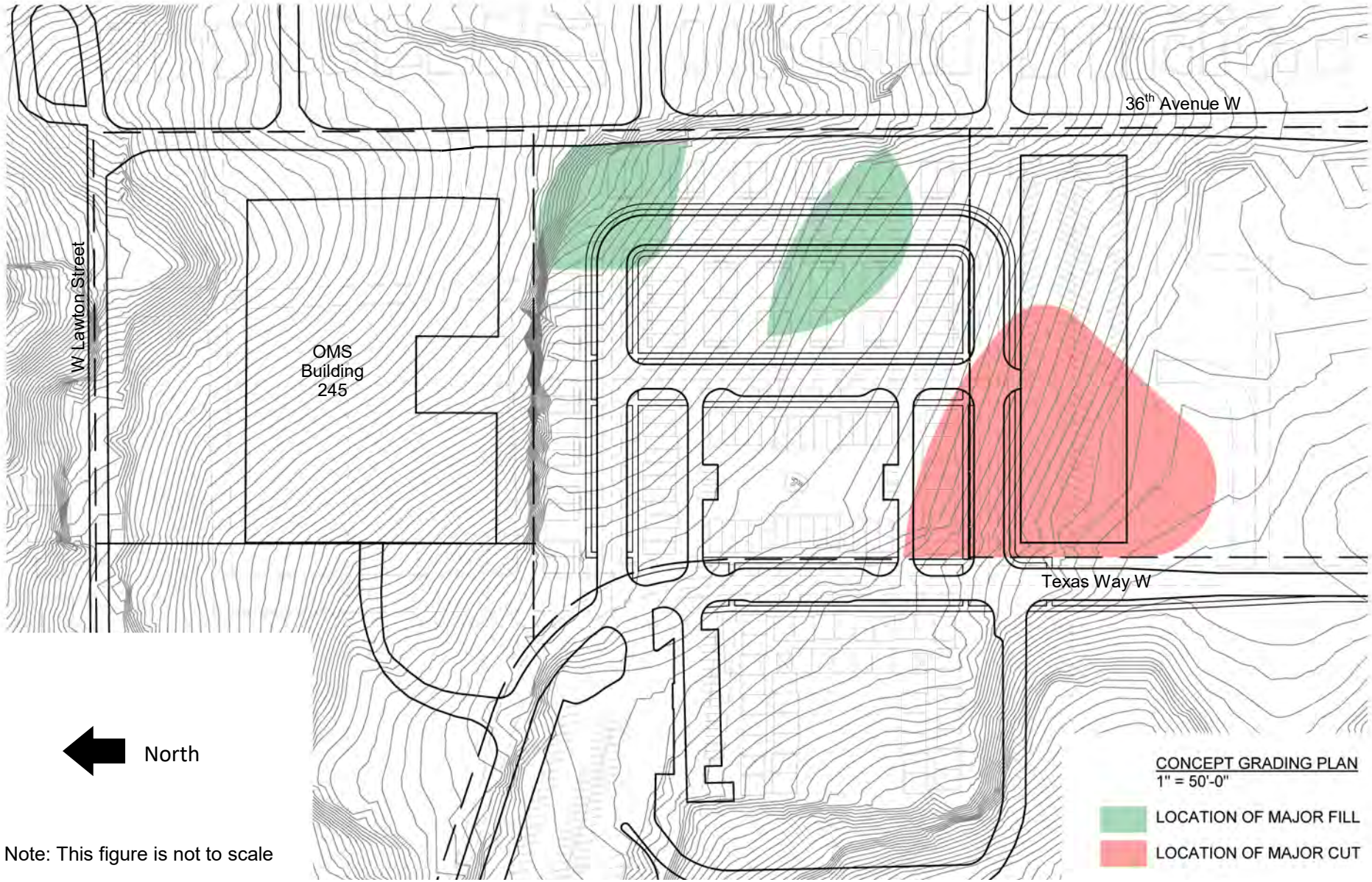


Note: This figure is not to scale

Source: SMR Architects, 2017.

EA Engineering, Science, and Technology, Inc., PBC

Figure 2-12A
Fort Lawton Site Plan—Alternative 3



Source: SMR Architects, 2017.

EA Engineering, Science, and Technology, Inc., PBC

Figure 3.1-1

Fort Lawton Grading Plan—Alternative 1

Appendix F

Environmental Hazards Abstracts

Appendix F – Environmental Documents Summaries

The following documents were reviewed to assess the environmental conditions/hazards associated with the Fort Lawton and Talaris properties. Below is a list of reviewed documents along with a summary and conclusions as they pertain to hazardous substances on the subject properties.

Fort Lawton Site

1. *Historical Photographs 1937, 1946 and 1950.*

   The historical photograph reviewed did not reveal any environmental concerns.

2. *Fort Lawton, Seattle Washington, Post Map, Map, Sewer Services. January 1946 revision.*

   Overview map of the Fort Lawton complex in 1946. The map illustrates where the buildings, roads, shooting ranges, cemetery, motor pool, coal yard and parade ground were located. The former motor pool and coal yard areas appear to be off of the subject property, located several thousand feet to the southwest. The cemetery appears to be directly adjacent to the west, of the south end of the subject property.

3. *Phase II Environmental Site Assessment (ESA) Report, Fort Lawton US Army Reserve Complex, 4585 Texas Way West, Seattle, WA 98199. ACT Associates, Inc. July 2009.*

   In April 2009, ATC associates, Inc. performed a limited Phase II ESA which included subsurface investigation activities to determine if the FLARC property (directly adjacent to the northwest of AMSA Building 222) was adversely impacted from historical use or adjacent properties. The limited Phase II ESA included an evaluation of the potential environmental issues identified during ATC's 2009 Phase I Environmental Site Assessment. The above referenced potential issues included the following:

   - An evaluation of the potential for impact from suspect USTs and/or ASTs at the property associated with the approximately 15 to 20 "temporary" barracks located on the property circa 1944.
   - An evaluation of the potential for impact to site soil and groundwater from ammunitions used at the small munitions shooting range located on the property circa 1936.
   - An evaluation of the potential for impact from the gas pump island and associated piping on the immediately east-adjacent property.
   - An evaluation of the potential for impact from the potential fuel source at the helicopter landing pad identified on the property in 1977.
   - An evaluation of the potential for impact from fill material imported to the site from an unknown source.

The following conclusions were made. Concentrations of arsenic in groundwater collected from soil boring B-9 are slightly above the MTCA Method A cleanup level of 5 ug/L and concentrations of dissolved lead are present in concentrations that meet the Method A cleanup level of 15 ug/L. ATC notes that groundwater collected from soil boring B-9 appears to be from limited zone of perched groundwater that is likely to be present seasonally. ATC further notes that concentrations of arsenic and lead were not detected in any other locations analyzed at the subject site. Based upon this knowledge, it is ATC's opinion that the presence of arsenic and lead in groundwater at does not represent a reportable release and does not warrant further investigation or remedial action. No other analyte was detected in soil and groundwater samples at concentrations above MTCA Method A cleanup levels.

4. *Final Site Investigation Report, Fort Lawton Rifle Target Range, Fort Lawton Pistol Target Range. 88th Regional Support Command, Fort Lawton U.S. Army Reserve Complex, Seattle Washington. U.S. Army Corp of Engineers, Omaha District. May 2010.*

   In 2010, the US army Corp of Engineers, Omaha District conducted a site investigation to evaluate environmental conditions of property for transfer. The Fort Lawton Rifle Target Range (Rifle Range) and the Fort Lawton Pistol Target Range (Pistol Range) were investigated to determine the presence of munitions constituents in soil due to Department of Defense use of the property. Fort Lawton Rifle Target Range and Pistol Target Range are located on property owned by the Fort Lawton Army Reserve Complex and the City of Seattle. Both are static small arms ranges that were active from approximately 1904 through 1944 for rifle and pistol marksmanship training for those stationed at Fort Lawton Military Reservation.

   The following conclusions were made: 1) The 1,000-Yard Target Range Munitions Response Site (MRS) is the portion of the Fort Lawton Rifle Target Range located on Fort Lawton US Army Reserve Complex property. No environmental conditions related to munitions were found and no further action is recommended on this property. 2) The 1,000-Yard Target Range-TD MRS is the portion of the Fort Lawton Rifle Target Range and Fort Lawton Pistol Target Range located on City of Seattle property. This property is recommended for further remedial response under the Formerly Used Defense Site Program to address munitions constituents.

5. *Final, Radiological Site Assessment Report (and memo), Leisy Hall and AMSA 79. Fort Lawton Army Reserve Center (WA030), 4570 Texas Way West, Seattle, Washington. Cabrera Services. June 2012.*

   In June 2012, Cabrera Services Inc. performed a Radiological Site Assessment (RSA) at the Leisy Hall and Area Maintenance Support Activity (AMSA) 79, Fort Lawton U.S. Army Reserve Center (USARC) in Seattle, Washington. The RSA covered Leisy USARC (Building 220), AMSA 79 (Building 222), the Fort Lawton USARC (Building 240), the Organizational Maintenance Shop (Building 245), the Harvey USARC (Building 216), the Information Technology (Building 214), and warehouse storage (Building 211). A visual inspection and exposure rate survey were performed to determine if any sources of radioactivity remain at the site.

The results of the visual inspection and exposure rate survey support the conclusion that no sources of radioactivity remain at the site.

6. *Final, Environmental Assessment (EA) For BRAC 05 Recommendations for Closure, Disposal, and Reuse of Fort Lawton, United States Army Reserve Center (FACID WA030, WA031, WA012), Seattle, Washington. U.S. Army Corp of Engineers, Mobile District. July 2012.*

   The EA evaluated three alternatives with the following conclusions:

   - No Action Alternative: Caretaker Status - no environmental impacts.

   - Traditional Disposal and Reuse Alternative - no significant adverse effects on any of the environmental or related resource areas at Fort Lawton or to areas surrounding the USARC. All the resource areas were evaluated to be at the No Effects or No Significant Effect levels.

   - Public Sale Alternative would have no significant adverse effects on any of the environmental or related resource areas at Fort Lawton or to areas surrounding the USARC. All of the resource areas were evaluated to be at the No Effects or No Significant Effect levels.

   The following conclusions were made in the EA:

   - No improper storage techniques or staining was noted in or around the hazardous materials sheds or flammable storage cabinets and no potential environmental threat was noted.

   - Results of post excavation samples after removal of three underground storage tanks and a fuel dispenser area showed total petroleum hydrocarbons (TPH) were either not detected or the levels were well below the WDOE action levels.

   - No leaks associated with the three above ground storage tanks were observed or reported during the 2007 ECPs.

   - There are no PCB-containing ballasts or transformers present at Harvey Hall USARC and Leisy Hall.

   - The EA referenced a 1994 asbestos containing material (ACM) survey report for Leisy hall, which indicated ACM was present in Buildings 220, 222, and 250. Based on construction dates, ACM may also be present in AMSA 79 (Building 222). The EA stated that no ACM abatement documentation was available; however, based on personal interviews conducted during the 2007 ECP, all ACM was removed from Leisy Hall during previous renovation activities. The 1994 asbestos survey report for Harvey Hall indicated the presence of ACM in Building 216, but no ACM in Building 211. According to the EA, no records were available for ACM abatement in Building 216.

- The EA concluded there are no documented LBP surveys or abatement records for buildings on the installation. Because the buildings on the installation were constructed before 1981 (Leisy Hall (1972), AMSA 79, Building 222 (1972), and Harvey Hall (1950s), the presence of LBP is presumed.

- The EA states that a radon survey was conducted in Fort Lawton buildings in 2007. The survey results indicated radon levels below the U.S. EPA recommended action level of 4.0 picoCurries per liter (pCi/l).

- No reportable quantities of hazardous substances have been stored at Leisy Hall and no spills or releases were documented or reported. Installation personnel indicated that a diesel fuel spill/leak occurred in the parking lot of the Fort Lawton USARC and was cleaned up years ago.

- Site records indicate that three underground storage tanks (USTs) were removed from the Leisy Hall area in 1990. A fuel island area was formerly located on the northwestern corner of the AMSA 79 (Building 222) corner of the installation, which contained a gasoline UST, a diesel fuel UST and two dispenser areas. A third UST, used for waste oil storage, was formerly situated on the southern central perimeter the AMSA 79 (Building 222) area. Records indicated that there was no visual evidence of soil contamination and no groundwater was encountered during the tank excavation. Results of post excavation samples showed total petroleum hydrocarbons (TPH) were either not detected or the levels were well below the action levels

- Three above ground storage tanks (ASTs) are located at Leisy Hall. One 4,000-gallon capacity diesel AST is situated on the southern exterior of Leisy Hall and is associated with an emergency generator. One 200-gallon capacity AST utilized to store hydraulic fuel for a vehicle lift is situated in a storage room of AMSA 79 Building 222 and one 500-gallon capacity AST utilized for the storage of used oil collected in maintenance operations conducted at AMSA 79 Building 222 is located within a portable hazmat storage shed west of AMSA 79 Building 222. No issues of leaks associated with the ASTs were observed or reported in the 2007 ECP Report.

7. *Periodic ACM/PACM Condition Assessment – Lawton US Army Reserve Center, Seattle, Washington. Rose Environmental. December 3, 2012.*

   In November 2012, Rose Environmental conducted a periodic condition assessment of asbestos-containing materials (ACM) and potential asbestos-containing materials (PACM) at the Fort Lawton US Army Reserve Center. The purpose of the inspection was to determine the presence and condition of ACM and PACM within the buildings. The US Army 88th Regional Support Command provided Rose Environmental with asbestos survey reports of the facility conducted in November 1993 by AGI Technologies (reports both dated May 5, 1994). At that time, the Harvey Hall report identified nine ACM present within Building 216. The Leisy HQ report identified ten ACM present and two PACM identified in Building 220. The report also identified three ACM present and two PACM in Building 222.

The results of Rose Environmental's walkthrough inspection of all three buildings indicated that ACM and PACM are still present in the buildings. However, Rose Environmental could not confirm to be present, and assumed to be removed, the following ACM/PACM which was identified in the AGI 1994 reports: Building 216 Harvey Hall - (1) Brown 9" x 9" floor tiles with brown mastic in 1st Floor offices, (2) Brown 12" x 12" floor tiles with brown mastic in certain 1st Floor and 2nd Floor offices, (3) Boiler Room furnace gaskets (new boiler installed), (4) 2nd Floor concrete and straw firing range soundproofing, (5) 2nd Floor soundproofing below hardwood flooring. Building 220 Leisy HQ - 12" x 12" white ceiling tiles in the Print Shop. Building 222 AMSA Building - White 9" x 9" floor tiles with brown mastic in the Tool Supply Room.

8. *Environmental Condition of Property (ECP) Update Report: Fort Lawton U.S. Army Reserve Center (WA030, WA031, WA012), Seattle, Washington 98199. EXCEL Engineering, Inc. April 2013.*

   In October 2012, XCEL Engineering conducted a site reconnaissance of the USAR Center (WA030, WA031, WA012) to visually obtain information indicating the environmental condition of the property prior to disposal. The site was vacant at the time of the inspection and has been since September 2011. An original ECP report was prepared in September 2001 by Fuller, Mossbarger, Scott and May Engineers, Inc. The original report was included as an appendix, and was reviewed in conjunction with the update report. The purpose of the update report is to identify any Recognized Environmental Conditions at the property and/or any environmental conditions that may have changed since the 2007 ECP report. Of note, the two areas of potential environmental concern identified in the 2007 ECP were connected with the FLARC parcel and not associated with the subject site.

   The ECP Update Report did not identify any recognized environmental conditions at the property during the site visual inspection, regulatory database search, or interviews with personnel knowledgeable about the property. The report classified the property as an ECP Type 2, which is defined as an area or parcel of real property where only the release or disposal of petroleum products or their derivatives has occurred. (Refer to the UST Closure Report located in Appendix E of the ECP Report Update).

9. *Environmental Condition of Property Recertification for the Fort Lawton, United States Army Reserve Center, Seattle, WA. Department of the Army, Headquarters, 88th Regional support command. June 2016.*

   A site visit was conducted in June 2016 by the BRAC Environmental Coordinator (Versar Contractor) 88th Regional Support Command Conditions on the subject property and in the area surrounding.

   It was concluded that the environmental conditions of the subject property have not changed materially since the ECP (September 2007) and ECP Update (April 2013) were completed. The ECP did not identify any Recognized Environmental Conditions.

The following other environmental condition was identified during records review: The 2013 ECP Update incorrectly stated that there were two Underground Storage Tanks (USTs) on the Property and the 2007 ECP incorrectly stated that there were three USTS on the Property. According to Fort Lawton UST closure reports and state UST database, there were five UST's on the Property that were used for storage of petroleum products. From 1990-1993, five USTs were removed, cleaned, and disposed of from the AMSA (bldg. 222); Harvey (bldg. 116); and Storage (former maintenance shop-bldg. 211) areas. There was no visual or olfactory evidence of soil contamination at these tank site locations. Soils were over excavated and confirmatory soil samples collected revealed TPH concentrations below Washington Department of Ecology action levels. The status of three reportable tanks has been listed as "removed" within the Washington Department of Ecology UST system, the other two heating fuel USTs were exempt from reporting as soil samples were non-detect.

Talaris Site

1. *2013 Environmental SEPA Checklist (4000 Property). City of Seattle, Department of Planning and Development. October 2013.*

   Notes from the 2013 SEPA Checklist for the Talaris Property pertaining to Hazardous Substances:

   - The property contains nine separate buildings formerly related to the Institute for Advanced Study. Buildings were constructed in two phases. Phase I, 1965 – 1967; and Phase II 1970/1971. Potential for lead based paint and asbestos due to the age of the buildings. Unknown if any LBP or asbestos surveys conducted.

   - Likely to need an NPDES permit (stormwater permit) and Stormwater Pollution Prevention Plan (SWPPP).

   - The site was the subject of a 2004 Final Environmental Impact Statement (EIS). This EIS was not available for review.

   - The abandoned old Montlake Landfill is located adjacent to the subject property. No landfill deposits underlie the site. Methane migration from the former landfill to the subject property was determined to be unlikely.

   - Construction equipment could potentially pose a threat to environmental health via leaky equipment, spills during refueling, and leaky containers stored on-site for construction equipment maintenance.

   - Future residential uses could pose a threat to the environment through the misuse and improper disposal of household cleaners, yard fertilizers and pesticides, and gas and other petroleum products used in the operation and maintenance of automobiles and yard equipment. On-site equipment fueling.

2. *Geotechnical Report, 4000 Property, Seattle, Washington. Shannon & Wilson, Inc. October 2013.*

   In October 2013, Shannon and Wilson, Inc. evaluated the subsurface soil and groundwater conditions in the Laurelhurst neighborhood of Seattle in the property located at 4000 NE 41st Street, Seattle, Washington. The goal was to develop preliminary geotechnical recommendations for the site grading and infrastructure design and construction required for the proposed development. Pertinent information included in the evaluation included a 1,000-foot methane buffer next to the abandoned Montlake landfill, which operated west of the property from 1926 to 1966 and was closed in 1971 following landfill practices of the time. It was covered with about 2 feet of clean soil. The easternmost extent of the mapped abandoned landfill waste is slightly more than 1,000 feet from the western edge of the property.

   In the opinion of Shannon and Wilson, Inc., the probability of methane migrating from the abandoned landfill onto the property is low. It was concluded that no special measures are needed to mitigate potential methane migration from the abandoned Montlake Landfill.

Appendix G

Visual and Shadow Analysis Documentation

VISUAL ANALYSIS DOCUMENTATION

LAWTONWOOD
Seaview Ave
32nd Ave NW
NW 54th St
Scheuerman Creek
W Commodore Way
Hiram M. Chittenden Locks
Illinois Ave
Kiwanis Memorial Preserve Park
Discovery Park Blvd
W Government Way
10
7
8
6
5
9
4
3
2
1
LEGEND
1- Texas Way Entrance
2- FT. Lawton Military Cemetery
3- Mid Texas Way
4- Discovery Park Loop Trail
5- Across from Veteran Center
6- Texas Way Secondary Entrance
7- Commodore Way
8- Commodore Park
9- 36th Ave W
10- Seaview Avenue
0' 90' 180' 360' 720'

Discovery Park Blvd

SHADOW ANALYSIS DOCUMENTATION

DEVELOPMENT ALTERNATIVE 1
EQUINOX 9AM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 1
EQUINOX 12PM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 1
EQUINOX 3PM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 1
SUMMER SOLSTICE 9AM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 1
SUMMER SOLSTICE 12PM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 1
SUMMER SOLSTICE 3PM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 1
WINTER SOLSTICE 9AM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 1
WINTER SOLSTICE 12PM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 1
WINTER SOLSTICE 3PM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 2
EQUINOX 9AM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 2
EQUINOX 12PM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 2
EQUINOX 3PM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 2
SUMMER SOLSTICE 9AM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 2
SUMMER SOLSTICE 12PM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 2
SUMMER SOLSTICE 3PM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 2
WINTER SOLSTICE 9AM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 2
WINTER SOLSTICE 12PM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 2
WINTER SOLSTICE 3PM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 3
EQUINOX 9AM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 3
EQUINOX 12PM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 3
EQUINOX 3PM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 3
SUMMER SOLSTICE 9AM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 3
SUMMER SOLSTICE 12PM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 3
SUMMER SOLSTICE 3PM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 3
WINTER SOLSTICE 9AM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 3
WINTER SOLSTICE 12PM

LEGEND

FORT LAWTON SITE CONDITIONS

DEVELOPMENT ALTERNATIVE 3
WINTER SOLSTICE 3PM

LEGEND

FORT LAWTON SITE CONDITIONS

Appendix H

Historic/Cultural Resources Report

CULTURAL RESOURCES TECHNICAL REPORT, FORT LAWTON ARMY RESERVE CENTER REDEVELOPMENT PROJECT EIS, SEATTLE, KING COUNTY, WASHINGTON

BY
MARGARET BERGER, PRINCIPAL INVESTIGATOR/PROJECT ARCHAEOLOGIST
JAMES MCNETT, HISTORIC ARCHITECT

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SEATTLE, WA 98107

OCTOBER 26, 2017
REVISED NOVEMBER 3, 2017

Cultural Resource Consultants

CULTURAL RESOURCES REPORT COVER SHEET

Author: Margaret Berger and James McNett

Title of Report: Cultural Resources Technical Report, Fort Lawton Army Reserve Center Redevelopment Project EIS, Seattle, King County, Washington

Date of Report: November 3, 2017

County(ies): King Sections: 10, 15 Township: 25 N Range: 3 E
Sections: 15 Township: 25 N Range: 4 E

Quad: Shilshole Bay, WA; Seattle North, WA Acres: ca. 52

PDF of report submitted (REQUIRED) ☐ Yes

Historic Property Inventory Forms to be Approved Online? ☐ Yes ☒ No

Archaeological Site(s)/Isolate(s) Found or Amended? ☐ Yes ☒ No

TCP(s) found? ☐ Yes ☒ No

Replace a draft? ☐ Yes ☒ No

Satisfy a DAHP Archaeological Excavation Permit requirement? ☐ Yes # ☒ No

Were Human Remains Found? ☐ Yes DAHP Case # ☒ No

DAHP Archaeological Site #:

_____
_____
_____
_____
_____

- Submission of PDFs is required.
- Please be sure that any PDF submitted to DAHP has its cover sheet, figures, graphics, appendices, attachments, correspondence, etc., compiled into one single PDF file.
- Please check that the PDF displays correctly when opened.

Executive Summary
This report presents methods and results of a cultural resources analysis for the Fort Lawton Army Reserve Center Redevelopment Project Environmental Impact Statement (EIS) in Seattle, King County, Washington. This project is seeking redevelopment within the Fort Lawton U.S. Army Reserve Center (USARC), located in the Magnolia neighborhood, and Talaris site, located in the Laurelhurst neighborhood, to provide supportive and affordable housing as well as create public park uses and meet park maintenance needs. EA Engineering, Science, and Technology, Inc., PBC (EA) requested that Cultural Resource Consultants (CRC) prepare this cultural resources analysis to ensure that potential impacts to cultural resources are considered in the proposal in accordance with the Washington State Environmental Policy Act (SEPA), and other applicable regulations. CRC's investigations to date have included review of relevant background literature and maps, records on file at the Washington State Department of Archaeology and Historic Preservation (DAHP), and available project plans and related information; correspondence with area tribes; as well as field investigations.

Literature review and reconnaissance survey were conducted. No previously recorded archaeological sites are in or adjacent to the project's onsite (Fort Lawton) or offsite (Talaris) locations. The Fort Lawton location is considered to have a low potential to contain as-yet unknown archaeological sites due to the extent of prior ground disturbance in a non-depositional setting on a glacial landform. The Talaris location has also been previously altered by earthmoving activity but is considered to have moderate potential for as-yet unknown archaeological sites due to the presence of the historical Union Bay shoreline and Holocene peat deposits on the property. Previously recorded historic sites are present within both the Fort Lawton and Talaris sites, and would be directly impacted under each of the proposed alternatives. Measures are recommended to avoid, minimize, and mitigate significant impacts to cultural resources.

Cultural Resources Technical Report, Fort Lawton Army Reserve Center Redevelopment Project EIS, Seattle, King County, Washington

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Introduction

Cultural Resource Consultants (CRC) was retained by EA Engineering, Science, and Technology, Inc., PBC (EA) to conduct a cultural resources analysis for the Fort Lawton Housing Redevelopment Project Environmental Impact Statement (EIS) in Seattle, King County, Washington. This project is seeking redevelopment within the Fort Lawton U.S. Army Reserve Center (USARC), located in the Magnolia neighborhood, and Talaris site, located in the Laurelhurst neighborhood, to provide supportive and affordable housing as well as create public park uses and meet park maintenance needs. Four alternatives, including no action, were considered in the analysis. The goal of CRC's assessment for the EIS was to identify any previously recorded cultural resources in the project area, and evaluate the potential for archaeological and historic sites to be impacted by redevelopment under the alternatives.

Assessment methods included a review of previous ethnographic, historical, and archaeological investigations onsite and in the local area, a records search at the Washington State Department of Archaeology and Historic Preservation (DAHP) for known sites in the immediate area, and review of relevant background literature and maps (including General Land Office [GLO], United States Geological Service [USGS], and county atlases), as well as pedestrian survey and subsurface testing. Consideration of the project's potential impacts to cultural resources was based upon review of available project information provided by EA, and the local archaeological, historical, and ethnographic records. CRC also contacted the cultural resources department at the Duwamish, Muckleshoot, Snoqualmie, and Suquamish tribes to inquire about project-related cultural information or concerns on a technical staff-to-technical staff basis (Attachment A). This was not intended to be or intended to replace formal government-to-government consultation. A Suquamish tribe archaeologist responded indicating no particular concerns with the project. At the time this assessment was completed, no other response had been received. If new information is provided, it would be incorporated into a revision of this document. This assessment utilized a research design that considered previous studies, the magnitude and nature of the undertaking, the nature and extent of potential effects on historic properties, and the likely nature and location of historic properties within the area of potential impacts, as well as other applicable laws, standards, and guidelines (per 36CFR800.4 (b)(1)) (DAHP 2017a).

Regulatory Framework

CRC's work was intended, in part, to assist in addressing state regulations pertaining to the identification and protection of cultural resources (e.g., RCW 27.44, RCW 27.53); compliance with the Washington State Environmental Policy Act (SEPA); and compliance with Seattle Municipal Code Chapter 25.12 (Landmarks Preservation Ordinance). The Archaeological Sites and Resources Act (RCW 27.53) prohibits knowingly disturbing archaeological sites without a permit from the Washington State Department of Archaeology and Historic Preservation (DAHP), and the Indian Graves and Records Act (RCW 27.44) prohibits knowingly disturbing Native American or historic graves. Under SEPA, agencies must consider the environmental consequences of a proposal, including impacts to cultural resources, before taking action.

All projects that involve changes to a City landmark must follow Seattle Municipal Code Chapter 25.12 (Landmarks Preservation Ordinance). Projects involving City of Seattle landmarks must submit an application for a Certificate of Approval before they can submit their Master Use

Permit (MUP) application or Construction Permit application. The following changes require a Certificate of Approval before work can begin, even if no permit from the Department of Construction and Inspections is required:

- Any change to the exterior of any building or structure;
- Installation of any new sign or changes to existing signs;
- A change in the color the building or structure is painted;
- Any change in a public right-of-way or other public space, including parks and sidewalks (e.g., sidewalk displays, street lights, etc.);
- New construction;
- Demolition of any building or structure;
- Changes to the interior that show from the street, changes to individual business spaces in the Pike Place Market, and changes to the interior of some landmark buildings;
- Site alterations in some cases; or
- A proposed new business or service or an expansion of current use in some cases (DON 2015).

Furthermore, if a project is proposed adjacent to or across the street from a designated landmark, the decision-maker shall refer the proposal to the City's Historic Preservation Officer for an assessment of any adverse impacts on the designated landmark and for comments on possible mitigating measures. Mitigation may be required to insure the compatibility of the proposed project with the character of the designated landmark and to reduce impacts on the character of the landmark's site. Possible mitigating measures include sympathetic facade treatment, sympathetic street treatment, sympathetic design treatment, or reconfiguration of the project and/or relocation of the project on the project site (DON 2015).

For projects involving structures or sites that are not yet designated as historical landmarks but which appear to meet the criteria for designation, the decision maker or any interested person may refer the site or structure to the LPB for consideration. If the LPB approves the site or structure for nomination as an historic landmark, consideration of the site or structure for designation as an historic landmark and application of controls and incentives shall proceed as set forth in the Landmarks Preservation Ordinance. If the site or structure is rejected for nomination, the project shall not be conditioned or denied for historical preservation purposes unless sites of archaeological significance or adjacent designated landmarks are present (DON 2015).

The City of Seattle uses the following guidelines for eligibility for identifying Seattle Landmarks. In order to be designated, the building, object, or site must be at least 25 years old and must meet at least one of the six criteria for designation outlined in the Seattle Landmarks Preservation Ordinance (SMC 25.12.350):

A. It is the location of, or is associated in a significant way with, a historic event with a significant effect upon the community, City, state, or nation; or

B. It is associated in a significant way with the life of a person important in the history of the City, state, or nation; or

C. It is associated in a significant way with a significant aspect of the cultural, political, or economic heritage of the community, City, state or nation; or

D. It embodies the distinctive visible characteristics of an architectural style, or period, or a method of construction; or
E. It is an outstanding work of a designer or builder; or
F. Because of its prominence of spatial location, contrasts of siting, age, or scale, it is an easily identifiable visual feature of its neighborhood or the city and contributes to the distinctive quality or identity of such neighborhood or the City.

In addition to meeting at least one of the above standards, the object, site, or improvement must also possess integrity or the ability to convey its significance. At the public meeting on designation, the Landmarks Preservation Board receives evidence and hears arguments as to whether the site, building or object meets the standards for designation. If the Board does not designate the property, the proceedings terminate and the property cannot be considered for designation for five years, except at the request of the owner.

Project Description

The applicant, Seattle Office of Housing (Office of Housing), is considering redevelopment options including housing and park uses for the Fort Lawton U.S. Army Reserve Center (USARC) site, located in the Magnolia neighborhood in northwest Seattle. The Office of Housing's goals are to produce supportive housing for formerly homeless people and affordable rental and ownership housing for low income families and individuals, as well as create public park uses (including both active and passive uses) and meet park maintenance needs. It is expected that full buildout of the Fort Lawton Project would occur by 2025. However, actual buildout could depend on specific economic and market conditions. As discussed in Chapter 2 of the EIS, the City identified four alternatives during scoping. Two of these alternatives include offsite development in addition to development at the Fort Lawton site. The offsite location selected by the Office of Housing is the Talaris site, located in the Laurelhurst neighborhood of Seattle.

The approximately 34-acre Fort Lawton site contains six buildings and four smaller structures (sheds, pumphouse, and a smokestack) and is located at 4570 Texas Way W in the Magnolia neighborhood in northwest Seattle. The site is bordered by W Lawton Street to the north, 36th Avenue West to the east, W Government Way to the south and Discovery Park to the west. The site is in the SW¼ of the SE¼ of Section 10 and NW¼ of the NE¼ of Section 15, Township 25 North, Range 3 East. W.M. (Figures 1 and 2).

The approximately 18-acre Talaris site contains nine buildings and is located at 4000 NE 41st Street in the Laurelhurst neighborhood in northeast Seattle. The site is bordered by existing commercial, institutional and residential uses along NE 45th Street to the north, residential uses along 42nd Avenue NE to the east, NE 41st Street to the south and the unimproved 38th Avenue NE right of way to the west. The site is in the N½ of the NW¼ of Section 15, Township 25 North, Range 4 East, W.M. (Figures 3 and 4).

For the purposes of this assessment, the area of potential impacts to cultural resources is considered to be the Fort Lawton USARC and Talaris sites as described above and shown in Figures 1 – 8. This area is anticipated to include all proposed redevelopment as described below and in Chapter 2 of the EIS.

Alternative 1 – Mixed Income Affordable Housing and Public Park Uses Onsite (Applicant's Preferred Alternative)

Under this alternative, development would feature a mix of affordable housing on the Fort Lawton site, including affordable rental and ownership and formerly homeless housing (Figure 5). A portion of the site would be rezoned to low rise residential zoning. Public park uses would also be created, including active park facilities, preserved existing natural areas and conversion of an existing structure to a park maintenance facility. A total of approximately 202,291 square feet (sq. ft.) of residential uses (238 units), 21.6 acres of parks and recreation facilities and 266 parking spaces would be provided on the Fort Lawton site. All the buildings on the Fort Lawton site, except OMS - Building 245, would be demolished and removed. OMS - Building 245 would be preserved as a maintenance facility for Seattle Parks and Recreation (SPR).

Site grading for the residential and parks and recreation uses and associated infrastructure at the Fort Lawton site would occur during initial site preparation and during all subsequent phases of site redevelopment. As much as possible, buildings, fields and infrastructure would be designed to conform to the existing site topography and minimal grading would occur. Existing wooded areas in the north and south parts of the site would be preserved in their natural condition. A large passive park would be provided in the north part of the site and a small passive park would be created in the central site area, amongst the townhouses and row houses. Two unlit, natural-turf multi-purpose fields would be provided in the central portion of the site, to the south of the housing and parking. Up to 4.7 acres of forest land owned by the U.S. Army in the west portion of the site would be dedicated to Discovery Park.

Alternative 1 would include four building types: senior supportive housing, affordable rental housing, affordable homeownership rowhouses, and affordable homeownership townhouses. This alternative would require new water, sewer, stormwater, electrical and solid waste service for development. The primary access point to the site would continue to be from the south via the intersection of Texas Way W and W Government Way. Access would also continue to be available from the north via the intersection of Texas Way W and 40th Avenue W. Other new residential streets would be developed onsite to serve development. Sidewalks and trails would be located throughout the site to provide opportunities for non-motorized circulation.

Alternative 2 – Market Rate Housing Onsite; Affordable and Homeless Housing Offsite

Under Alternative 2, development of market rate single family housing under current zoning is assumed on the Fort Lawton site, and construction of affordable and formerly homeless housing is assumed on the Talaris site (Figures 6 and 7). Alternative 2 would include 316,400 sq. ft. of residential uses (113 units) and 254 parking spaces on the Fort Lawton site, and approximately 256,551 sq. ft. of residential uses (up to 238 units), approximately 30,621 sq. ft. of community facilities and 295 parking spaces on the Talaris site. All the existing buildings on the Fort Lawton site would be demolished and removed under Alternative 2 to construct the market rate housing. It is assumed that all the existing buildings on the Talaris site would be retained and reused for the affordable and formerly homeless housing and community facilities, and that new residential buildings would be constructed as well.

The Talaris site has been designated as an historic landmark by City of Seattle. Under Alternative 2, much of the existing landscaping would be retained with the development of the homeless and affordable housing on this site. Any modifications to the existing landscaping would adhere to the requirements of the site's historic landmark designation.

Residential buildings and associated infrastructure would be designed to conform to the existing site topography on the Fort Lawton site; minimal grading would occur. Minimal grading is also anticipated for the residential uses and associated infrastructure at the Talaris site. The project would not provide any active or passive public parks. Up to 4.7 acres of forested land in the west portion of the site that borders Discovery Park could be: retained by the U.S. Army and used as open space for the Fort Lawton Army Reserve Complex (FLARC) Veterans Administration (VA) offices; purchased by the developer of the private homes and used as private open space for the development; or purchased by the City for future public use.

Vehicular access through the Fort Lawton site would be provided via Texas Way W and other public streets. Texas Way W would likely terminate in a cul-de-sac. The primary access point to the site would continue to be from the south via the intersection at W Government Way. Access would also be available from the north via a new intersection off W Lawton Street and from the east via three new access points along 36th Avenue West. Access to the Talaris site would continue as under existing conditions.

All the housing on the Fort Lawton site under Alternative 2 would be single family detached homes. Some of the affordable and formerly homeless housing on the Talaris site would occupy existing, renovated buildings, while other of the housing would be in newly constructed buildings. The community facilities would occupy existing, renovated buildings on the Talaris site. All the existing building exteriors on the Talaris site have been designated as an historic landmark by City of Seattle. As such, any modifications to the existing buildings would adhere to the requirements of the buildings' historic landmark designation. The design of new housing and community services on the Talaris site would be similar to the building design under Alternative 1 and would blend with the existing historic architecture onsite. This alternative would require water, sewer, stormwater, electrical and solid waste service for housing uses at the Fort Lawton site and housing and community facilities at the Talaris site.

Alternative 3 – Public Park Onsite; Affordable and Homeless Housing Offsite

Under Alternative 3, the entire Fort Lawton site would be developed as a public park; construction of affordable and formerly homeless housing would occur at the Talaris site (Figures 7 and 8). Alternative 3 would include approximately 29.0 acres of park and recreation uses and 90 parking spaces on the Fort Lawton site, and approximately 256,551 sq. ft. of residential uses (up to 238 units), 30,621 sq. ft. of community facilities and 295 parking spaces on the Talaris site.

No housing would be developed on the Fort Lawton site under Alternative 3. As with Alternative 1, all the existing buildings on the Fort Lawton site would be demolished and removed except OMS - Building 245. OMS - Building 245 would be preserved and used as a parks maintenance facility by SPR. Site grading would occur during initial site preparation and during all subsequent phases of site redevelopment. Park and recreation uses and associated infrastructure

on the Fort Lawton site would be designed to conform to the existing site topography; minimal grading would occur. A total of 17.0 acres of the site would be provided for passive recreation activities. A total of 7.6 acres of the site would be developed as active open space areas. Three unlit, natural-turf multi-purpose fields would be provided. Like Alternative 1, up to 4.7 acres of forest land owned by the U.S. Army in the west portion of the site would be dedicated to Discovery Park.

The primary access point to the Fort Lawton site would continue to be from the south via the intersection of Texas Way W and W Government Way. Access would also continue to be available from the north via the intersection of Texas Way W and 40th Avenue W. Sidewalks and trails would be located throughout the site to provide opportunities for non-motorized circulation. Texas Way W would feature sidewalks on both sides of the roadway. No direct sidewalk/trail connections would be provided to the Magnolia neighborhood to the east or Discovery Park to the west. This alternative would require water, sewer, stormwater, electrical and solid waste service for park and recreation uses at the Fort Lawton site.

Development of the Talaris site would be the same as under Alternative 2, providing up to 238 affordable and formerly homeless housing units, and community services.

Alternative 4 – No Action Alternative

Under the No Action Alternative, the Fort Lawton site would remain in its existing vacant condition. The property would not be conveyed by the U.S. Army to the City of Seattle per the BRAC process. The City would terminate its lease of the property and the Army would resume maintenance of the site and facilities. Buildings and infrastructure would likely continue to deteriorate. The site could be conveyed to the City or conveyed or sold to another entity in the future, and could be developed in accordance with the uses allowed by the site's current SR 7200 zoning.

Affected Environment

Determining the potential for the project to contain cultural resources was largely based upon review and analysis in September – October 2017 of previously collected environmental and cultural information for the project area. Environmental and cultural context information for this project is derived from relevant published reports, articles, and books (e.g., Larson and Lewarch 1995; Suttles and Lane 1990); *Archaeology of King County, Washington: A Context Statement for Native American Archaeological Resources* (Kopperl et al. 2016); historical maps and documents (e.g., USSG 1855, 1856); geological and soils surveys (e.g., Booth et al. 2005, 2009; WA DNR 2017); ethnographic accounts (e.g., Smith 1940, 1941; Waterman ca. 1920, 2001); and archaeological reports (e.g., Shantry 2014; Wilke and James 1984; Wilson et al. 2014) in the local area. The following discussion of project area geology, archaeology, history, and ethnography incorporates context information from CRC's prior work in the Lake Washington watershed (e.g., Kassa 2016, 2017), the Seattle Landmark nomination prepared for Talaris (Friends of Battelle/Talaris 2013), and a cultural resources study completed as a part of an environmental site assessment at Fort Lawton USARC (Groesbeck 2011) by reference.

Environmental Context

The landscape of northwest Washington is a product of crustal deformation initiated by the Cascadia subduction zone; successive glacial scouring and deposition most recently during the Pleistocene; and landslides, erosion and deposition, and human activity during the Holocene (Troost and Booth 2008). The project is within the Willamette-Puget Lowland physiographic province characterized by the wide "trough" between the Coast and Cascade Ranges formed during the advance and retreat of Pleistocene epoch glaciers (Franklin and Dyrness 1973; McKee 1972). During the Late Pleistocene or last glacial period (110,000 to 12,000 years BP), the Cordilleran ice sheet covered much of the American northwest and scoured the landscape during advance and retreat episodes initiated by localized climate fluctuations. The most recent glaciation was the Vashon Stade of the Fraser glaciation during which the Puget Lobe of the Cordilleran ice sheet entered northwest Washington around 17,000 years BP (Thorson 1980). This final glacial advance episode scoured the landscape producing north-trending ridges, extensive drift uplands, moraine features, topographic lows, and deposited glacial till prior to its recession.

The Puget Lobe reached the vicinity of present-day Seattle by about 14,500 years BP achieving its maximum extent near Olympia by 14,000 years BP (Booth et al. 2003). The onset of climatic warming caused the ice sheets to retreat to the north and began the transition into the Holocene. The Puget Lobe retreated past Seattle by roughly 13,600 years BP (Booth et al. 2003). As the glacier receded during this more temperate period, meltwater became impounded behind the ice forming a series of proglacial lakes that eventually merged into Lake Russell, which extended roughly from the southern margin of present-day Whidbey Island to Olympia impounding low lying sections of the Puget Sound and adjacent river valleys (Bretz 1913; Waitt and Thorson 1983). Glacial Lake Russell merged with Lake Bretz before draining via the Strait of Juan de Fuca (Minard and Booth 1988; Thorson 1981). This lake also extended approximately 160 feet above modern sea level (Bretz 1913:123). Marine backwater replaced the draining glacial meltwaters in surficial depressions, which in turn became freshwater lakes once isolated from the marine waters. As glacial meltwaters drained, sheets of outwash were deposited and channels were carved into the local landscape. Salmon Bay, located northeast of the project, is one of these glacial outwash channel features (Galster and Laprade 1991; Porter and Swanson 1998).

While sedimentation was widespread and voluminous during the Pleistocene, deposition during the Holocene has been more restricted, occurring in river valleys and at the base of steep slopes (Booth et al. 2003). Geomorphic processes such as isostatic rebound, global sea level rise, tidal movements, and a large earthquake 1,100 years ago originating from the Seattle fault zone (located south of the project) causing localized subsidence north of the fault (Bucknam et al. 1992) are also factors that have affected the geography of the Puget Sound region to varying degrees during the Holocene (Booth et al. 2003; Thorson 1989).

As the climate stabilized during the Holocene, vegetation returned to the landscape and the climate warmed considerably to contemporary ranges. The project is within the *Tsuga heterophylla* (Western Hemlock) vegetation zone, the most extensive in western Washington. This zone has a wet, mild, maritime climate characterized primarily by Douglas fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), and western red cedar (*Thuja plicata*) with an

understory of sword fern (*Polystichum muritum*), bracken fern (*Pteridium aquilinum*), Oregon grape (*Mahonia aquifolium*), and vine maple (*Acer circinatum*).

Historically, the landscape of Fort Lawton consisted of a forested high terrace and slopes that descended to the north towards the western end of Salmon Bay. Contemporary elevation ranges from 75 to 210 feet above sea level (King County 2017). Steep slopes are present along the north edge of the site. Surface geology mapped in this location consists of Vashon stade (Pleistocene) advance outwash (Booth et al. 2005). This geologic unit consists of well-sorted sand and gravel deposited by streams issuing from the advancing ice sheet (Booth et al. 2005).

Talaris is on a former wetland and stream (Yesler Creek) within .15 mile north of the present-day Union Bay shoreline on Lake Washington. Most of the site is developed as a park-like setting with ornamental landscaping and a manmade pond. Contemporary elevation ranges from approximately 20 to 60 feet above sea level (King County 2017). Surface geology mapped in this location is Holocene peat (Qp) in the central and southwestern parts of the property; Vashon stade (Pleistocene) recessional outwash (Qvr) in the northwest, north, and east; and a smaller area of Pleistocene ice-contact deposits (Qi) in the south and east (Booth et al. 2009). Holocene peat consists of accumulations of wood and other plant debris forming layers that are greater than about 1 meter in thickness. In northeast Seattle, these deposits are thickest in the floors of recessional outwash channels (such as in the Talaris location) and where lowering of Lake Washington has exposed extensive lake-floor deposits (as is the case just south of the project). The recessional outwash deposits consist of stratified sand, moderately sorted to well sorted, with some silty sand, silt, and gravel that were deposited in broad outwash channels that carried south-draining glacial metlwater during ice retreat away from the ice margin. The ice-contact deposits are similar in texture to the recessional outwash but are typically less well sorted and have a rich silt matrix (Booth et al. 2009).

Archaeological Context

Thousands of years of human occupation of the Puget Sound have been summarized in a number of archaeological, ethnographic, and historical investigations over the past several decades that provide a regional context for evaluating the project (e.g., Greengo 1983; Kopperl et al. 2010; Larson and Lewarch 1995; Morgan 1999; Nelson 1990). Archaeological evidence suggests the presence of nomadic hunter-gatherers not long after glaciers retreated and catastrophic meltwaters subsided after which landforms stabilized during the late Pleistocene to early Holocene. Consequently, evidence of early human occupation in once glaciated areas is found atop intact glacial sediments, which provide a stratigraphic lower limit for human occupation in these areas. Following deglaciation, subsequent changes to landforms, climate, and vegetation influenced the available resources and, consequently, the spatial distribution of human activities. Similar to elsewhere, human land use was generally structured around the value of natural resources available in local environments including fresh water, terrestrial and marine food resources, forests, and suitable terrain.

Kopperl et al. (2016) developed an archaeological chronologic sequence for King County based on their review of previous cultural history, selectionist, and evolutionary ecological interpretations of western Washington from which they identified a general chronological framework demarcated by changes in the geological, paleobotanical, and archaeological records.

Based on their research, they identify five Analytic Periods (AP) that are used to establish an archaeological sensitivity model for King County (discussed in section "3.0 Archaeological Expectations"). Kopperl et al. (2016:10-101) also identified an archaeological resource classification that is first defined by activity association parsed into task intensity then divided into 11 site types. According to their research, based on available data, these site types are represented variably throughout the Analytic Periods and demonstrate an increase in diversity and number of site types over time with an appearance of residential activity, multi-task site types such as villages and base camps in later periods in comparison to the earlier record comprised of more limited-task site types such as specific-resource procurement/processing sites and specific-resource field camps, in addition to a representation of certain multi-task sites such as multiple-resource field camps. The following provides an overview of the chronological sequence defined for King County (Kopperl et al. 2016:95):

1. Analytic Period 1 (14,000 cal BP and 12,000 cal BP) was a period of relative postglacial environmental stability in Western Washington. During this period, hunter-gatherers began to colonize Western Washington subsequent to the retreat of the Cordilleran Ice Sheet. This period is demarcated by regional climate and vegetation patterns, and estimated arrival of the first hunter-gatherers into the Western Washington region.
2. Analytic Period 2 (12,000 cal BP and 8000 cal BP) is characterized by increasingly sophisticated land use strategies adapted to local environments and the associated shifts of those strategies in regard to regional climate and vegetation patterns.
3. Analytic Period 3 (8000 cal BP and 5000 cal BP) is defined by a shift from a warm, dry climate to a cool, moist climate. During this period, archaeologists have argued that hunter-gatherer subsistence and technology was reorganized in response to the environmental change within this analytic time period.
4. Analytic Period 4 (5000 cal BP and 2500 cal BP) is defined by the appearance of shell middens in the archaeological record of Puget Sound, and the development of old growth Douglas- fir and western hemlock forests within the Puget Lowland. During this period, the majority of the contemporary Duwamish River– Green River Valley had been filled with alluvial sediments. Archaeologists generally recognize shifts in hunter-gatherer economic and technological organization during this period.
5. Analytic Period 5 (2500 cal BP and the commencement of settlement in the area by Euro-Americans about 200 years ago) is defined by developments in hunter-gatherer economic and social patterns and concluding with initial Euro-American contact. The local archaeological record of Puget Sound demonstrates an increase in the number of shell midden sites after 2500 cal BP. The period is also marked by adaptations to localized environmental changes caused by the 1100 cal BP earthquake on the Seattle Fault in addition to probable changes in economic and social organization as a result of Euro-American contact.

Ethnographic Context

The project is located within the traditional territory of the Duwamish a southern South Coast Salish people who spoke Southern Lushootseed; historically, members of Suquamish and Muckleshoot Tribes also utilized this vicinity (Suttles and Lane 1990; Waterman 2001). Major Duwamish winter villages were formerly located on the Cedar, Duwamish, Sammamish, and Black Rivers, Lake Sammamish, Lake Washington, Lake Union, Elliott Bay, and Salmon Bay (Harrington ca. 1909; Smith 1941:207; Waterman ca. 1920, 1922). Each portion of the Duwamish drainage had a name and an associated named community (Miller and Blukis Onat

2004:35). Near Fort Lawton, the north shore of Salmon Bay was home to a Duwamish band known as the Shilsholamish or Shul-shale (Waterman ca. 1920, 1922). The Talaris area was in the homeland of the Lakes Duwamish, also called Tsa-bah-bobs or xatcoabc (Miller and Blukis Onat 2004:35). Precontact Suquamish settlements were often located on major waterways, and heads of bays or inlets. The Muckleshoot Indian Tribe includes the descendants of an amalgam of tribes that lived in the Green River and White River valleys, including the Skopamish, Smulkamish, Stkamish, Yilalkoamish, and Twakwamish (Suttles and Lane 1990).

Ethnohistoric economies were structured based on seasonally available resources, which translated to seasonal occupation and logistic mobility. Permanent villages were generally established along rivers during the winter, and temporary camps were used while traveling to obtain seasonal food sources during the warmer summer months. Local Indian people shared many broadly defined traditions with their Puget Sound neighbors, including subsistence emphasis on salmon and other fish, land game, and a wide variety of abundant vegetable foods as well as household and village communities linked by family and exchange relations (Suttles and Lane 1990).

As described by Larson and Lewarch (1995:1-13-14),

> The Shilsholamish lived in longhouses along the shore of Salmon Bay and according to Costello (1974:86 [1895]), formerly numbered in the thousands, but were reduced to around 500 due to the attacks on them by native raiders from British Columbia and Alaska. The Shilsholamish numbered a dozen families in 1853 probably as a result of disease Duwamish elders described three longhouses at Shilshole, including one that was used as a potlatch house (Duwamish et al. 1933:Exhibit W-2). The village at Salmon Bay was on or near waters rich in marine resources including salmon (Collins 1892) and a variety of shellfish. Wandrey (1975) describes the abundance of clams, mussels, oysters, crabs, and shrimp present in Salmon Bay and a typical historic native gathering…The Villagers at Salmon Bay had bountiful marine resources available to them immediately in front of their homes. Their strategic location between Lake Washington and Puget Sound would have been a good position to profit from trade between saltwater and upriver or lake groups. With mutually acceptable trade goods (Wilke and James 1984), Salmon Bay was a conduit between the saltwater Duwamish and Suquamish and the inland groups, such as the Snoqualmie, forming an east to west cultural division similar to saltwater/inland connections in the north and south (Smith 1941). Peripheral areas were probably known to them and utilized in the summer months by certain families who chose to seasonally gather near their winter villages. However, areas such as West Point may not have been defended as territory by the Shilsholamish because of the surplus of resources found in their Salmon Bay home.

Twentieth century ethnographers documented locations of villages and names for resource areas, water bodies, and other cultural or geographic landscape features from local informants (e.g., Snyder 1968; Waterman ca. 1920, 2001). Knowledge of these features contributes to the broader archaeological context of the project location and the nature of the archaeology that may be encountered during this assessment. Near Fort Lawton, Salmon Bay was a thoroughfare for Puget Sound peoples headed east to Lake Washington via canoe and portage seeking resources and trade with neighboring tribes (Waterman 1922). In addition, inland peoples travelled by a trail to Salmon Bay in search of marine foodstuffs (Harrington ca. 1909). Harrington (ca. 1909)

provides the name *tselágotsid* for an inlet that occupied southern Interbay, from which canoes could be portaged to Salmon Bay. Waterman (2001:54-56) identified six named places around Salmon Bay between Puget Sound and Lake Union:

- *Tcɛ'dkedäd*, translated as "lying curled on a pillow," references a small curved promontory in Ballard near the entrance to Salmon Bay. The name of this promontory references the shape of the sand spit, which is curled in. This location was popular for digging clams.
- *C1lco'lutsid*, translated as "mouth of *cilco'l,*" references Salmon Bay. This bay was also referred to as Shul-shale, presumably for the tribe that lived here.
- *C1lco'l*, translated as threading a bead or something" references the way this narrow estuary invades the shoreline and is the location of a Duwamish village site. Indian peoples used this estuary as a transportation route east to Lake Washington. The *Cilcol-a'bc* tribe lived at the northern shore of Salmon Bay in present day Ballard. At the time Euro-Americans arrived, the headman of the settlement was Shilshole Curly, while the last person to live at this settlement was Indian Charley or *Xwe'Ltct1d*.
- *B1t^{l}da'kt*, translated as "a kind of supernatural power," references a very small creek that entered the north side of Salmon Bay in proximity to the Fremont Bridge. The power referenced in this name gave an individual the ability to enter the underworld to regain a guardian spirit. At this creek, shamans held dances.
- *Qw^{3}ûla'stab*, translated as "a small bush with white flowers and black berries," references a small creek, different than the aforementioned, that enters the same inlet.
- *Hwiwa'iq^{u}*, translated as "large, having lots of water," references a creek that drained into the south shore of Salmon Bay through a gully from the neighborhood of Fort Lawton.

There are two ethnographic place names along the north shore of Union Bay near Talaris:

- *Sluwi'L*, translated as "perforation for a canoe," and described as "the marsh laying between Laurel Point and buildings of the UW… The creek, which enters the bay through this swamp, flows out of Green lake through a conduit into Ravenna Park. A large aboriginal fish trap made of piles stood in this bay" (Waterman 2001:77); and
- *A'did*, translated as "dear me," for a small cove on the west side of Laurel Point that was formerly on the property of Joe Somers and set aside as a camping place (Waterman 2001:77). According to Thrush (2007:251-252), Native Americans gathered here to play the *slahal* bone game.

Union Bay was also along the canoe and portage route connecting Puget Sound to Lake Washington (Waterman 1922). These place names indicate a familiarity with the landscape surrounding Talaris.

Historic Context

Euro-American exploration of the Puget Sound began in 1792 with Captain Vancouver, followed by the Wilkes Expedition in 1841. Continued settlement of the Oregon Territory, and later the Washington Territory, led to the federal government's decision to enact the Oregon Donation Land Act of 1850. This act was largely responsible for enticing settlers to the area as well as

rewarding those early settlers by providing free land. In 1851, the first Euro-American settlers arrived on Alki Point and established a temporary settlement (Wilma 2001). They later moved across Elliott Bay and established the settlement of Seattle, honoring Indian Chief Sealth of the Duwamish people. Early settlers explored the surrounding landscape and many staked claims under the Oregon Donation Land Act. The new town's principal economic support was Henry Yesler's lumber mill at the foot of Mill Street (now Yesler Way), completed in 1853 (Wickwire 2001:9). Washington was established as a territory in the same year, which increased people's interest in settling the Puget Sound region. Euro-American settlement activity during this period focused on easily accessed areas such as shorelines and river valleys.

Early Euro-American homesteaders and commercial enterprises significantly impacted Native American lifeways on Puget Sound by the middle of the nineteenth century. In 1855, following the signing of the Point Elliot Treaty and others, area tribes were forced to abandon many of their Puget Sound villages and relocate to reservations. The treaty dissolved Indian title to their traditional and accustomed lands and by 1855-1856 the federal government used military force to contain Indian people dissatisfied with the poor quality of reservation lands. Individuals considered to belong to the Suquamish Tribe were relocated to the Port Madison Indian Reservation and the Muckleshoot Indian Tribes was relocated to the Muckleshoot Reservation. Some Duwamish people moved to these reservations; however, many remained on their ancestral lands. The Duwamish Tribe is not currently federally recognized but continues to seek federal recognition (Duwamish Tribe 2011).

The City of Seattle was incorporated in 1869. At this time the City's boundaries did not include the Fort Lawton or Talaris locations. The Magnolia area, containing Fort Lawton, was annexed in 1891 and the Laurelhurst area, containing Talaris, was annexed in 1910 (Wickwire 2001:10). Henry Yesler platted the Town of Yesler west of Talaris and established a mill about 1888 on Union Bay to the south (Caldbick 2013; USCGS 1910). The mill was operated by the Yesler Coal, Wood, and Lumber Company, and later, Yesler Logging Company (Gordon 2013:9, 12). The land surrounding the town, including the location of Talaris, was still densely forested, with areas of marshland, and the only community in the area was the rural mill town (Gordon 2013:9). Although the original mill burned in 1895, a mill operated in the same location until the 1920s (Boba 2016). Land at Fort Lawton was transferred from the City of Seattle to the United States in 1898 for the creation of the new military post on Magnolia Bluff. The initial construction of Fort Lawton took place to the west of the USARC, in what is now the Fort Lawton Historic District (Groesbeck 2011:28).

Significant developments near both locations involved in the project included construction of the Lake Washington Ship Canal and Ballard Locks, connecting Shilshole and Lake Washington via Lake Union. Construction began on the Lake Washington Ship Canal and Ballard Locks (later renamed the Hiram M. Chittenden Locks) in 1911 (CH2M Hill 2009). The Ballard Locks allowed ships to negotiate the difference in elevation between Puget Sound and the inland lakes. In 1916, workers breached a temporary dam at Portage Bay, allowing water to spill from Lake Washington into the Montlake Cut, and the Ship Canal was officially opened in 1917 (Miller and Blukis Onat 2004:Table 1). This completely changed the hydrology of the Lake Washington watershed. The lake's outflow shifted from its former Black River-White River-Duwamish River-Elliott Bay route to the Montlake Cut and Lake Washington Ship Canal, entering Puget

Sound at Shilshole Bay. The elevation of Lake Washington decreased from 29.8 feet to 21 feet MLLW (Chrzastowski 1983:3; Troost and Booth 2008:29). In proximity to the project, shoreline recession on Union Bay, which is rather shallow (USC&GS 1902; USGS 1909), drained wetlands and exposed the edge of the lakebed near the southern edge of Talaris.

Historical Land Use

Historical maps, land records, and aerial photographs were reviewed to characterize conditions within the project locations prior to construction of the extant facilities, beginning with the settlement period (BLM 2017; King County 2017; USCS 1867; USCGS, 1899, 1902; USGS 1909, 1949; USSG 1855, 1856). Further historical details for the Fort Lawton and Talaris locations are available from prior studies and documents (Friends of Battelle/Talaris 2013; Gordon 2013; Groesbeck 2011) as summarized below.

Fort Lawton

The General Land Office (GLO) surveyed the township containing the project in the 1850s. The GLO cadastral survey map shows homesteads on Salmon Bay and Shilshole Bay; no cultural features were mapped in or adjacent to the project (Figure 9). A stream, now known as Wolfe Creek, was present in a ravine east of Fort Lawton. It drained a marsh south-southeast of Fort Lawton and flowed to Salmon Bay. According to an online search of federal land records, a patent for land containing this location was issued to David N. Hyde in 1872 (Accession/Serial No. WAOAA 075497, Scrip, 160 total acres) (BLM 2017). Historical coast charts show the Fort Lawton location as in a forested area that slopes down to the north, east of the Army Post established in 1898 and north of the road that connected the post to a landing on Salmon Bay (Figures 10 and 11). These maps do not show any cultural features (e.g., trails or homesteads) in the project location.

A topographic map from 1909 shows terrain and natural features similar to those on the coast charts in the Fort Lawton location (Figure 12). A road extending northwest from 36th Avenue West and two structures had been built at Fort Lawton in the northwestern part of the property. Aerial imagery from 1936 shows a network of roads through the site and vegetation conditions ranging from dense tree cover in the northwest to fully cleared in the northeastern part, and thinned forest in the central and southern parts (Figure 13). A topographic map from 1949 shows most of the northern two thirds of Fort Lawton as occupied by structures (Figure 14).

Groesbeck (2011:28, 32) provides a history of development and military activity at Fort Lawton:

> The approximately 33-acre area that now comprises Fort Lawton USARC was part of the land transferred from the City of Seattle to the United States in 1898 for the creation of the new military post on Magnolia Bluff. The initial construction of the newly created Fort Lawton took place to the west of the USARC, in what is now the Fort Lawton Historic District. The earliest constructed feature near the site related to the land's military use was the rifle range. The range was built as early as 1906, just west of the AMSA and extending to the west toward Puget Sound (FMSM 2007:11). A July 1910 plan for improvements to Fort Lawton, created by John C. Olmsted, shows the rifle range, as well as the USARC site, identified as a possible site for vegetable gardens. The plan shows one building, a laundry, in the approximate location of Leisy Hall (USAR 88th RSC).

The Incinerator Building (Building 275), the first of the extant buildings on the site, was constructed in 1934 to destroy fallen horses. Photographs indicate that it was a two-story, wood frame building (FMSM 2007:11) (Plate 23).

The site remained, for the most part, undeveloped until World War II. Rows of barracks were constructed on the site during the war, covering the entire site (Plate 24). A large, Greek crossshaped building with a cross-shaped monitor roof was built at the center of the barracks, on the site of present-day Leisy Hall (see Plate 23). The barracks remained on the site at least through 1950, though they had been removed from the site by the time Harvey Hall was completed in 1958. The large building, of which no records were found to indicate its use, appeared in a historical aerial photograph from 1968. The building was most likely demolished when Leisy Hall was constructed in 1972.

Harvey Hall USARC (Building 215) and OMS (Building 211) were completed in 1958 to consolidate Army Reserve activities at Fort Lawton. The four-unit (800-man) facility was built as part of a large-scale building campaign by the Army Reserve. As part of the Fiscal Year 1957 appropriations, a large number of new training centers were approved for construction throughout the country. In Washington State, centers were approved to be built in Everett, Mount Vernon, Renton, Seattle, Spokane, and Tacoma. Harvey Hall USARC was approved as a four-unit (800-man) training center, its estimated construction cost at $492,000 (U.S. Senate Committee on Appropriations 1956:518). As originally constructed, Harvey Hall fell into the Sprawling Plan sub-type (Plate 25). …

In 1962 an OMS (Building 250) was built on the site of the current OMS (Building 245) to be used as a motor repair shop. The one-story building had a flat roof and three garage bays on its north elevation. A 1972 aerial photograph shows the building and surrounding MEP, which appears to have been unpaved at that date (Plate 26). Eighty-eighth RSC Army facility records indicate that the fuel building west of present-day AMSA 79 was constructed circa 1972.

Leisy Hall USARC and AMSA 79 were constructed in 1972. The new, 1,000-man center followed post-1964 building trends for facilities. Rather than standard designs, such as those created by Reisner & Urbahn, later buildings were designed as individual commissions. Although facilities during this period addressed the same functional needs as the earlier buildings, they did so by using a variety of architectural styles, from a continuation of Reisner & Urbahn's Contemporary-style buildings to brick-and-glass cube structures that resembled commercial office buildings (Adams and Kierstead 1997:48). …

The original 1972 building was T-shaped, including the north and west wings (see Plate 26). The main entrance to Leisy Hall was from the south elevation of the north wing. A flight of stairs led from the parking lot to the east to a paved pad in front of the entrance. The original building was expanded in 1976 with the addition of the east and south wings. The addition followed the style of the original building, the east wing mimicking the north and the south wing following the buildings adjoining it to the west (Plate 27). Prior to its tenancy by the 88th RSC at Leisy Hall, it was occupied by the 50th General Hospital Reserve Unit, a Dental Unit, and other units to support Fort Lawton (FMSM 2007:12).

In 1990 the flammable material storage building west of AMSA 79 was erected. Storage Building 214 was built in 1999, and the pump house north of Harvey Hall was built in connection with the FLARC building to the west of the site (built in 2000 as a USARC, transferred to the VA in 2009). Building 245, an OMS, was constructed in 1999 to replace the OMS built in 1962.

The Incinerator Building remained standing through 1997, but a 2003 aerial photograph of the site shows that it had been demolished by that date (U.S. Army 88th RSC var.). Only its concrete foundation remains alongside the Incinerator Stack.

Harvey Hall has undergone extensive renovations in the past decade. In 2003 the southwest addition was constructed as band practice rooms. Around the same time, the drill hall was renovated as an auditorium. As a result, the original roll-up vehicle door was removed and window glazing was replaced with metal panels. Early, undated changes to the building include the replacement of original windows and removal of the indoor firing range. The original entrance assembly has been replaced and the two-story entry enclosed to create additional second-story office space. Original accordion room partitions have been replaced with solid walls.

In 1968, the Army decided to transfer much of the base site to the City of Seattle, which subsequently became Discovery Park, the City's largest park (534 acres). After the land was transferred to the City, a 20-acre portion of the site was turned over to Native Americans to create the Daybreak Star Cultural Center.

An area of approximately 46 acres was retained by the U.S. Army and used as a Reserve Center. In 2000, the Army built the FLARC building at the Reserve Center, which was transferred to the VA in 2011. The Federal Government plans to retain the portion of the Army Reserve Center site that contains FLARC, together with supporting parking and the military cemetery. The remaining approximately 34 acres of the Army Reserve Center included in this analysis is currently closed and vacant and is in caretaker status by the Army.

Talaris

The General Land Office (GLO) surveyed the township containing the project in the 1850s. The GLO cadastral survey map shows an Indian trail between Union Bay on Lake Washington and Portage Bay on Lake Union; no cultural features were mapped in or adjacent to the project (Figure 15). According to an online search of federal land records, a patent for land containing this location was issued to William H. Surber in 1872 (Accession/Serial No. WAOAA 071879, Sale-Cash Entry, 164.91 total acres) (BLM 2017). Talaris is located at a historical stream confluence near the Union Bay shoreline. This location was in a largely forested area that sloped down towards the creek in the central and southwestern parts of the property, just north of Union Bay and west of the Town of Yesler (Figure 16). These maps do not show any cultural features (e.g., trails or homesteads) in the project location.

A topographic map from 1909 shows terrain and natural features similar to those on the coast chart in the Talaris location (Figure 17). No development is shown at Talaris on this map. Aerial imagery from 1936 shows a densely vegetated parcel with no structures; Yesler Creek appears to flow through a straightened channel (Figure 18). A topographic map from 1949 shows the Talaris location as undeveloped (Figure 19).

William Harvey Surber, who would later become Seattle's first Chief of Police in the 1860s, purchased the land containing Talaris from the U.S. government in 1861 (Gordon 2013:9). The Town of Yesler was platted to the west of Talaris, but the Talaris location was not developed at this time.

> Although the Town of Yesler was just across Union Bay from the city, getting there by land required following a trail through woods and marshland to cross the strip of land separating Lake Washington and Lake Union that would later be broken by the Montlake Cut. Another alternative route was to row across what was then a much larger Union Bay to Madison Park. The difficulty of the journey from the city to the Town of Yesler prevented early development, and isolated the area from the rapid expansion of the city. [Gordon 2013:10]

While other land in the neighborhood was platted and subdivided for residential, institutional, and commercial uses in the late nineteenth to early twentieth centuries, Surber's land remained largely intact (Gordon 2013:10).

> Surber's land consisted of much open space, but on it, he had also built a large home and planted orchards. Unfortunately the house burned down in the late 1920s after his death and was never replaced. The land, like many other early settlements, also served as a working farm, with chickens, horses, and cattle. Surber kept most of his land intact, but sold off the areas to the southwest to developers, including selling the western edge of his property as early as 1906. He did, however, make an effort to keep his land separate from the city that was beginning to grow around it, fencing in his acreage. Due in part to his efforts, the property remained undeveloped marshland until 1966-1967, when the Battelle Memorial Institute Seattle Research Center was constructed. … After his death, the property was purchased by Laurelhurst Golf Club Inc., which intended to build a golf course on the land. However, due to a money shortage, the plans were never realized. [Gordon 2013:10]

After failing to develop the site, its owners deeded the Talaris parcel to the University of Washington Board of Regents in 1949, and the property remained vacant until after the Board sold the property to the Battelle Memorial Institute (Gordon 2013:12). In the 1960s and 1970s, the Talaris site was developed as the Battelle Memorial Institute, which was modeled on the Institute for Advanced Studies at Princeton University (Gordon 2013:13). The Battelle campus was used for educational seminars, conferences and workshops and as an advanced study center.

Apartment buildings A, B, and C, and Seminar Building D were built during the first phase of construction, 1965-1967. Lodge Building E, Dining Building F, and Office Building G were built during phase two, 1970-1971. The designed landscape includes a water feature and pedestrian bridge, as well as planted trees, shrubs, and groundcover (Friends of Battelle/Talaris 2013:5-8, Figures 79-83). An equipment shed and memorial marker were added later; the memorial marker was removed before the landmark nomination was prepared (Friends of Battelle/Talaris 2013:8, Figures 79-83). The design architect for the Battelle Memorial Institute for both Phases One and Two was NBBJ, Inc. The firm of Richard Haag Associates was responsible for both the conceptual Master Plan and landscape design for the Battelle Memorial Institute (Friends of Battelle/Talaris 2013).

In 1997, Battelle sold the property to ERA Communities of Laurelhurst, and in 2000, ERA Communities sold the property to 4000 Property, LLC. The property was leased to the Talaris Research Institute, which used the facilities to study early childhood development. In 2012, Talaris Research was sold to a Maryland-based company. The property is currently used as a conference center, known as the Talaris Conference Center. In 2013, the buildings and landscaping at the Talaris site were designated as an historic landmark by City of Seattle (Gordon 2013).

Previously Recorded Sites and Surveys

Numerous cultural resources investigations have been conducted within approximately one mile from each of the project locations. These have included surveys, test excavations, data recovery, and monitoring for a variety of private and public developments. Cultural resources investigations within the project have been limited to an archaeological and historic resources survey west of Leisy Hall (Thompson et al. 1995) and the historic inventory conducted at Fort Lawton USARC (Groesbeck 2011), and the Seattle Landmark nomination at Talaris (Friends of Battelle/Talaris 2013). Prior cultural resources investigations have identified archaeological and historic sites within a distance of one mile from each location.

Fort Lawton – Archaeological Resources

Seven archaeological sites have been recorded within one mile from the Fort Lawton property (Table 1). One precontact archaeological site has been recorded on the Magnolia Bluff uplands near Fort Lawton. This is site 45KI1, for which minimal location is available. This scatter of precontact lithic material was identified in 1950 as a campsite containing stone tools in the center of Magnolia overlooking a historic marsh (University of Washington 1950). In 1958, there was an attempt to revisit the site, but no artifacts or deposits were observed. It was noted that the artifacts had been collected and were in the possession of local residents. This site location is mapped by DAHP as .28 mile southeast of the Fort Lawton property, but the margins of the historical marsh mapped by the GLO (see Figure 9) is more compatible with the location description given in 1950. Other precontact archaeological sites in the area are near the Magnolia Bluff and Salmon Bay shorelines. Historic-era archaeological sites associated with Fort Lawton have been identified west of the project. These include a historic building foundation (45KI1162) and a historic dump site used by the military (45KI24). Archaeological sites have not been recorded within the Fort Lawton project location.

Fort Lawton – Historic Resources

Review of DAHP's Historic Property Inventory shows that 75 historic resources have been identified within approximately 500 feet from Fort Lawton USARC. Most of these have been entered in the database based only on information from King County Assessor records. These resources are early to middle twentieth century single-family residences. Six historic resources within 500 feet from Fort Lawton USARC have been recorded in more detail (Table 2). These include the USARC buildings recorded within the current project. Each of these resources has been determined not eligible for the NRHP. They have not previously been evaluated for eligibility for nomination as Seattle Landmarks. The Fort Lawton Cemetery, located immediately west of the project, has been determined eligible for the NRHP based on its associations with the development of Fort Lawton and its uniqueness as the only "post" cemetery in King County

(Sundberg 2010). Additionally, one mid-twentieth century residence has been recorded east of the project on 36th Avenue West but has not been evaluated for potential historical significance.

Within one mile from the Fort Lawton site, several historic properties have been listed on the NRHP, Washington Heritage Register (WHR), Seattle Landmarks Register (SLR), or as a National Historic Landmark (Table 3). However, none of these would be physically altered by the project, nor are they located in close enough proximity to the project for indirect impacts (e.g., change to viewshed) to occur. The project alternatives do not involve any part of the Fort Lawton Historic District, located .25 mile west of Fort Lawton USARC, and would not affect the historic district.

Talaris – Archaeological Resources
Seven archaeological sites have also been recorded within one mile from Talaris (Table 4). The archaeological site recorded nearest to Talaris is the University Landfill (45KI1201), located .19 mile west of the project. This landfill was in use from 1926 to 1966 and has been recommended eligible for the National Register of Historic Places (NRHP) based on its high structural and depositional integrity and potential to provide significant historic information (Wilson et al. 2014). Precontact sites recorded near Talaris are limited to two precontact isolates near the northern extent of the University of Washington Arboretum. 45KI1006 is a red cryptocrystalline silicate (CCS) biface fragment and 45KI1007 is stemmed projectile point made from fine grained volcanic lithic material. Both of these artifacts were found in disturbed sediments and not in association with intact cultural deposits (Perkins 2010a, 2010b). They were, therefore, recommended not eligible for the NRHP. Archaeological sites have not been recorded within the Talaris project location.

Talaris – Historic Resources
Approximately 130 historic resources have been identified within approximately 500 feet from Talaris (DAHP 2017b). These have been entered in the database based only on information from King County Assessor records. These resources are also early to middle twentieth century single-family residences. One historic resource within the 500 foot radius has been recorded in more detail; this is the Battelle Research Institute / Talaris property itself (Table 5). This property has been determined eligible for the NRHP and has also been designated as a Seattle Landmark.

Within one mile from Talaris, several historic properties have been recorded with DAHP as listed on the NRHP or WHR (Table 6). However, none of these would be physically altered by the project except the Battelle Research Institute / Talaris property itself; the remainder of the listed properties are not located in close enough proximity to the project for indirect impacts (e.g., change to viewshed) to occur.

Potential for Previously Unrecorded Cultural Resources
The DAHP statewide predictive model uses environmental data about the locations of known archaeological sites to identify where previously unknown archaeological sites are more likely to be found. The model correlates locations of known archaeological to environmental data "to determine the probability that, under a particular set of environmental conditions, another location would be expected to contain an archaeological site" (Kauhi and Markert 2009:2-3). Environmental data categories included in the model are elevation, slope, aspect, distance to

water, geology, soils, and landforms. According to the model, the Talaris site is ranked "Survey Highly Advised: Very High Risk" and the Fort Lawton site is mostly ranked "Survey Highly Advised: High Risk" with small areas ranked "Survey Highly Advised: Very High Risk" and "Survey Advised: Moderate Risk" (DAHP 2017b). These probability estimates are generally supported by proximity to previously recorded archaeological sites.

An archaeological sensitivity model was recently developed as a part of an archaeological context statement for King County (Kopperl et al. 2016). This model conditions the archaeological sensitivity of particular area of the modern-day King County landscape on two axes, sensitivity and preservation, across five analytic time periods and overall in relation to recorded archaeological sites (Kopperl et al. 2016:173). This model identifies the Fort Lawton vicinity as having moderate sensitivity for Analytic Periods (AP) 1 (14,000–12,000 cal BP), 2 (12,000–8000 cal BP), and 3 (8000–5000 cal BP); low sensitivity for AP 4 (5000–2500 cal BP) and 5 (2500–200 cal BP); low sensitivity for archaeological sites overall; and that the Fort Lawton location is in a stable (neither erosional nor aggradational) landform setting (Kopperl et al. 2016:Figures 8-2 – 8-8). The Talaris area is modeled as having low sensitivity for AP1, moderate sensitivity for AP 2 and 3, high sensitivity for AP 4, moderate sensitivity for AP 5, moderate sensitivity for archaeological sites overall, and that the Talaris location is in a stable landform setting (Kopperl et al. 2016:Figures 8-2 – 8-8).

Archaeological expectations in the project are informed by the above predictive models as well as historical and modern land use, precontact and ethnographic settlement patterns, and geomorphology. The Fort Lawton location is considered to have a low potential to contain as-yet unknown archaeological sites due to the extent of prior ground disturbance in a non-depositional setting on a glacial landform. The Talaris location has also been previously altered by earthmoving activity but is considered to have moderate potential for as-yet unknown archaeological sites due to the presence of the historical Union Bay shoreline and Holocene peat deposits on the property. The types of precontact-era archaeological materials that may be present within the project area could include the remains of habitation sites, lithic scatters, or similar features representing a range of domestic, subsistence, and ceremonial activities. Historic period archaeological materials at Fort Lawton would most likely be related to military activities. Historic period archaeological materials at Talaris may be associated with homesteading or farming.

Field Investigations

CRC archaeologist Margaret Berger and historic architect Jim McNett conducted site visits in September and October 2017; notes and photographs are on file at CRC. This field reconnaissance was conducted with the goal of observing current conditions in the Fort Lawton and Talaris sites and identifying potential impacts to cultural resources from each of the project alternatives (Figures 20 – 34).

The purpose of the archaeological reconnaissance was to inspect any available surface sedimentary exposures for archaeological material and to determine whether any potentially undisturbed locations were present. The purpose of the historic built environment reconnaissance as to observe the buildings, landscaping, and neighborhood setting in their current condition, and

evaluate historic buildings at the Fort Lawton location for potential Seattle Landmark nomination.

Fort Lawton

Conditions observed at Fort Lawton observed are largely consistent with those described by Groesbeck (2011:12):

> The perimeters of the site are lined with trees, but its interior has sparse vegetation that includes a few trees and landscape features. The two densely vegetated areas are the strip of land between Texas Way West and the Military Cemetery and the northwest portion of the site that slopes downhill, north and west of Trail Blazer Field.
>
> Harvey Hall is farthest to the south, facing 36th Avenue West. The building is partially screened from the street by a line of deciduous trees, and a metal fence separates the property from the street. West of Harvey Hall is a MEP asphalt parking area, the OMS building (Building 211), and Building 214. Just north of Harvey Hall is the pump house.
>
> Leisy Hall is directly north of Harvey Hall, the two separated by a POV parking area. AMSA 79 is west of Leisy Hall, on the other side of Texas Way West. The AMSA, large MEP area, and Buildings 223 and 228 on the south and west edges of the area are all enclosed by a chain link fence. Additional POV parking areas are to the north, northeast, and east of Leisy Hall.
>
> The OMS building (Building 245) is north of Leisy Hall. The OMS and its MEP parking area are separated from the Leisy Hall parking areas by a steeply sloped hill and a chain link fence that encloses the entire area.
>
> The northwestern portion of the property consists of Trailblazer Field, an open grassy area with two sets of bleachers on its south end; the Incinerator Stack and concrete foundation of the incinerator house at the west end of the field; and overgrown areas of trees and undergrowth to the north and west of the field.

The bleachers have been removed from Trailblazer Field and the first-story windows of vacant buildings have been covered with plywood, but conditions appeared otherwise unchanged. Open spaces throughout the property appear graded and terraced, as evidenced by road cuts and large, fairly flat lawns separated by steep slopes. Large areas were also graded to support the parking areas that dominate the eastern portion of the property. Moderate to steep slopes form the northern edge of the property, and a moderately sloped wooded buffer separates most of the property from the Fort Lawton Cemetery. A break in the vegetation provides a view corridor between the cemetery and the southwestern corner of the property along Texas Way.

Talaris

At Talaris, conditions are unchanged from their description in the Landmark nomination:

> Entering the 18-acre former Battelle Memorial Institute site, visitors first experience a tree-dotted, publicly accessible green (measuring 296 ft x 30 ft) running across the southern site boundary along NE 41st Street. This is the highest part of the site and serves as a transition from the residential grid of Laurelhurst to the conference center's natural retreat setting. The site topography ranges a total of approximately 30 feet from lowest to highest point across the Battelle property.

> An overlook from the curving entry lane offers a first glimpse of the site's low point and focus—a mature landscape of green open meadows, trees, water features and the simple recessive architecture of the conference center buildings beyond. The entrance lane then winds down and west through tall Lombardi Poplars, rounding a wetlands to the east and winding north, approaching the center of the site and the vehicular drop-off and parking…
>
> The landscape's bowl-like shape is reinforced by prominent framing edges along the west and northwest that rise a total of 25 feet at the northwest corner. The landscape's varied topography is employed to important effect in reinforcing a sense of retreat for the visitor by limiting views from within the site in an urban setting out toward the surrounding residential setting and urban development. [Friends of Battelle/Talaris 2013:4-5]

Results

No aboveground evidence of archaeological sites was observed at Fort Lawton or Talaris. The Fort Lawton property is considered to have a very low potential for intact archaeological sites due to the extent of prior construction and associated site preparation (e.g., grading) on a landform without natural deposition since the Pleistocene. The Talaris property has also been previously altered by earthmoving activity but is considered to have moderate potential for as-yet unknown archaeological sites due to the presence of the historical Union Bay shoreline and Holocene peat deposits. Significant historic properties are present at Fort Lawton and Talaris.

Fort Lawton

Existing buildings and structures on the property are shown in Figure 35. Although the Army Reserve Center facilities at Fort Lawton were determined not eligible for the NRHP, they had not been evaluated against Seattle Landmark nomination criteria. Based on these criteria (see "Regulatory Framework" above), the entire USARC may be considered to meet Criteria A and C due to its association with the growth of the Army Reserve after World War II and its role in the history of the neighborhood, but it has poor integrity as a whole. Individually, most of the buildings on the property do not meet the above criteria due to lack of significant associations, design characteristics, or prominence, or not meeting the age threshold of 25 years. The exception is Harvey Hall (Table 7).

In addition to meeting Criteria A and C, Harvey Hall also meets Criterion D because it embodies an early and distinctive modern military design that was meant to insert the reserve army into the fabric of the community, and Criterion E because it was an early implementation on the west coast of a Reisner and Urbahn prototype design developed for the Army Reserve. In the case of Harvey Hall, the setting, materials and massing succeeded in doing what the Army and architects envisioned. The concept for reserve centers was developed during the Eisenhower administration and the noted architect, Max O. Urbahn (1912-1995), as partner in Reisner and Urbahn, was commissioned to develop a set of prototypical designs in collaboration with the U.S. Army Corps of Engineers. The designs of the centers were based on earlier projects designed by Skidmore Owings and Merrill for the National Guard. Reisner and Urbahn continued the modern design aesthetic in their buildings by using simple materials and building massing that clearly expressed the structure and utilitarian use of the building.

The Harvey Hall administrative building, auditorium, and the Organizational Maintenance Shop (OMS) (Building 211) were all constructed in 1958, very early in the implementation of the Defense Facilities Act of 1955. The original Harvey Hall buildings included the two-story north and south administration wings, the entry vestibule and the auditorium to the west. The original T-shaped building is an early example of the Reisner and Urbahn Sprawling Plan. The decision to place the two story building parallel to 36th Avenue West in the narrow southern section of the USARC complex makes Harvey Hall part of the neighborhood. Harvey Hall is a rare example of a Cold War USARC Military facility that was intended to be part of the local community. It was designed and built from Reisner and Urbahn drawings, and has retained a high level of integrity.

Talaris
Existing buildings and structures on the property are shown in Figure 36. The Talaris property has been designated a Seattle Landmark and has also been determined eligible for the NRHP. The buildings and landscaping (Table 8) are considered to have local and national significance. Created, designed, and built in an era of American optimism, the Battelle Center embodies mid-century northwest regional architecture and landscape. The architects, NBBJ, were an integral part of the Northwest Modernist movement centered at the University of Washington. Richard Haag, the landscape and planning designer, has a national reputation as a founder of northwest landscape architecture and the School of Landscape Architecture at the University of Washington. The mid-century design was built according to the original plan, and the landscape has matured as envisioned in the original concept. The ensemble of mid-century landscape and structures is unchanged and unrivalled in Seattle. The site and building exteriors have been identified as features of the Landmark to be preserved (Gordon 2013:26).

Significant Impacts
Because archaeological sites have not been identified within the project, no significant impacts to archaeological sites are anticipated. However, significant impacts to archaeological sites could occur if the project disturbs as-yet unknown archaeological sites.

Significant impacts to historic sites could be generated by demolition, removal, or other physical alterations to historic structures or cultural landscapes. This project, as currently proposed, would entail significant impacts to historic sites for each of the alternatives as discussed below.

Alternative 1 - Mixed Income Affordable Housing and Public Park Uses Onsite (Applicant's Preferred Alternative)

Fort Lawton – Historic Resources
Under Alternative 1, all of the buildings and structures at Fort Lawton USARC except OMS Building 245 would be removed. All of the historic buildings and structures would be removed. This includes Harvey Hall, which is recommended eligible for nomination as a Seattle Landmark. This alternative is not considered to have potential for indirect impacts to Fort Lawton Cemetery.

Fort Lawton – Archaeological Resources
This alternative is considered to have a low potential to impact as-yet unknown archaeological sites due to the extent of prior ground disturbance in a non-depositional setting on a glacial landform. Non-developed areas of the property are forested and sloped and would not have been suitable for occupation or other activities with potential to generate significant archaeological deposits. Ground disturbance under this alternative would be less than under Alternative 2 but more extensive than under Alternative 3. This alternative does not involve any disturbance within Fort Lawton Cemetery.

Talaris – Historic Resources
No impacts to historic sites would occur at the Talaris site under Alternative 1.

Talaris – Archaeological Resources
No impacts to archaeological sites would occur at the Talaris site under Alternative 1.

Alternative 2 – Market Rate Housing Onsite; Affordable and Homeless Housing Offsite

Fort Lawton – Historic Resources
Under Alternative 2, all of the buildings and structures at Fort Lawton USARC except OMS Building 245 would be removed. All of the historic buildings and structures would be removed. This includes Harvey Hall, which is recommended eligible for nomination as a Seattle Landmark. These direct impacts to historic resources are the same as under Alternative 1, but there would also be indirect impacts to the NRHP-eligible Fort Lawton Cemetery due to the construction of a road and housing in proximity to the eastern cemetery boundary, which would affect its integrity of setting through the introduction of new built environment elements.

Fort Lawton – Archaeological Resources
This alternative is considered to have a low potential to impact as-yet unknown archaeological sites due to the extent of prior ground disturbance in a non-depositional setting on a glacial landform. Non-developed areas of the property are forested and sloped and would not have been suitable for occupation or other activities with potential to generate significant archaeological deposits. This alternative would involve more ground disturbance than under Alternatives 1 and 3. This alternative does not involve any disturbance within Fort Lawton Cemetery.

Talaris – Historic Resources
Development at Talaris under Alternative 2 would involve impacts to this Seattle Landmark designated and NRHP-eligible property. Although all of the site's major buildings would be retained and most of the landscaping would be retained, impacts would be generated by the currently proposed alterations. Specifically, impacts would occur due to alterations to the designed landscape and any interior alterations visible from the outside. The massing of units in large groups along NE 41st Street and deeper within the property, as shown in the preliminary site plan, is inconsistent with the siting and design of the existing buildings and surrounding neighborhood. Removal of vegetation planted as a part of the landscape design would also be considered an impact.

Talaris – Archaeological Resources
The Talaris location has also been previously altered by earthmoving activity but is considered to have moderate potential for as-yet unknown archaeological sites due to the presence of the historical Union Bay shoreline and Holocene peat deposits on the property. The stream confluence and shoreline settings would have been attractive for settlement and subsistence activities with potential to generate significant archaeological deposits. Archaeological sites buried beneath the extent of prior filling and other earthmoving could be impacted by construction.

Alternative 3 – Public Park Onsite; Affordable and Homeless Housing Offsite

Fort Lawton – Historic Resources
Under Alternative 3, all of the buildings and structures at Fort Lawton USARC except OMS Building 245 would be removed. All of the historic buildings and structures would be removed. This includes Harvey Hall, which is recommended eligible for nomination as a Seattle Landmark. These direct impacts to historic resources are the same as under Alternative 1, but the indirect impacts to the Fort Lawton Cemetery would be less than under Alternative 2 because new construction would not occur adjacent to the cemetery. A forested buffer would be retained east of the cemetery, and an active park area (e.g., sports field) would be north of Texas Way, to the north of the cemetery.

Fort Lawton – Archaeological Resources
This alternative is considered to have a low potential to impact as-yet unknown archaeological sites due to the extent of prior ground disturbance in a non-depositional setting on a glacial landform. Non-developed areas of the property are forested and sloped and would not have been suitable for occupation or other activities with potential to generate significant archaeological deposits. Ground disturbance under this alternative would be less than under Alternatives 1 and 2. This alternative also does not involve any disturbance within Fort Lawton Cemetery.

Talaris – Historic Resources
Impacts to historic sites at Talaris under Alternative 3 are the same as under Alternative 2.

Talaris – Archaeological Resources
Potential impacts to archaeological sites at Talaris under Alternative 3 are the same as under Alternative 2.

Alternative 4 – No Action Alternative

Fort Lawton – Historic Resources
If the current project is not pursued, buildings at Fort Lawton would likely continue to deteriorate. The Army may choose to retain the property in caretaker status, or it could sell it to another party. Future development of the property by others would have the potential to impact the setting of the Fort Lawton Cemetery and would likely involve removing the existing USARC buildings.

Fort Lawton – Archaeological Resources
Assuming a similar scale of ground disturbance, potential impacts to as-yet unknown archaeological sites would be similar to under Alternative 2.

Talaris – Historic Resources
If this project is not pursued, the Talaris property may be sold to another party. Future uses and development of the property would be subject to the City's Certificate of Approval process because it has been designated a Seattle Landmark.

Talaris – Archaeological Resources
Assuming ground disturbance of a similar scale to the proposal, potential impacts to as-yet unknown archaeological sites would be similar to under Alternative 2 or 3.

Mitigation Measures
In order to minimize risk of impacting archaeological and historic sites, the following specific measures are recommended for this project:

Fort Lawton – Historic Resources
At Fort Lawton, proposed development under Alternatives 1, 2, and 3 involves impacts to historic buildings and structures. It is recommended that the structures to be removed be referred to the LPB for consideration, following the process described above (see "Regulatory Framework"). Recommendations regarding Landmark nomination eligibility of the buildings and structures on the property are summarized in Table 7. Requirements for mitigation of impacts to historic sites would be determined by the LPB. Possible mitigation measures for impacts to historic sites could include the completion of a Seattle Landmarks nomination for Harvey Hall or the completion of Level II Mitigation Documentation as defined by DAHP, either of which would include more detailed documentation of the structures' architecture and history, and supplemental interior and exterior photographs. Harvey Hall's building elements, due to a simple and flexible plan type and sound construction could be considered for repurposing as an alternative to demolition. Mitigation of potential impacts to Fort Lawton Cemetery could include retaining an undeveloped buffer around the cemetery to avoid affecting its integrity of setting through introduction of new built environment elements.

Fort Lawton – Archaeological Resources
Should any as-yet unknown potentially significant archaeological sites be encountered by the project and it is not possible to avoid them, significant impacts would be generated. Impacts could potentially be minimized through development and implementation of mitigation measures appropriate to the nature and extent of discovered sites. In the State of Washington any alteration to an archaeological site requires a permit from DAHP (RCW 27.53.060). Mitigation measures may include one or more of the following:

- Limiting the magnitude of the proposed work;
- Modifying proposed development through redesign or reorientation to minimize or avoid further impacts to resources; or
- Archaeological monitoring, testing, or data recovery excavations (DAHP 2010).

Measures that may be required by the City to mitigate adverse impacts to an archaeological site include, but are not limited to:

- Relocation of the project on the site;
- Providing markers, plaques, or recognition of discovery;
- Imposing a delay of as much as 90 days (or more than 90 days for extraordinary circumstances) to allow archaeological artifacts and information to be analyzed; or
- Excavation and recovery of artifacts (DON 2015).

Talaris – Historic Resources
If Alternative 2 or 3 is selected, proposed development at Talaris will need to be reviewed by the Landmarks Preservation Board (LPB). Changes will need to comply with the designating ordinance (No. 623) as well as a Controls and Incentives Agreement between the owner and the LPB. The landmark designation report dated November 12, 2013 identified "the site and the exteriors of the buildings" as "features of the Landmark to be preserved" (Gordon 2013:26). Negotiations regarding controls and incentives were initiated soon after designation of the property as a Landmark but after a series of extensions requested by the owner, no agreement appears to have been reached (LPB 2015).

The changes proposed under Alternatives 2 and 3 would require a Certificate of Approval from the Department of Neighborhoods (DON) Historic Preservation Program. It is anticipated that proposed changes would be required to meet the Secretary of the Interior's Standards for Rehabilitation and Secretary of the Interior's Standards with Guidelines for the Treatment of Cultural Landscapes; specific guidelines would be identified by LPB in the Controls and Incentives Agreement. Additional measures to offset or minimize impacts to the historic resources at Talaris could include consulting members of the original architectural and landscape design firms to inform design of proposed alterations; and the use of interpretive information that would convey the historical significance of the site could be used as public education tools and/or integrated into future planning and design efforts.

Talaris – Archaeological Resources
Due to the moderate potential for subsurface archaeological sites at Talaris, it is recommended that archaeological survey be conducted if Alternative 2 or 3 is selected. Should any as-yet unknown potentially significant archaeological sites be encountered by the project and it is not possible to avoid them, significant impacts would be generated. In the State of Washington any alteration to an archaeological site requires a permit from DAHP (RCW 27.53.060). Impacts could potentially be minimized through development and implementation of mitigation measures appropriate to the nature and extent of discovered sites. Measures that may be required by the City to mitigate adverse impacts to an archaeological site include, but are not limited to:

- Relocation of the project on the site;
- Providing markers, plaques, or recognition of discovery;
- Imposing a delay of as much as 90 days (or more than 90 days for extraordinary circumstances) to allow archaeological artifacts and information to be analyzed; or
- Excavation and recovery of artifacts (DON 2015).

Significant Unavoidable Adverse Impacts
No significant unavoidable adverse impacts to historic sites are anticipated to be generated by the proposal. By implementing the mitigation measures recommended above, it should be possible to prevent any significant unavoidable impacts to historic sites.

Should any potentially significant archaeological sites be discovered and it is not possible to avoid them, impacts would be generated. However, it is expected that these impacts could potentially be minimized through development and implementation of additional mitigation measures appropriate to the nature and extent of discovered sites. In the event that ground disturbing or other activities do result in the inadvertent discovery of archaeological deposits, work should be halted in the immediate area and contact made with DAHP. Work should be halted until such time as further investigation and appropriate consultation is concluded. In the unlikely event of the inadvertent discovery of human remains, work should be immediately halted in the area, the discovery covered and secured against further disturbance, and contact effected with law enforcement personnel, consistent with the provisions set forth in RCW 27.44.055 and RCW 68.60.055. Attachment B outlines protocols for inadvertent discoveries in detail.

Limitations of this Assessment

No cultural resources study can wholly eliminate uncertainty regarding the potential for prehistoric sites, historic properties or Traditional Cultural Properties (TCPs) to be associated with a project. The information presented in this report is based on professional opinions derived from our analysis and interpretation of available documents, records, literature, and information identified in this report, and on our field investigation and observations as described herein. Conclusions and recommendations presented apply to project conditions existing at the time of our study and those reasonably foreseeable. The data, conclusions, and interpretations in this report should not be construed as a warranty of subsurface conditions described in this report. They cannot necessarily apply to site changes of which CRC is not aware and has not had the opportunity to evaluate.

It should be recognized that this assessment was not intended to be a definitive investigation of potential cultural resources concerns within the project area. Within the limitations of scope, schedule and budget, our analyses, conclusions and recommendations were prepared in accordance with generally accepted cultural resources management principles and practice in this area at the time the report was prepared. We make no other warranty, either express or implied. These conditions and recommendations were based on our understanding of the project as described in this report and the site conditions as observed at the time of our site visit.

This report was prepared by CRC for the sole use of EA. Our conclusions and recommendations are intended exclusively for the purpose outlined herein and the project indicated. The scope of services performed in execution of this investigation may not be appropriate to satisfy the needs of other users, and any use or re-use of this document, including findings, conclusions, and/or recommendations, is at the sole risk of said user. If there is a substantial lapse of time between the submission of this report and the start of construction, or if conditions have changed due to project (re)design, or appear to be different from those described in this report, CRC should be notified so that we can review our report to determine the applicability of the conclusions and recommendations considering the changed conditions.

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Figures and Tables

Figure 1. Location of the Fort Lawton USARC portion of the project shown on the Shilshole Bay, WA USGS 7.5-Minute topographic quadrangle.

Figure 2. Aerial imagery marked with the Fort Lawton site (base map: King County 2017).

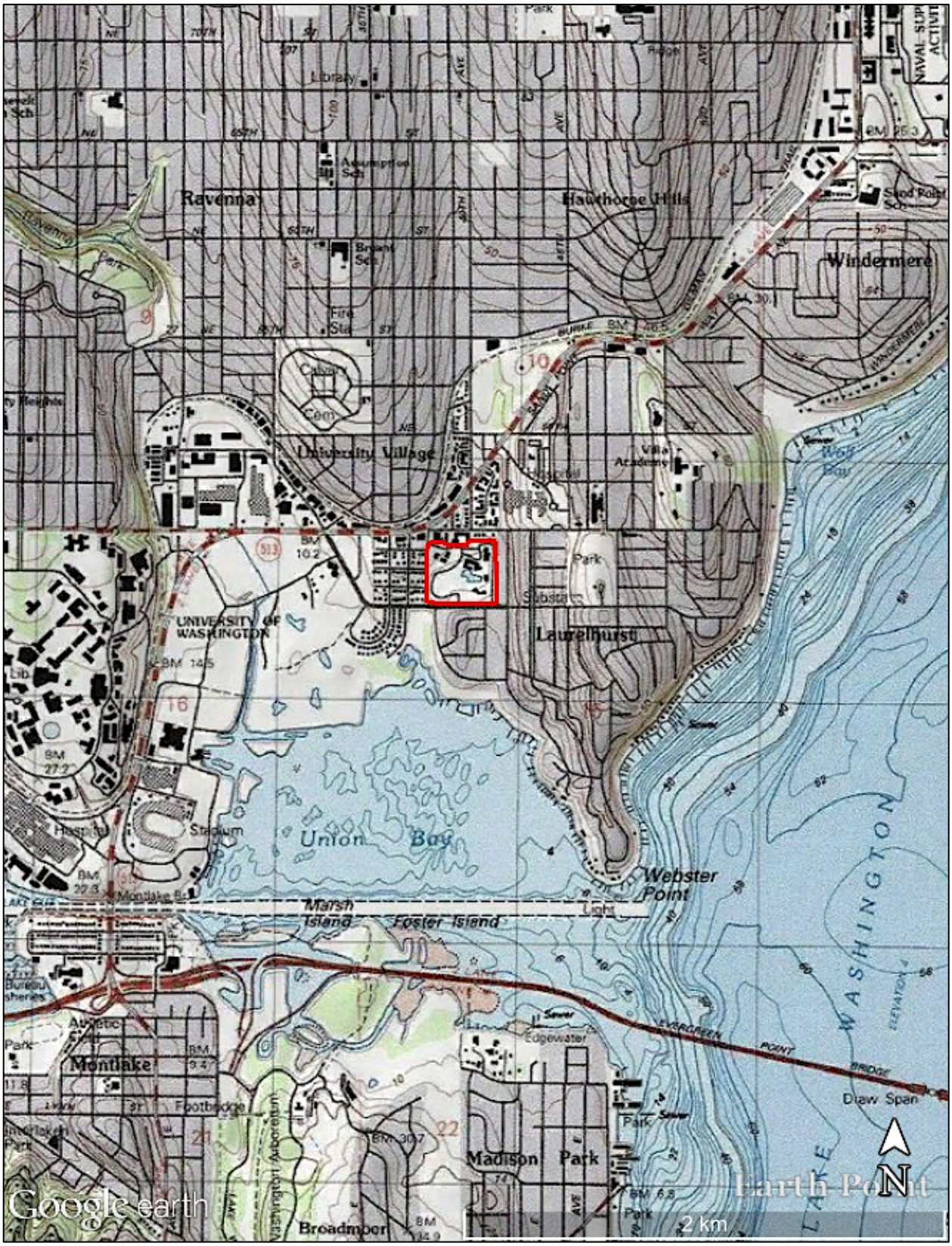

Figure 3. Location of the Talaris portion of the project shown on the Seattle North, WA USGS 7.5-Minute topographic quadrangle.

Figure 4. Aerial imagery marked with the Talaris site (base map: King County 2017).

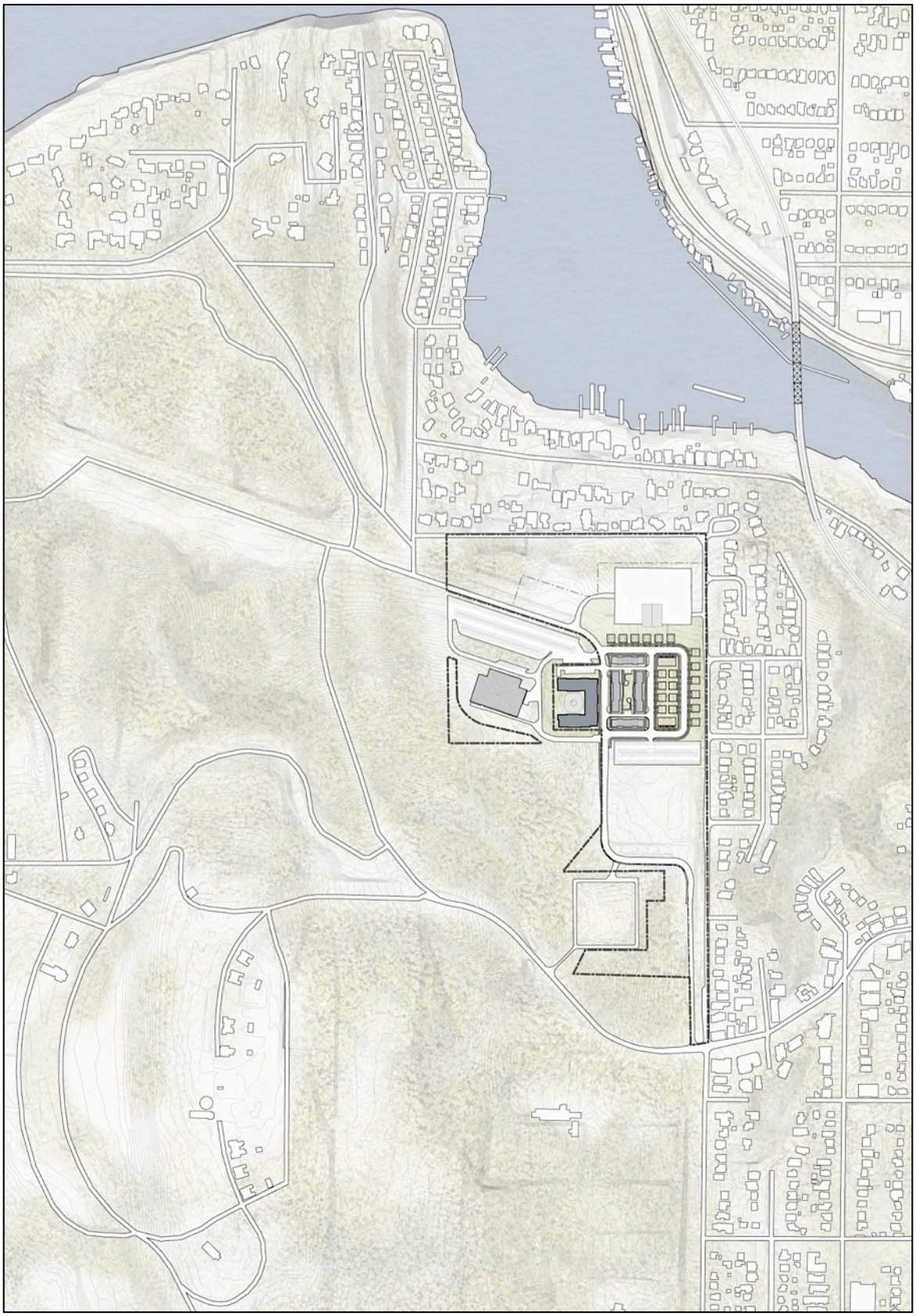

Figure 5. Preliminary site plan for Alternative 1 at Fort Lawton.

Figure 6. Preliminary site plan for Alternative 2 at Fort Lawton.

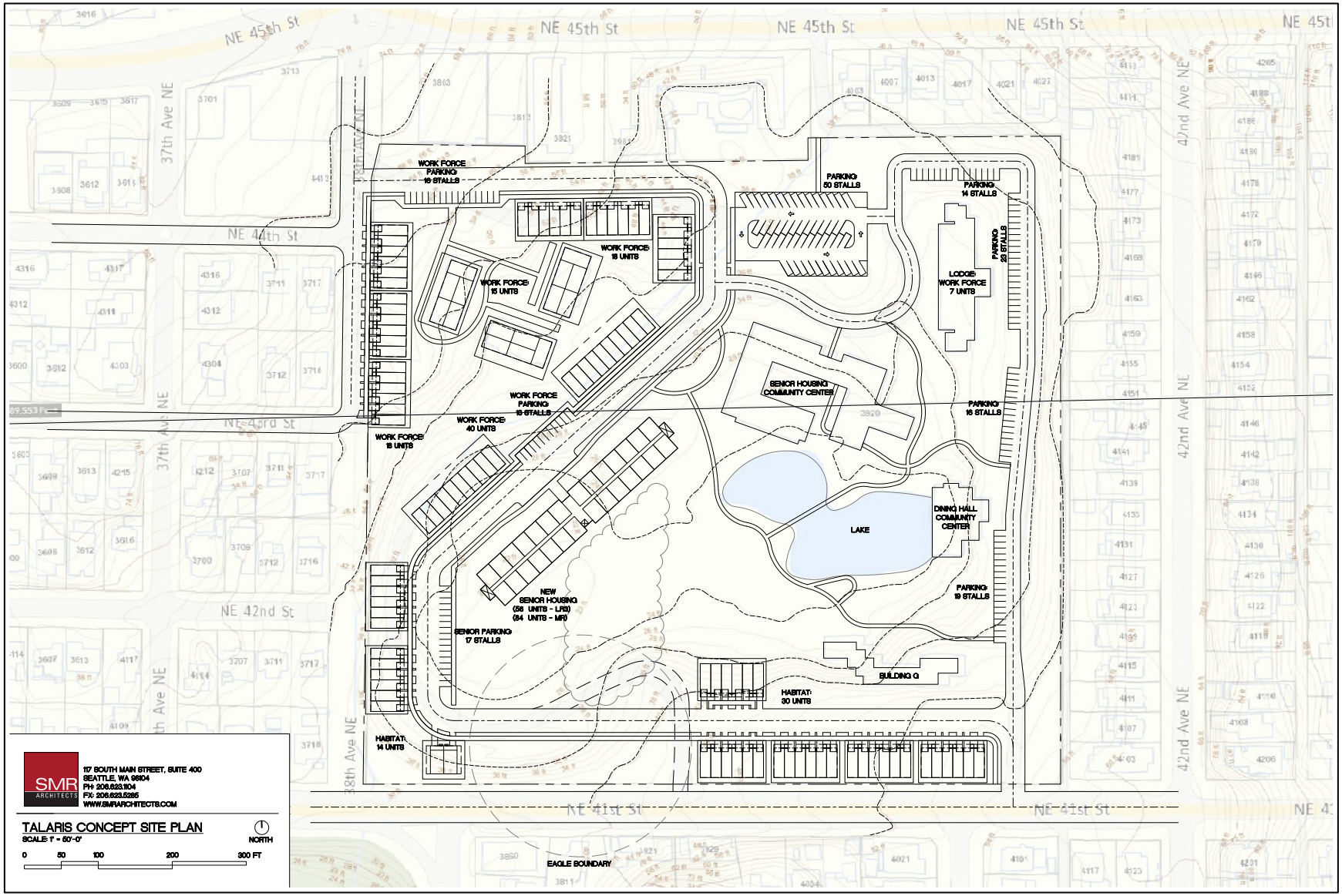

Figure 7. Preliminary site plan for Alternatives 2 & 3 at Talaris.

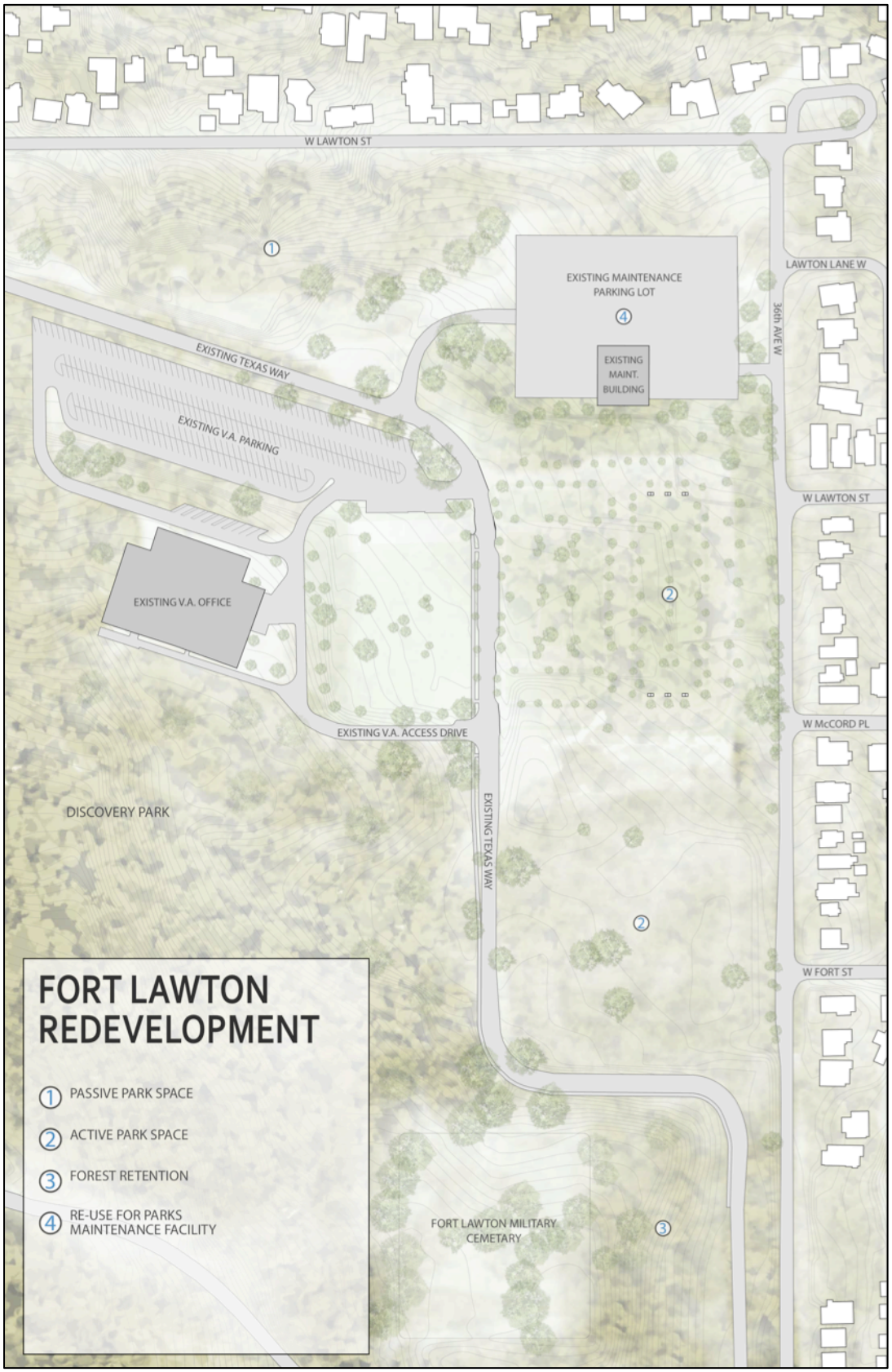

Figure 8. Preliminary site plan for Alternative 3 at Fort Lawton.

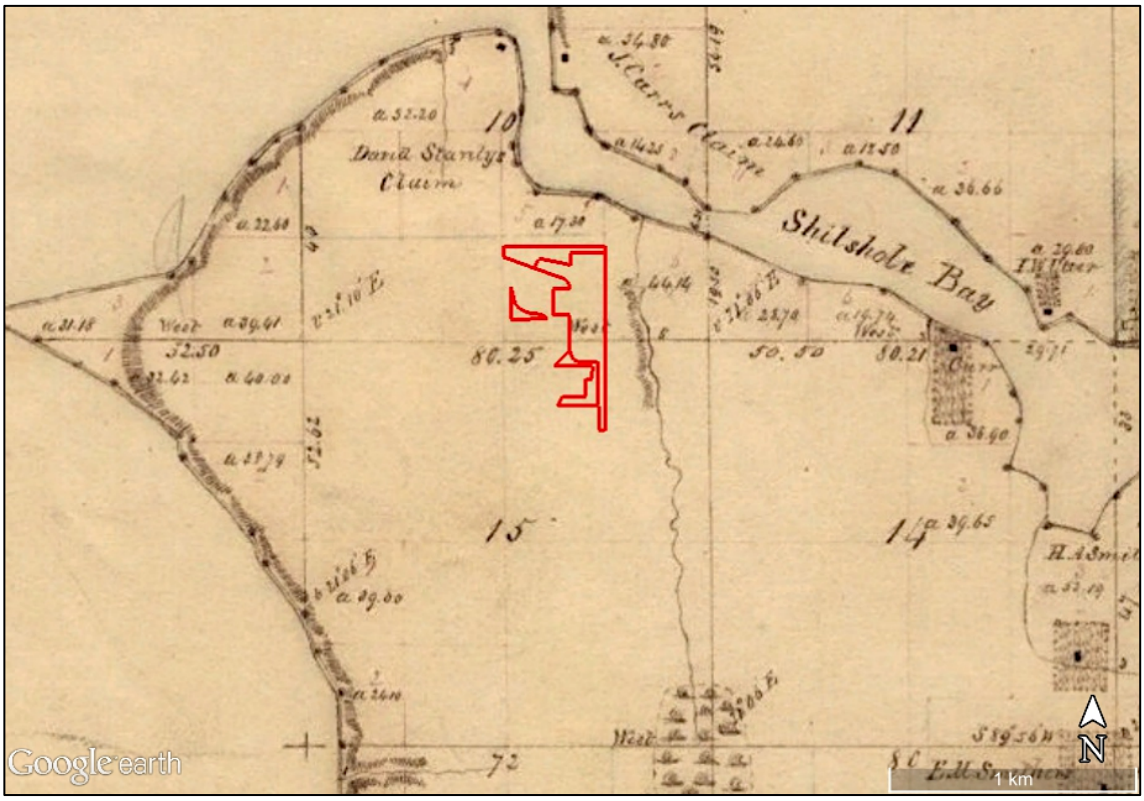

Figure 9. Fort Lawton property marked on GLO map (USSG 1855).

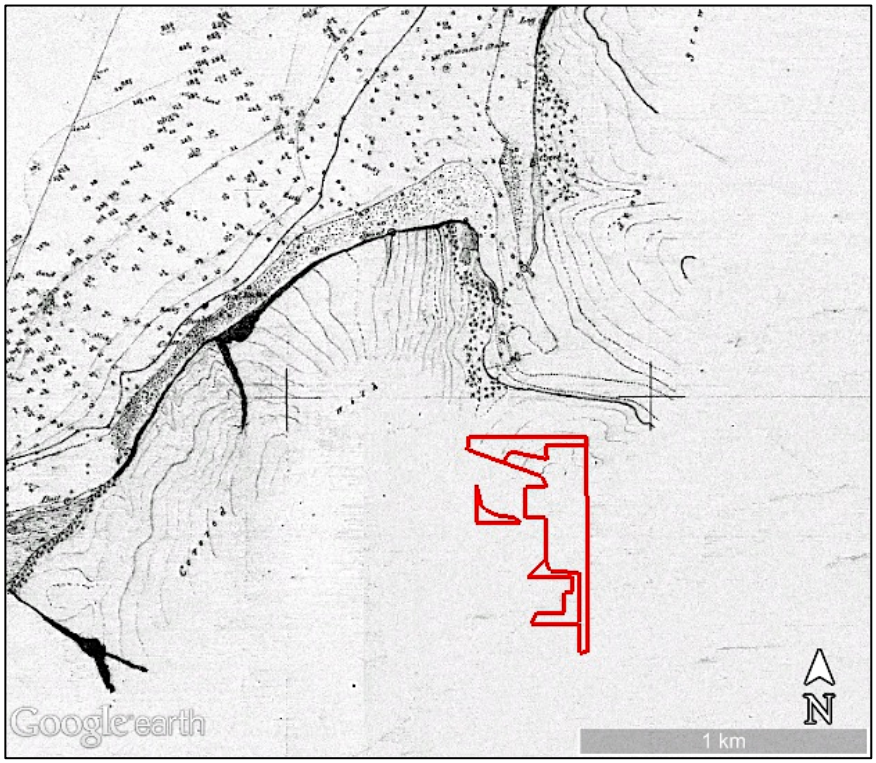

Figure 10. Fort Lawton site marked on georeferenced historical map (Fox 2009; USCS 1867) prior to establishment of the Fort Lawton military post to the west.

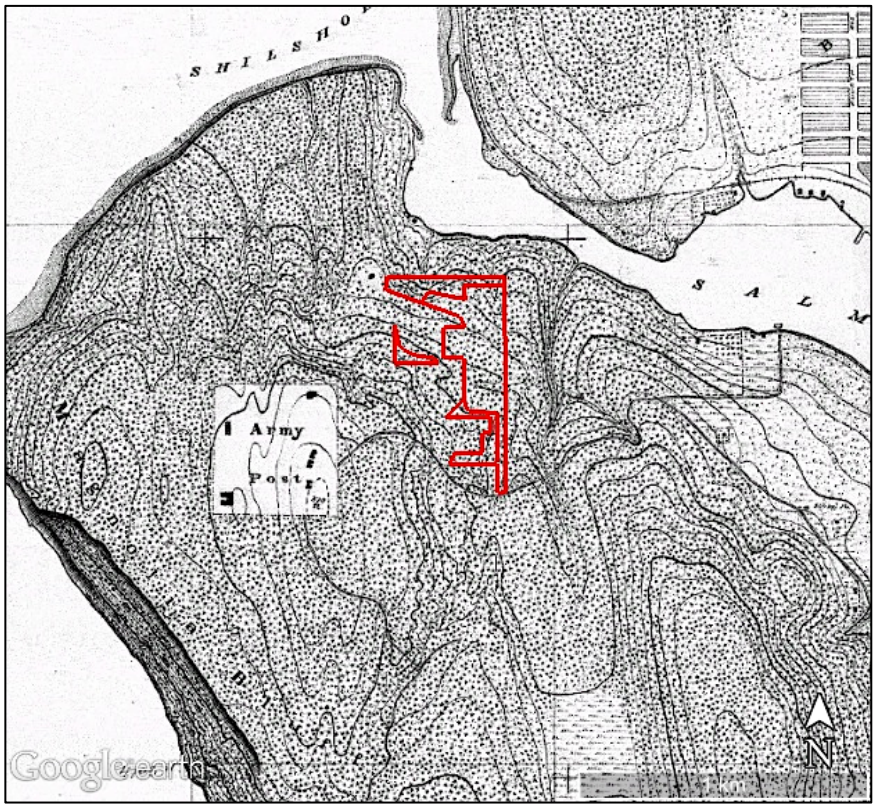

Figure 11. Fort Lawton site marked on georeferenced historical map (Fox 2009; USCGS 1899) post-dating establishment of the Fort Lawton military post.

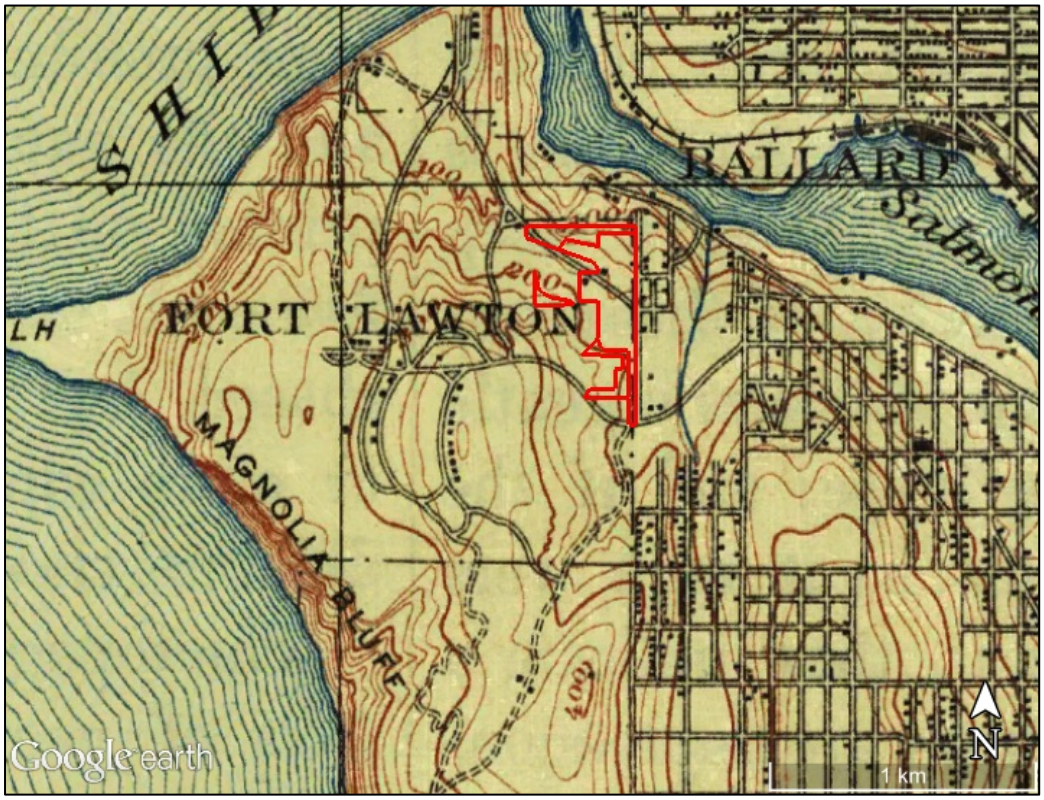

Figure 12. Fort Lawton site marked on historical topographic map (USGS 1909).

Figure 13. Fort Lawton site annotated on 1936 aerial imagery (King County 2017).

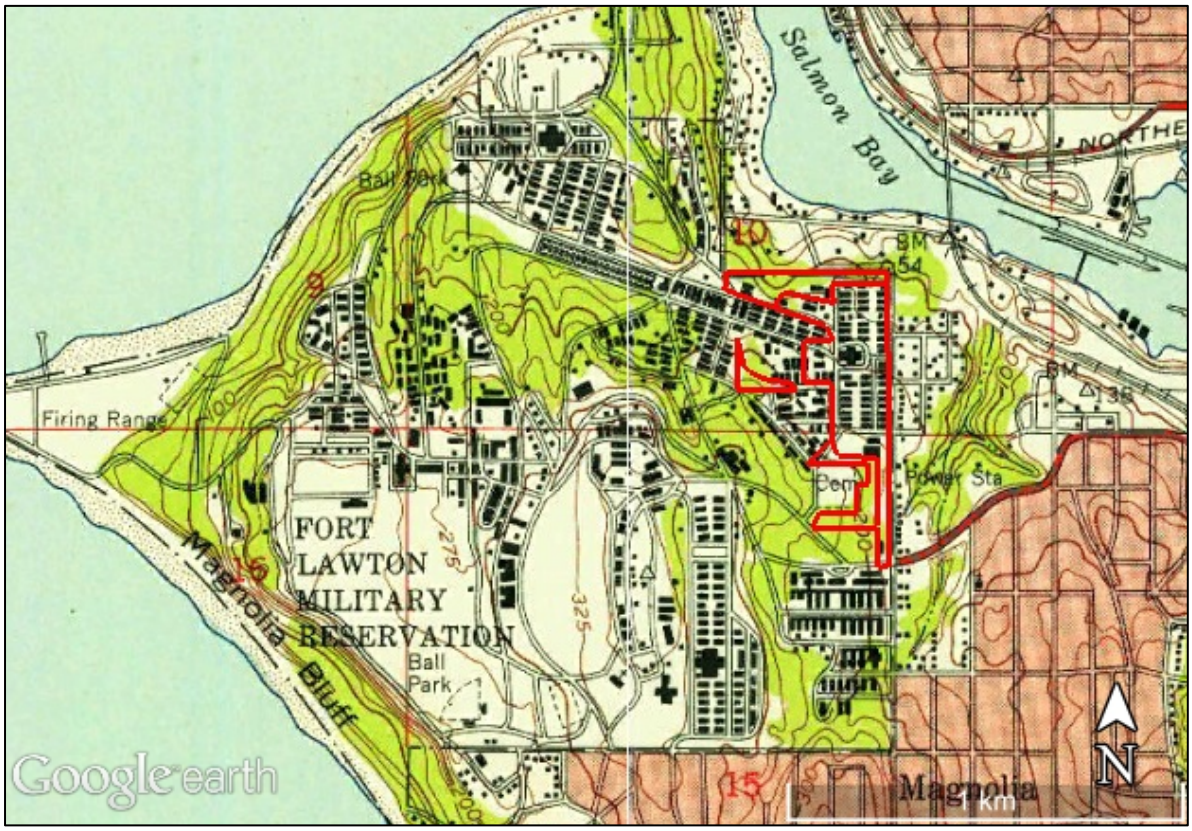

Figure 14. Fort Lawton site marked on historical topographic map (USGS 1949b).

Figure 15. Talaris property marked on GLO map (USSG 1856).

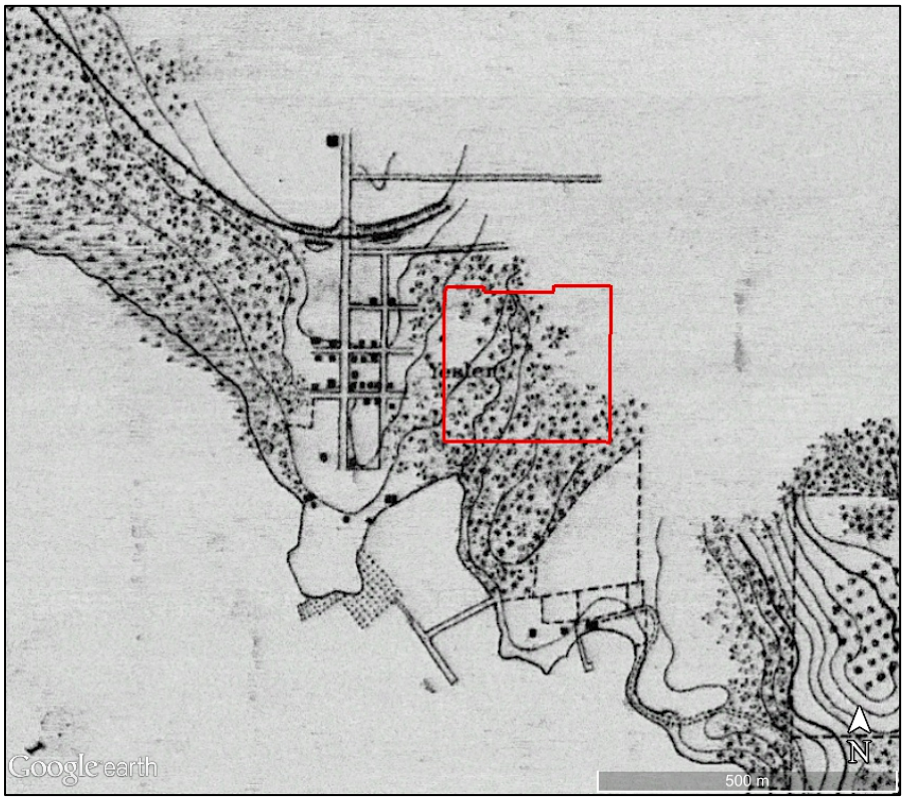

Figure 16. Talaris site marked on georeferenced historical map (Fox 2009; USCGS 1902).

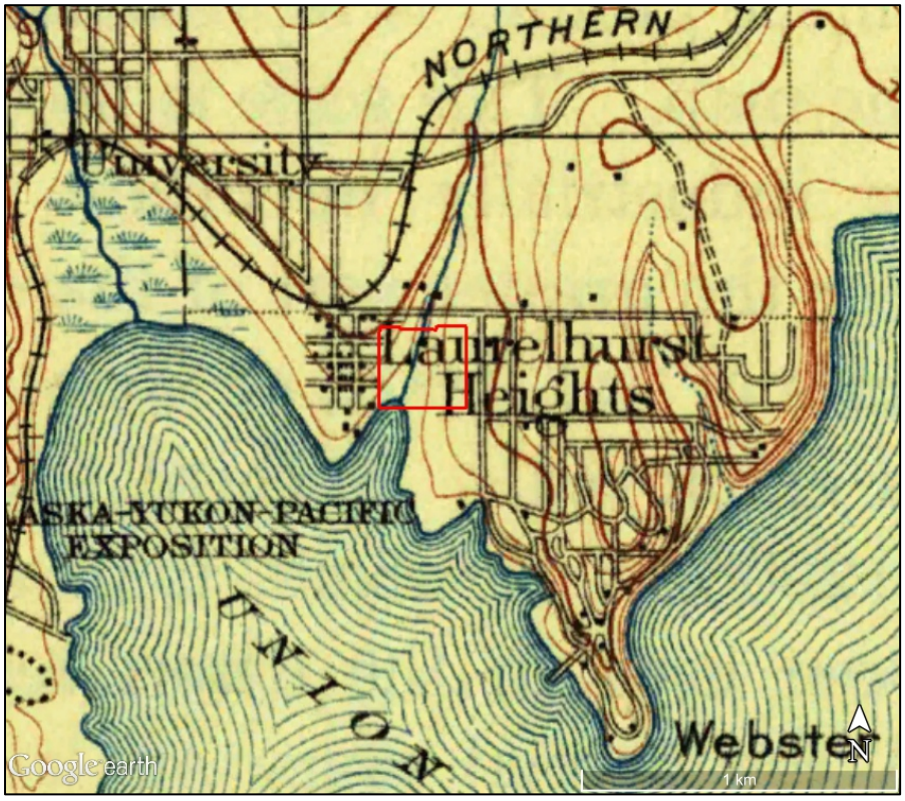

Figure 17. Talaris property marked on historical topographic map (USGS 1909).

Figure 18. Talaris site annotated on 1936 aerial imagery (King County 2017).

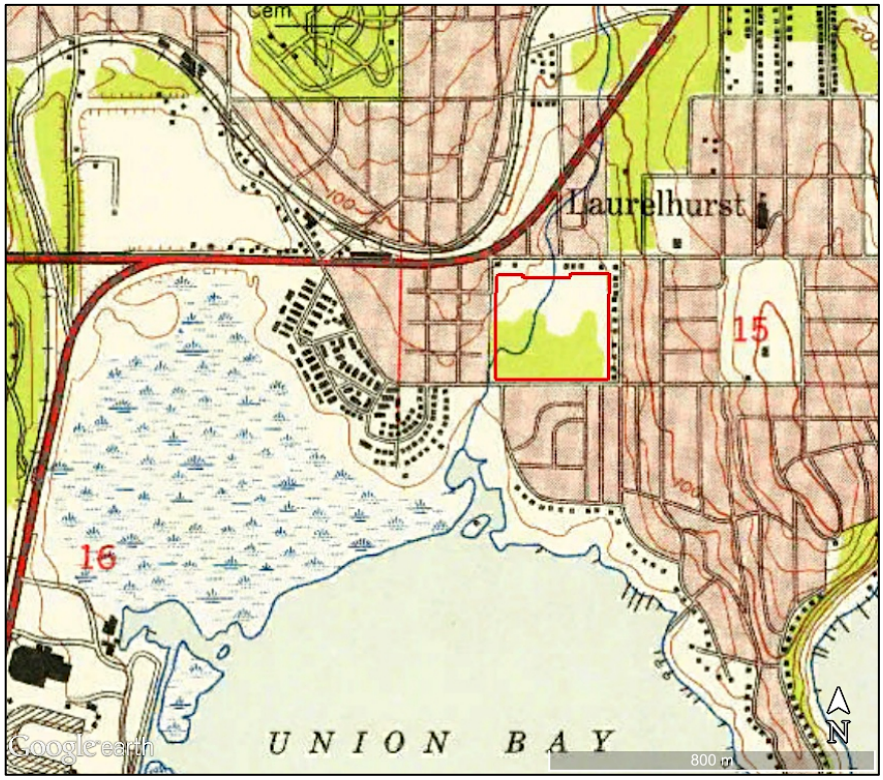

Figure 19. Talaris site marked on historical topographic map (USGS 1949a).

Table 1. Archaeological sites recorded within approximately one mile from Fort Lawton USARC (DAHP 2017b).

Site	Site Type	Distance from Project	Historic Register Status	Potential Effects
45KI1	Precontact lithic material	.25 – 1 mile S (estimated)	Unevaluated.	None.
45KI24	Historic debris scatter / concentration	.47 mile W	Unevaluated.	None.
45KI428	Precontact village	1.08 mile W	Determined eligible for NRHP.	None.
45KI429	Precontact shell midden	1 mile W	Unevaluated.	None.
45KI1000	Precontact shell midden	.19 mile NE	Unevaluated.	None.
45KI1162	Historic military property	.35 mile SW	Unevaluated.	None.
45KI1298	Historic and precontact components	.55 mile NW	Unevaluated.	None.

Table 2. Historic buildings previously inventoried within approximately 500 feet from Fort Lawton USARC (DAHP 2017b).

Name	Address	Built Date	Historic Function	Historic Register Status	Potential Impacts
Fort Lawton Cemetery	3701 W Government Way, Seattle	Established 1898	Funerary – Cemetery	Determined eligible for NRHP.	Development in proximity to the cemetery under Alternative 2 has potential to affect aspects of integrity (e.g., setting, feeling). It is recommended that a buffer around the cemetery be left undisturbed.
Fort Lawton USARC – Incinerator Stack	4570 Texas Way W, Seattle	1934	Defense – Military Facility	Determined not eligible for NRHP.	This structure would be removed under all alternatives. However, it is not eligible for NRHP, WHR, or Seattle Landmark nomination.
Fort Lawton USARC – Organizational Maintenance Shop	4570 Texas Way W, Seattle	1999	Defense – Military Facility	Determined not eligible for NRHP.	This structure would be removed under all alternatives. However, it is not eligible for NRHP, WHR, or Seattle Landmark nomination.
Fort Lawton USARC – Leisy Hall & AMSA 79	4570 Texas Way W, Seattle	1972, 1976	Defense – Military Facility	Determined not eligible for NRHP.	These structures would be removed under all alternatives. However, they are not eligible for NRHP, WHR, or Seattle Landmark nomination.
Fort Lawton USARC – Harvey Hall	4570 Texas Way W, Seattle	1958, 2003	Defense – Military Facility	Determined not eligible for NRHP.	The structure would be removed. It does not meet NRHP or WHR eligibility criteria but it does meet Seattle Landmark nomination criteria.
David Quam House	3752 W Lawton St, Seattle	1967	Domestic – Single Family House	Unevaluated.	Indirect impacts (e.g., to viewshed and setting).

Table 3. Register-listed historic properties within one mile from Fort Lawton USARC (DAHP 2017b).

Historic Name (Common Name)	Address	Built Date	Historic Function	Historic Register Status	Potential Impacts
Fort Lawton Historic District	Fort Lawton, Seattle	1899 – 1945	Defense – Military Facility	Listed on NRHP, WHR, and SLR.	None.

Historic Name (Common Name)	Address	Built Date	Historic Function	Historic Register Status	Potential Impacts
Salmon Bay Great Northern Railroad Bridge	Spans Salmon Bay, Seattle	1913	Transportation – Rail Related	Listed on WHR.	None.
Fireboat Duwamish	Lake Washington Ship Canal, Chittenden Locks, Seattle	1909	Transportation – Water Related	Listed as National Historic Landmark.	None.
Chittenden Locks and Lake Washington Ship Canal	Salmon Bay, Seattle	1906 – 1917	Transportation – Water Related	Listed on NRHP and WHR.	None.
Magnolia Public Library	2801 34th Ave W, Seattle	1964	Education – Library	Listed on NRHP and WHR.	None.
Seattle Carnegie Library – Ballard Branch	2026 NW Market St, Seattle	1904	Education – Library	Listed on NRHP, WHR, and SLR.	None.
Fire Station No. 18 – Ballard	5427 Russell Avenue NW, Seattle	1911	Government – Fire Station	Listed on NRHP, WHR, and SLR.	None.
Ballard Avenue Historic District	Ballard Ave from NW Market to NW Dock St, Seattle	1890 – 1930	Commerce / Trade – Business	Listed on NRHP, WHR, and SLR.	None.

Table 4. Archaeological sites recorded within one mile from Talaris (DAHP 2017b).

Site	Site Type	Distance from Project	Historic Register Status	Potential Impacts
45KI760	Historic dump	1 mile SSW	Recommended not eligible for NRHP.	None.
45KI952	Historic isolate	.95 mile SW	Unevaluated.	None.
45KI955	Historic public works	1 mile SW	Unevaluated.	None.
45KI1006	Precontact isolate	.95 mile SSW	Recommended not eligible for NRHP.	None.
45KI1007	Precontact isolate	.94 mile SSW	Recommended not eligible for NRHP.	None.
45KI1030	Historic structure	.79 mile W	Recommended not eligible for NRHP.	None.
45KI1201	Historic dump	.19 mile W	Recommended eligible for NRHP.	None.

Table 5. Historic buildings previously inventoried within approximately 500 feet from Talaris (DAHP 2017b).

Name	Address	Built Date	Historic Function	Historic Register Status	Potential Impacts
Battelle Memorial Institute Seattle Research Center	4000 NE 41st St, Seattle	1965 – 1971	Education – Research Facility	Determined eligible for NRHP and designated as a Seattle Landmark.	Redevelopment may remove or alter structures and would alter the site, which is a significant aspect of this historic property.

Table 6. Register-listed historic properties within one mile from Talaris (DAHP 2017b).

Register Name	Address	Built Date	Historic Function	Historic Register Status	Potential Impacts
University of Washington Faculty Center	4020 E Stevens Way NE	1960, 1967	Social – Clubhouse	Listed on NRHP and WHR.	None.
Sigma Kappa Mu Chapter House - University of Washington	4510 22nd Avenue NE	1930	Domestic – Institutional Housing; Education – Education Related	Listed on NRHP and WHR.	None.
Naval Military Hangar--University of Washington Shell House	University of Washington Campus	1918	Transportation – Air-Related	Listed on NRHP and WHR.	None.
Lewis Hall (Men's Dormitory)	University of Washington Campus	1896	Domestic – Institutional Housing; Education – Education Related	Listed on WHR.	None.
Clark Hall (Women's Dormitory)	University of Washington Campus	1896	Domestic – Institutional Housing; Education – Education Related	Listed on WHR.	None.
Chittenden Locks and Lake Washington Ship Canal	Salmon Bay, Fremont, and Montlake	1906 – 1917	Transportation – Water-Related	Listed on NRHP and WHR.	None.

Figure 20. Graded lawn and incinerator stack at For Lawton; view to the west.

Figure 21. Typical slope at north end of Fort Lawton property; view to the north.

Figure 22. View corridor to cemetery from Texas Way; facing south.

Figure 23. Texas Way & woods east of cemetery; view to southeast.

Figure 24. Leisy Hall and typical parking area; view to south.

Figure 25. Building 222 (left) and Leisy Hall (right); view to north.

Figure 26. Harvey Hall; view to southeast.

Figure 27. South part of Fort Lawton facing south; OMS 211 & 214 at right.

Figure 28. Typical landscaping in southern part of Talaris; view to southwest.

Figure 29. View to pond and 1960s buildings from near south end of driveway.

Figure 30. Buildings A, B, & C at Talaris; view to northwest.

Figure 31. Conditions in southwestern part of Talaris; view southeast.

Figure 32. Dining Building F in eastern part of Talaris; view east.

Figure 33. Seminar Building D in north-central part of Talaris; view north.

Figure 34. Lodge Building E and grounds in northeastern part of Talaris.

Figure 35. Existing buildings on the Fort Lawton site (base map: Google Earth).

Table 7. Summary data for existing buildings on the Fort Lawton site.

Name	Build Date	Impacts	Recommendations
Building 222 (AMSA 79)	1972	Demolition under Alt. 1, 2, 3.	Meets age threshold but does not appear to meet criteria for Seattle Landmark Designation. Obtain concurrence from DON.
Building 211 (storage)	1958	Demolition under Alt. 1, 2, 3.	Meets age threshold but does not appear to meet criteria for Seattle Landmark Designation. Obtain concurrence from DON.
Building 214 (storage)	2000	Demolition under Alt. 1, 2, 3.	Does not meet age threshold. No historic preservation work needed.
Building 223 (fuel shed)	1972	Demolition under Alt. 1, 2, 3.	Meets age threshold but does not appear to meet criteria for Seattle Landmark Designation. Obtain concurrence from DON.
Building 228 (storage shed)	1990	Demolition under Alt. 1, 2, 3.	Meets age threshold but does not appear to meet criteria for Seattle Landmark Designation. Obtain concurrence from DON.
Harvey Hall	1958, 2003	Demolition under Alt. 1, 2, 3.	Meets age threshold and Criteria A, C, D, E for Seattle Landmark Designation. Obtain concurrence from DON.
Incinerator Stack	1934	Demolition under Alt. 1, 2, 3.	Meets age threshold but does not appear to meet criteria for Seattle Landmark Designation. Obtain concurrence from DON.
Leisy Hall	1972, 1976	Demolition under Alt. 1, 2, 3.	Meets age threshold but does not appear to meet criteria for Seattle Landmark Designation. Obtain concurrence from DON.
Building 245 (organizational maintenance shop)	1999	No change under proposal.	Does not meet age threshold. No historic preservation work needed.
Pumphouse	2001	Demolition under Alt. 1, 2, 3.	Does not meet age threshold. No historic preservation work needed.

Figure 36. Existing buildings and features on the Talaris site (base map: Google Earth).

Table 8. Summary data for existing buildings and features on the Talaris site.

Name	Build Date	Impacts	Recommendations
Apartment Building A	1966	Renovated for housing and altered setting under Alt. 2 and 3.	Obtain Certificate of Approval from DON, and follow Controls and Incentives to be specified by LPB.
Apartment Building B	1966	Renovated for housing and altered setting under Alt. 2 and 3.	Obtain Certificate of Approval from DON, and follow Controls and Incentives to be specified by LPB.
Apartment Building C	1966	Renovated for housing and altered setting under Alt. 2 and 3.	Obtain Certificate of Approval from DON, and follow Controls and Incentives to be specified by LPB.
Seminar Building D	1966	Renovated for housing and community center, and altered setting under Alt. 2 and 3.	Obtain Certificate of Approval from DON, and follow Controls and Incentives to be specified by LPB.
Lodge Building E	1971	Renovated for housing and altered setting under Alt. 2 and 3.	Obtain Certificate of Approval from DON, and follow Controls and Incentives to be specified by LPB.

Name	Build Date	Impacts	Recommendations
Dining Building F	1971	Renovated for dining hall and community center use, and altered setting under Alt. 2 and 3.	Obtain Certificate of Approval from DON, and follow Controls and Incentives to be specified by LPB.
Office Building G	1971	May be renovated, altered setting under Alt. 2 and 3.	Obtain Certificate of Approval from DON, and follow Controls and Incentives to be specified by LPB.
Water Feature (Pond)	1967	Altered setting under Alt. 2 and 3.	Water feature is a contributing feature; alteration would require a Certificate of Approval from DON, and would need to follow Controls and Incentives to be specified by LPB.
Pedestrian Bridge	1971	Altered setting under Alt. 2 and 3.	Pedestrian bridge is a contributing feature; alteration would require a Certificate of Approval from DON, and would need to follow Controls and Incentives to be specified by LPB.
Equipment Shed	Unknown (after 1992)	Removed under Alt. 2 and 3.	Shed was not a part of the Phase 1 or Phase 2 development and is not considered to be a contributing feature, but removal would require a Certificate of Approval from DON.

Attachment A. Project correspondence between CRC and cultural resources staff of the Duwamish, Muckleshoot, Snoqualmie, and Suquamish tribes.

Cultural Resource Consultants

June 12, 2017

Duwamish Tribe
Cecile Hansen, Chairwoman
4705 W Marginal Way SW
Seattle, WA 98106-1514

Re: Cultural Resources Assessment for the City of Seattle, Fort Lawton, Project #6318301
Seattle, WA

Dear Cecile:

I am writing to inform you of a cultural resources assessment for the above referenced project and to seek additional information about the project area the Tribe may have that is not readily available through other written sources. This letter is on a technical staff-to-technical staff basis to inquire about project-related cultural information or concerns. It is not intended as formal government-to-government consultation to be initiated by the appropriate regulatory agency.

The project is located at Fort Lawton, United States Army Reserve Center in Seattle, King County, Washington (map attached). EA Engineering is requesting this assessment as a part of documentation for the *Fort Lawton Army Reserve Center Redevelopment Draft Environmental Impact Statement*.

We are in the process of reviewing available information. Background research will include a site files search at the Washington State Department of Archaeology and Historic Preservation, review of previously recorded cultural resource reports, and review of pertinent published literature and ethnographies. Results of our investigations will be presented in a technical memo.

We are aware that not all information is contained within published sources. Should the Tribe have additional information to support our assessment, we would very much like to include it in our study. Please contact me at sonja@crcwa.com or 360-395-8879 should you wish to provide any comments. I appreciate your assistance in this matter and look forward to hearing from you.

Sincerely,

Sonja Kassa
Projects Manager

CULTURAL RESOURCE CONSULTANTS, LLC., BALLARD LABS, 1416 NW 46TH ST, STE 105 PMB346, SEATTLE, WA 98107
PHONE 206.855.9020 - sonja@crcwa.com

Cultural Resource Consultants

June 12, 2017

Muckleshoot Indian Tribe
Laura Murphy
39015 172nd Ave SE
Auburn, WA 98092

Re: Cultural Resources Assessment for the City of Seattle, Fort Lawton, Project #6318301
Seattle, WA

Dear Laura:

I am writing to inform you of a cultural resources assessment for the above referenced project and to seek additional information about the project area the Tribe may have that is not readily available through other written sources. This letter is on a technical staff-to-technical staff basis to inquire about project-related cultural information or concerns. It is not intended as formal government-to-government consultation to be initiated by the appropriate regulatory agency.

The project is located at Fort Lawton, United States Army Reserve Center in Seattle, King County, Washington (map attached). EA Engineering is requesting this assessment as a part of documentation for the *Fort Lawton Army Reserve Center Redevelopment Draft Environmental Impact Statement*.

We are in the process of reviewing available information. Background research will include a site files search at the Washington State Department of Archaeology and Historic Preservation, review of previously recorded cultural resource reports, and review of pertinent published literature and ethnographies. Results of our investigations will be presented in a technical memo.

We are aware that not all information is contained within published sources. Should the Tribe have additional information to support our assessment, we would very much like to include it in our study. Please contact me at sonja@crcwa.com or 360-395-8879 should you wish to provide any comments. I appreciate your assistance in this matter and look forward to hearing from you.

Sincerely,

Sonja Kassa
Projects Manager

CULTURAL RESOURCE CONSULTANTS, LLC., BALLARD LABS, 1416 NW 46TH ST, STE 105 PMB346, SEATTLE, WA 98107
PHONE 206.855.9020 - sonja@crcwa.com

Cultural Resource Consultants

June 12, 2017

Snoqualmie Indian Tribe
Steven Mullen-Moses
PO Box 969
Snoqualmie, WA 98065

Re: Cultural Resources Assessment for the City of Seattle, Fort Lawton, Project #6318301
Seattle, WA

Dear Steven:

I am writing to inform you of a cultural resources assessment for the above referenced project and to seek additional information about the project area the Tribe may have that is not readily available through other written sources. This letter is on a technical staff-to-technical staff basis to inquire about project-related cultural information or concerns. It is not intended as formal government-to-government consultation to be initiated by the appropriate regulatory agency.

The project is located at Fort Lawton, United States Army Reserve Center in Seattle, King County, Washington (map attached). EA Engineering is requesting this assessment as a part of documentation for the *Fort Lawton Army Reserve Center Redevelopment Draft Environmental Impact Statement*.

We are in the process of reviewing available information. Background research will include a site files search at the Washington State Department of Archaeology and Historic Preservation, review of previously recorded cultural resource reports, and review of pertinent published literature and ethnographies. Results of our investigations will be presented in a technical memo.

We are aware that not all information is contained within published sources. Should the Tribe have additional information to support our assessment, we would very much like to include it in our study. Please contact me at sonja@crcwa.com or 360-395-8879 should you wish to provide any comments. I appreciate your assistance in this matter and look forward to hearing from you.

Sincerely,

Sonja Kassa
Projects Manager

CULTURAL RESOURCE CONSULTANTS, LLC., BALLARD LABS, 1416 NW 46TH ST, STE 105 PMB346, SEATTLE, WA 98107
PHONE 206.855.9020 - sonja@crcwa.com

Cultural Resource Consultants

June 12, 2017

Suquamish Tribe
Stephanie Trudel
PO Box 498
Suquamish, WA 98392-0498

Re: Cultural Resources Assessment for the City of Seattle, Fort Lawton, Project #6318301
Seattle, WA

Dear Stephanie:

I am writing to inform you of a cultural resources assessment for the above referenced project and to seek additional information about the project area the Tribe may have that is not readily available through other written sources. This letter is on a technical staff-to-technical staff basis to inquire about project-related cultural information or concerns. It is not intended as formal government-to-government consultation to be initiated by the appropriate regulatory agency.

The project is located at Fort Lawton, United States Army Reserve Center in Seattle, King County, Washington (map attached). EA Engineering is requesting this assessment as a part of documentation for the *Fort Lawton Army Reserve Center Redevelopment Draft Environmental Impact Statement*.

We are in the process of reviewing available information. Background research will include a site files search at the Washington State Department of Archaeology and Historic Preservation, review of previously recorded cultural resource reports, and review of pertinent published literature and ethnographies. Results of our investigations will be presented in a technical memo.

We are aware that not all information is contained within published sources. Should the Tribe have additional information to support our assessment, we would very much like to include it in our study. Please contact me at sonja@crcwa.com or 360-395-8879 should you wish to provide any comments. I appreciate your assistance in this matter and look forward to hearing from you.

Sincerely,

Sonja Kassa
Projects Manager

CULTURAL RESOURCE CONSULTANTS, LLC., BALLARD LABS, 1416 NW 46TH ST, STE 105 PMB346, SEATTLE, WA 98107
PHONE 206.855.9020 - sonja@crcwa.com

Tribal Historic Preservation Officer
Fisheries Department
360/394-8529
Fax 360/598-4666

THE SUQUAMISH TRIBE
P.O. Box 498 Suquamish, Washington 98392

June 21, 2017

Ms. Sonja Kassa
Cultural Resource Consultants
Ballard Labs, 1416 NW 46th St, STE 105 PMB 346
Seattle, WA 98107

RE: City of Seattle, Fort Lawton, Project #6318301, Seattle, King County, Washington
Request for Traditional Cultural Property Information
Suquamish Tribe Reference: 17-6-13-4

Dear Sonja:

Thank you for consulting with the Suquamish Tribe regarding CRC's cultural resources assessment for the City of Seattle, Fort Lawton, Project #6318301 in Seattle, Washington. The Tribe does not have any specific concerns or statements about the proposed project at this time. Please contact me at 360-394-8533 or via e-mail at strudel@suquamish.nsn.us as additional project information becomes available.

Sincerely,

Stephanie E Trudel

Stephanie E. Trudel
Archaeologist

Cc: Gretchen Kaehler, Local Government Archaeologist, Washington State Department of Archaeology and Historic Preservation

Attachment B. Inadvertent Discovery Protocol

Protocols for Discovery of Archaeological Resources

The Archaeological Sites and Resources Act (RCW 27.53) prohibits knowingly disturbing archaeological sites without a permit from the Washington State Department of Archaeology and Historic Preservation (DAHP), and the Indian Graves and Records Act (RCW 27.44) prohibits knowingly disturbing Native American or historic graves.

In the event that archaeological resources are encountered during project implementation, the following actions will be taken:

All ground disturbing activity at the find location will stop, and the work supervisor will be notified immediately. The find location will be secured from any additional impacts.

The project proponent will immediately contact the agencies with jurisdiction over the lands where the discovery is located, if appropriate. The appropriate agency archaeologist or the proponent's contracting archaeologist will determine the size of the work stoppage zone or discovery location in order to sufficiently protect the resource until further decisions can be made regarding the work site.

The project proponent will consult with DAHP regarding the evaluation of the discovery and the appropriate protection measures, if applicable. Once the consultation has been completed, and if the site is determined to be NRHP-eligible, the project proponent will request written concurrence that the agency or tribe(s) concurs that the protection and mitigation measures have been fulfilled. Upon notification of concurrence from the appropriate parties, the project proponent will proceed with the project.

Within six months after completion of the above steps, the project proponent will prepare a final written report of the discovery. The report will include a description of the contents of the discovery, a summary of consultation, and a description of the treatment or mitigation measures.

Protocols for Discovery of Human Remains

If human remains are found within the project area, the project proponent, its contractors or permit-holders, the following actions will be taken, consistent with Washington State RCWs 68.50.645, 27.44.055, and 68.60.055:

If ground-disturbing activities encounter human skeletal remains, then all activity will cease that may cause further disturbance to those remains. The area of the find will be secured and protected from further disturbance. The project proponent will prepare a plan for securing and protecting exposed human remains and retain consultants to perform these services. The finding of human skeletal remains will be reported to the county medical examiner/coroner and local law enforcement in the most expeditious manner possible. The remains will not be touched, moved, or further disturbed. The county medical examiner/coroner will assume jurisdiction over the human skeletal remains and make a determination of whether those remains are forensic or non-forensic. If the county medical examiner/coroner determines the remains are non-forensic, then they will report that finding to DAHP, which will then take jurisdiction over the remains. DAHP

will notify any appropriate cemeteries and all affected tribes of the find. The State Physical Anthropologist will make a determination of whether the remains are Indian or Non-Indian and report that finding to any appropriate cemeteries and the affected tribes. DAHP will then handle all consultation with the affected parties as to the future preservation, excavation, and disposition of the remains.

Contact Information

Duwamish Tribe
4705 West Marginal Way SW
Seattle, WA 98106
Primary Contact: Cecile Hanson, Chair, 206-431-1582

Muckleshoot Indian Tribe
39015 172nd Ave SE
Auburn, WA 98092
Primary Contact: Laura Murphy, Archaeologist/Cultural Resources, 253-876-3272

Snoqualmie Indian Nation
PO Box 969
Snoqualmie, WA 98065
Primary Contact: Steven Mullen-Moses, Director of Archaeology and Historic Preservation, 425-495-6097

Suquamish Tribe
PO Box 498
Suquamish, WA 98392-0498
Primary Contact: Dennis Lewarch, THPO Cultural Resources, 360-394-8529

Washington State Department of Archaeology and Historic Preservation (WA DAHP)
P.O. Box 48343, Olympia, WA 98504-8343
Lead Representative: Allyson Brooks, State Historic Preservation Officer, 360-586-3066
Primary Contact: Gretchen Kaehler, Local Government Archaeologist, 360-586-3088
Primary Contact for Human Remains: Guy Tasa, State Physical Anthropologist, 360-586-3534

King County Medical Examiner
908 Jefferson Street
Seattle, WA 98104
Primary Contact: Richard Harruff, Medical Officer, 206-731-3232

King County Sheriff
516 Third Avenue, Room W-116
Seattle, WA 98104-2312
Primary Contact: John Urquhart, Sheriff, 206-296-3311

Appendix I

Transportation Report

TRANSPORTATION TECHNICAL REPORT

for

Fort Lawton
Army Reserve Center Redevelopment

PREPARED BY:

heffron transportation inc
6544 NE 61st Street, Seattle, WA 98115
ph: (206) 523-3939 ◆ fx: (206) 523-4949

December 11, 2017

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1. INTRODUCTION

This report presents the transportation impact analyses for the Fort Lawton Army Reserve Center Redevelopment project. It is intended to serve as the Transportation appendix to the Draft Environmental Impact Statement (DEIS) and addresses potential impacts to the roadway system, intersection operations, traffic safety, transit facilities, non-motorized facilities, and parking. It compares the impacts of three development alternatives on two different sites.

1.1. Project Description

The applicant, Seattle Office of Housing, is considering redevelopment options including housing and park uses for the Fort Lawton U.S. Army Reserve Center site (Fort Lawton site), located in the Magnolia neighborhood in northwest Seattle. The City's goals are to produce supportive housing for formerly homeless people and affordable rental and ownership housing for low income families and individuals, as well as create public park uses (including both active and passive uses) and meet park maintenance needs. It is expected that full buildout of the Fort Lawton Project would occur by 2025. However, actual buildout could depend on specific economic and market conditions.

The redevelopment alternatives evaluated in this report include both on-site and off-site options. On-site refers to the Fort Lawton site, and off-site refers to the Talaris site located in northeast Seattle. Descriptions of these sites are provided below.

1.1.1. Existing Fort Lawton Site

The Fort Lawton site, approximately 34 acres in size, is located in the Magnolia neighborhood in northwest Seattle. The site is bordered by W Lawton Street to the north, 36th Avenue W to the east, W Government Way to the south, and Discovery Park to the west.

In 1968, the Army transferred most of the former Fort Lawton Army Base to the City of Seattle, which subsequently became Discovery Park, the City's largest park (534 acres). A 20-acre portion of the site was turned over to Native Americans to create the Daybreak Star Cultural Center. An area of approximately 46 acres was retained by the U.S. Army and used as a Reserve Center. In 2000, the Army built the Fort Lawton Army Reserve Complex (FLARC) building at the Reserve Center, which was transferred to the Veterans Administration (VA) in 2011. The Federal Government plans to retain the portion of the Army Reserve Center site that contains FLARC, together with supporting parking and the military cemetery. The remaining approximately 34 acres of the Army Reserve Center, and the subject site of this EIS, is currently closed and vacant and is in caretaker status by the Army.

Primary vehicle access to the site is provided by Texas Way, which connects to Discovery Park Boulevard to the south and 40th Avenue W to the north. The site currently has five off-street parking lots supporting four sets of existing structures. Only one parking lot —between the existing maintenance facility and the structures to the south—is open to the public and can be accessed from Texas Way. There are a total of five driveways along the east side of Texas Way (only one is active) and two driveways on the west side of Texas Way that currently serve the VA and its parking lot. There are also two driveways to 36th Avenue W, both of which are closed.

1.1.2. Existing Talaris Site

The Talaris site, approximately 18 acres in size, is located in the Laurelhurst neighborhood in northeast Seattle. The site is bordered by existing commercial, institutional and residential uses along NE 45th Street to the north, residential uses along 42nd Avenue NE to the east, NE 41st Street to the south, and the unimproved 38th Avenue NE right of way to the west. Vehicular access to this site is currently provided by two driveways on NE 41st Street; an existing connection to 38th Avenue NE is closed and gated.

1.1.3. Redevelopment Alternatives

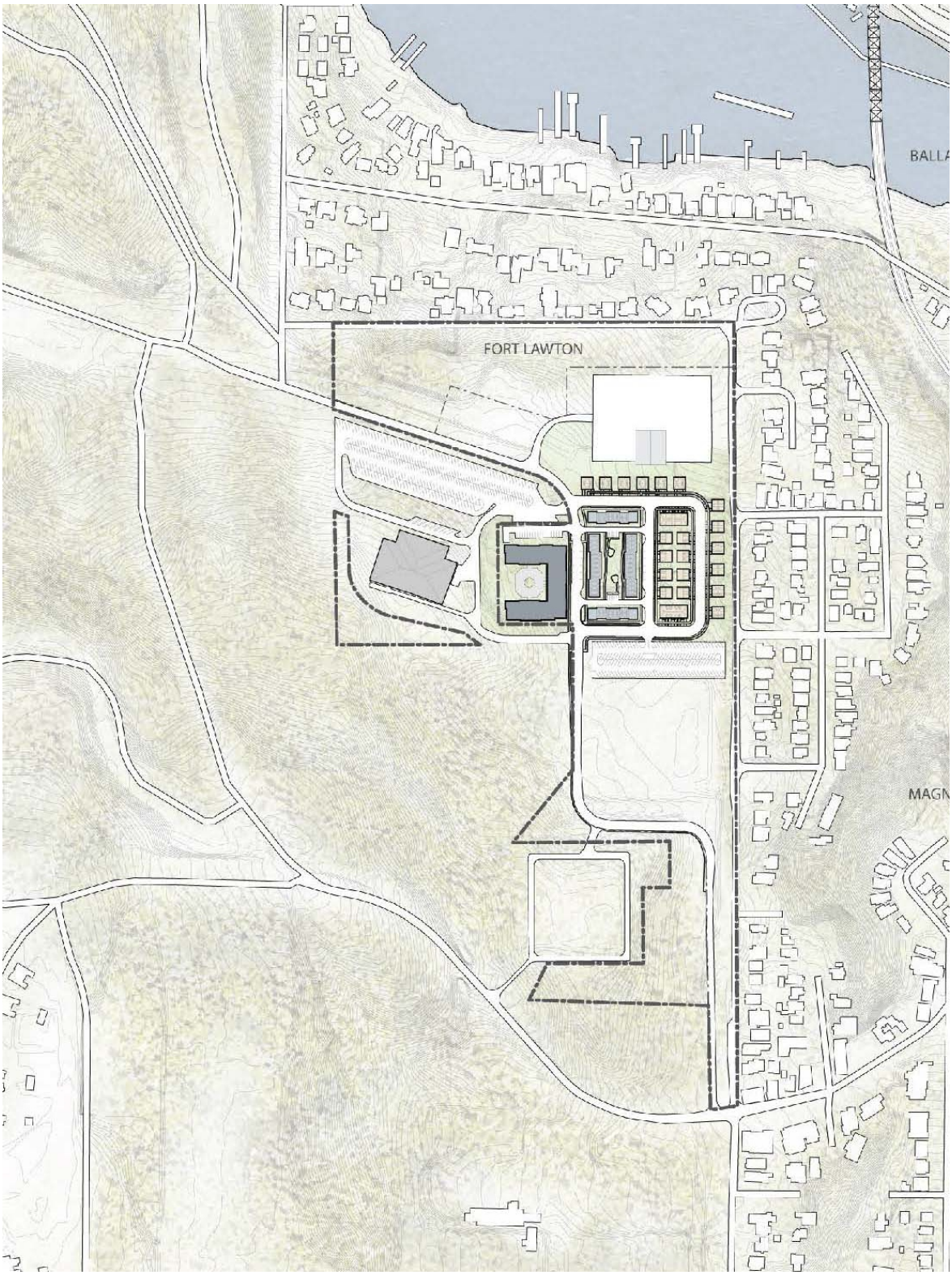
Four redevelopment alternatives were evaluated, described as follows.

- **Alternative 1 – Mixed Income Affordable Housing and Public Park Uses Onsite (Applicant's Preferred Alternative)**. Development of a mix of affordable housing, including formerly homeless and affordable rental and ownership housing, with a portion of the site likely rezoned to Low-rise residential zoning. Public park uses would also be created, including active park facilities, preserved existing natural areas and conversion of an existing structure to a park maintenance facility. Alternative 1 includes new residential and recreational facilities on the Fort Lawton site only (all on-site); an Alternative 1 scenario has not been defined for the Talaris site. A conceptual site plan for Alternative 1 is shown on Figure 1.

- **Alternative 2 – Market Rate Housing Onsite; Affordable and Homeless Housing Offsite.** Development of market rate single family housing under current zoning onsite, and construction of formerly homeless and affordable housing at an off-site location. Alternative 2 includes only single-family residential units on the Fort Lawton site and includes a variety of other residential unit types on the Talaris site; no recreational facilities are included for either site. A conceptual site plan for Alternative 2 on the Talaris site is shown on Figure 2.

- **Alternative 3 – Public Park Onsite; Affordable and Homeless Housing Offsite.** Development of the entire site as a public park, and construction of formerly homeless and affordable housing at an off-site location; Alternative 3 includes only recreational facilities added to the Fort Lawton site (with no residential units); this alternative for the Talaris site includes the same number and mix of residential uses as Alternative 2 (with no recreational facilities).

- **Alternative 4 – No Action.** No redevelopment of either the Fort Lawton or Talaris site; existing structures on each site would be maintained.

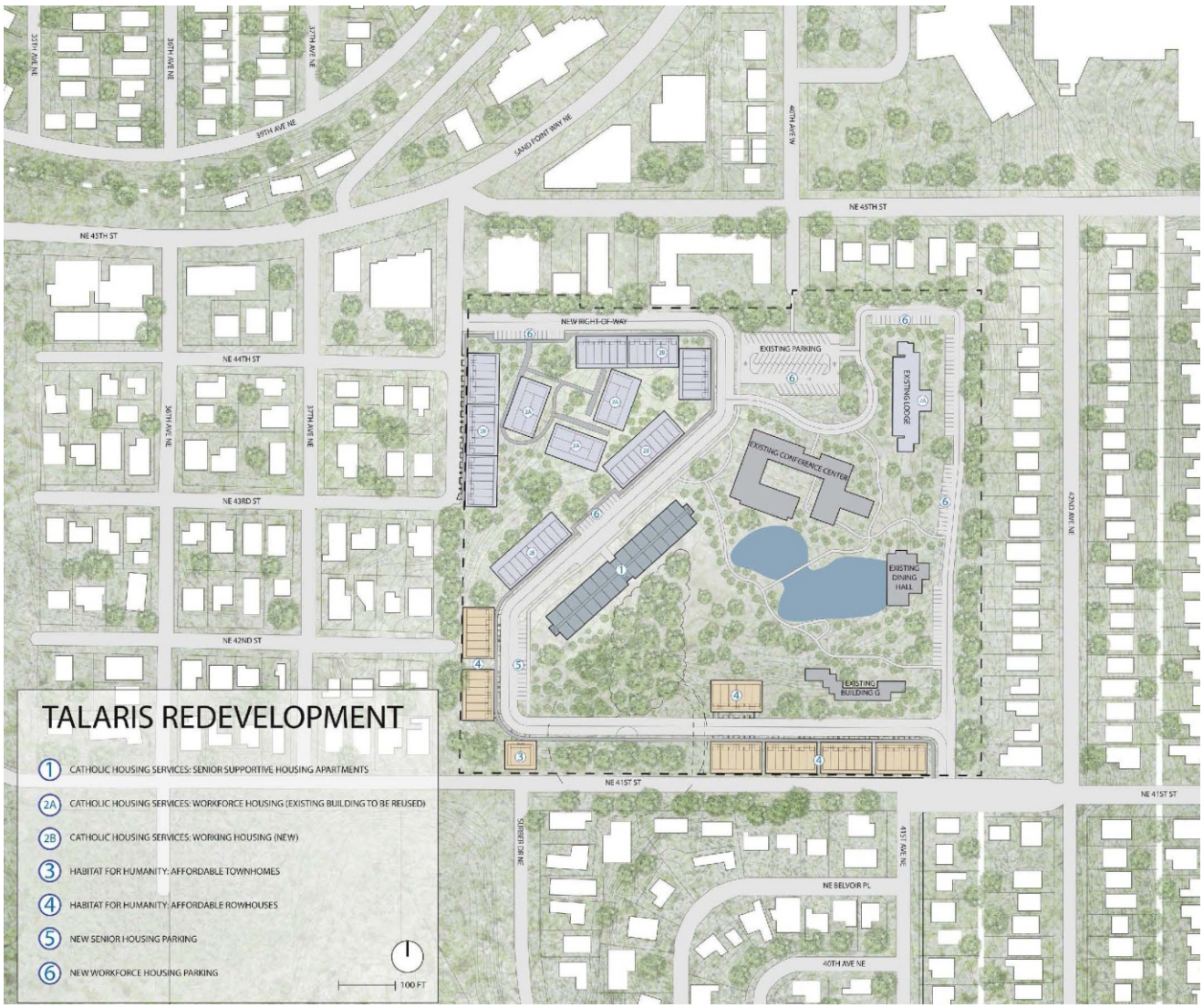


Not to scale

Fort Lawton
Redevelopment

Figure 1
Fort Lawton Conceptual Site Plan
Alternative 1

heffron transportation inc



Not to scale

Fort Lawton
Redevelopment

Figure 2
Talaris Conceptual Site Plan
Alternative 2 and 3

heffron transportation inc

Key metrics used to determine the traffic and parking impacts of the project include the number and type of housing units, and park amenities, summarized in Table 1. For the purpose of this transportation analysis, the same number of units as the Fort Lawton site were assumed to be developed at the Talaris site. It is likely that slightly fewer units would fit at Talaris due to the need to preserve existing buildings and other site constraints. Therefore, this analysis reflects a worst-case condition for the Talaris site.

Table 1. Redevelopment Alternatives

	Alternative 1		Alternative 2		Alternative 3	
	Fort Lawton Site	Talaris Site [1]	Fort Lawton Site	Talaris Site	Fort Lawton Site	Talaris Site
HOUSING						
Number of Housing Units by Type						
Low-rise Apartments – Studios (Formerly Homeless Seniors)	86	--	0	86	0	86
Rowhouse Apartments – 1, 2 & 3 Bedroom (Affordable Rental)	100	--	0	100	0	100
Townhouses – 3 Bedroom (Affordable Homeownership)	40	--	0	40	0	40
Rowhouses – 3 Bedroom (Affordable Homeownership)	12	--	0	12	0	12
Single-family Housing (Market Rate)	0	--	113	0	0	0
TOTAL HOUSING UNITS	238	--	113	238	0	238
PARKS & ATHLETIC FIELDS						
Acreage of Parks by Type						
Add to Discovery Park	4.7	--	0	0	4.7	0
Seattle Parks & Recreation Maintenance Facility	3.3	--	0	0	3.3	0
Active Recreation	5.1	--	0	0	7.6	0
Passive Recreation	8.3	--	0	0	12.3	0
TOTAL ACREAGE of PARKS	21.4	--	0	0	27.9	0
Number of Multi-Purpose Athletic Fields (No Lights)	2	--	0	0	3	0

Source: Seattle Office of Housing, September 2017.

1. Alternative 1 assumes no development of the Talaris site by the Office of Housing.

The number of parking spaces proposed with each alternative is summarized in Table 2. The parking ratio would range from 0.86 spaces per unit for the alternatives with multi-family housing, to 2.2 spaces per unit for the all-single-family alternative. Proposed parking for the park equates to 30 spaces per athletic field.

Table 2. Parking Supply by Alternative

	Alternative 1		Alternative 2		Alternative 3	
	Fort Lawton Site	Talaris Site [1]	Fort Lawton Site	Talaris Site	Fort Lawton Site	Talaris Site
Number of Parking Stalls for Housing by Type						
Low-rise Apartments – Studios	18	--	0	18	0	18
Rowhouse Apartments. – 1, 2 & 3 Bedroom [2]	112	--	0	112	0	112
Townhouses – 3 Bedroom	40	--	0	40	0	40
Rowhouses – 3 Bedroom	12	--	0	12	0	12
New On-Street Parking Stalls	24	--	0	24	0	24
Single-family Housing	0	--	254	0	0	0
TOTAL PARKING FOR HOUSING	206	--	254	206	0	206
Number of Parking Stalls for Park Use	60	--	-- [2]	-- [2]	90	-- [2]

Source: Seattle Office of Housing, August 2017.

1. *Alternative 1 assumes no development of the Talaris site by the Office of Housing.*
2. *This scenario does not include a park component.*

A conceptual plan for Fort Lawton Alternative 1 is shown on Figure 2. Texas Way would continue to be the primary vehicle access street for the site, and no vehicular access would be provided on 36th Avenue W. A grid of new streets and a shared parking lot would be created east of Texas Way to serve the new housing in that area. Senior housing and its parking would be located on the west side of the street. Pedestrian facilities would be provided along all of the new streets and upgraded along Texas Way. King County Metro bus stops would be located on both sides of Texas Way, approximately where the stop is located today.

Analysis of the Talaris site assumes that existing buildings would be repurposed for housing, and existing access to and around those buildings would likely remain in their existing configuration. Some existing roads may be removed or relocated to allow for new buildings. For the transportation analysis presented in this report, access is assumed to be retained at NE 41st Street and re-established to 38th Avenue NE. All roadways would be upgraded to include a sidewalk and/or separated walkways as needed to meet the City's street standards.

2. AFFECTED ENVIRONMENT

This chapter discusses the existing and future "No Action" conditions at and near the two alternative sites. The future conditions reflected for the No Action Alternative provide the baseline against which the project alternatives are compared in Chapter 3. All future analyses were performed for the year 2030 to be consistent with other transportation planning efforts in Seattle.

2.1. Fort Lawton Site

Study area intersections near Fort Lawton were selected based on the vehicular travel routes expected to be used to access and egress the site. The following four intersections were evaluated for both the morning and afternoon peak hours. All of the study area intersections are currently unsignalized.

- 40th Avenue E / Texas Way
- Discovery Park Boulevard / Texas Way
- W Government Way / 36th Avenue W
- Discovery Park Boulevard / 34th Avenue W

The following sections describe the existing study area roadway network, traffic volumes, traffic operations (in terms of levels of service), parking, traffic safety, transit facilities, and non-motorized facilities.

2.1.1. Roadway Network

Roadways through and near the Fort Lawton site are described below. In September 2016, the Seattle City Council approved an ordinance that officially changed Seattle's default arterial speed limit from 30 to 25 miles per hour (unless otherwise posted), and the default non-arterial speed limit from 25 to 20 miles per hour. These new speed limits were assumed for all vicinity streets.

Texas Way is a local access street that starts at Discovery Park Boulevard just west of 36th Avenue W and crosses the project site before terminating just west of Illinois Avenue. Texas Way technically continues as a loop road farther west into Discovery Park until it intersects back with Discovery Park Boulevard; however, this narrow segment of the roadway is blocked from the adjacent street system by bollards. Adjacent to the site, the street has one travel lane in each direction, with curb and gutter on both sides of the street and sidewalk on the west side. Adjacent to the project site, there is a sheltered bus stop on the west side of the street and an unsheltered stop on the east side. Parking is prohibited on both sides of the roadway and there are no bicycle facilities.

Discovery Park Boulevard is an east-west local access street that traverses Discovery Park and connects to W Government Way at the east boundary of the park. It has one travel lane in each direction. In the site vicinity, it has curb and gutter on both sides of the street, and sidewalk on the south side, separated from the roadway by a landscape strip. There is no parking on either side of the street and there are no bicycle or transit facilities. It has painted crosswalks along the north, south, and east legs of its intersection with 36th Avenue W, where Discovery Park Boulevard becomes W Government Way.

W Government Way is an east-west Minor Arterial that connects between Discovery Park to the west and Gilman Avenue W to the east. It is a divided roadway, with one travel lane and one parking lane in each direction. It has a raised landscaped median separating the two directions of travel between 36th Avenue W and 34th Avenue W. Between 34th Avenue W and 32nd Avenue W it has a center turn lane and no median. There is a narrow painted bike lane in each direction between the travel lane and parking lane,

and bus stops at about two-block intervals in both directions. The bus stop serving eastbound buses just east of 36th Avenue W is sheltered and the remaining stops are unsheltered.

36th Avenue W is a north-south local access street that traverses most of the Magnolia neighborhood, with intermittent curb, gutter and sidewalk. Where there is curb, it is primarily on the west side of the street adjacent to the Fort Lawton site. Where there is sidewalk, it is primarily located on the east side of the street with a narrow planting strip but no curb or gutter. On-street parking is allowed on both sides; on the east side of the street the planting strip is used for parking. There are painted crosswalks along the north, south, and east legs of its intersection with W Government Way.

34th Avenue W is a north-south Minor Arterial that connects between W Government Way and south Magnolia. It has one travel lane and a parking lane in each direction. There is curb, gutter, and sidewalk on both sides of the street, with a wide planting strip separating the sidewalk from the roadway. There are sheltered and unsheltered bus stops along both sides of the street.

40th Avenue W is a north-south two-lane street that provides connection between Texas Way and the north end of the Magnolia neighborhood. South of W Commodore Way the street is a Collector Arterial with no on-street parking. Near the project site, there is curb and gutter on both sides of the street, and sidewalk on the east side of the street. It has no transit or bicycle facilities.

W Commodore Way is an east-west Collector Arterial oriented roughly parallel to Salmon Bay between 40th Avenue W and 21st Avenue W. The street has one travel lane in each direction. Near the site, there is curb, gutter, and sidewalk on both sides of the street with intermittent planting strip separating the sidewalks from the roadway. Parking is permitted on the north side of the street, and there are no bicycle or transit facilities.

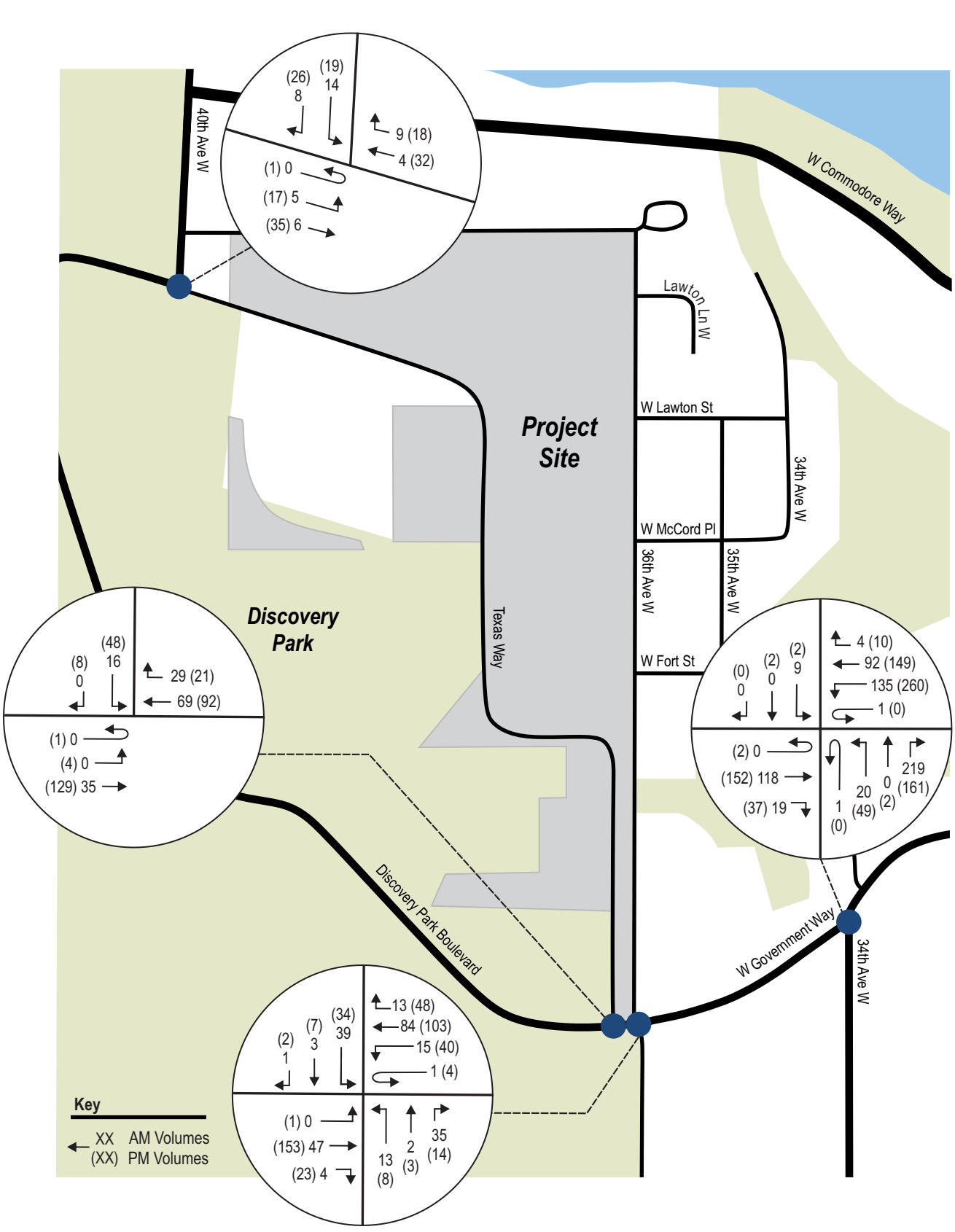
City plans and programs reviewed to determine if there are any transportation improvements planned for the study area include: the *Adopted 2017-2022 Capital Improvement Program*,[1] the *Seattle Bicycle Master Plan*,[2] the *Seattle Bicycle Master Plan – Implementation Plan 2017 – 2021*,[3] and the *Move Seattle – 10-Year Strategic Vision for Transportation*.[4]

No projects were identified that would affect the roadway network or intersection capacity within the study area; therefore, the future conditions analysis assumes that roadway and intersection geometry would remain the same as existing.

2.1.2. Traffic Volumes

Traffic volumes in the site vicinity are primarily generated by local residential development and visitors to Discovery Park. Based on observations by Heffron Transportation at Magnuson Park and seasonal counts performed at that park's entrance, traffic volumes at Discovery Park are expected to be highest during the summertime. They are expected to peak in the morning when parents drop off students who participate in day camps offered at the park. Peak period turning movement counts were conducted at all Fort Lawton site study area intersections by Idax Data Solutions on Tuesday, July 11, 2017. During these periods, the highest existing hourly volumes in the morning began at 8:00 A.M. at all intersections. The highest afternoon hourly volumes varied from times starting between 4:00 and 5:00 P.M. The existing AM and PM peak hour intersection volumes for the Fort Lawton study area are shown on Figure 3.

1 City of Seattle, 2014.
2. SDOT, April 2014.
3 SDOT, April 2017.
4 SDOT, Spring 2015.



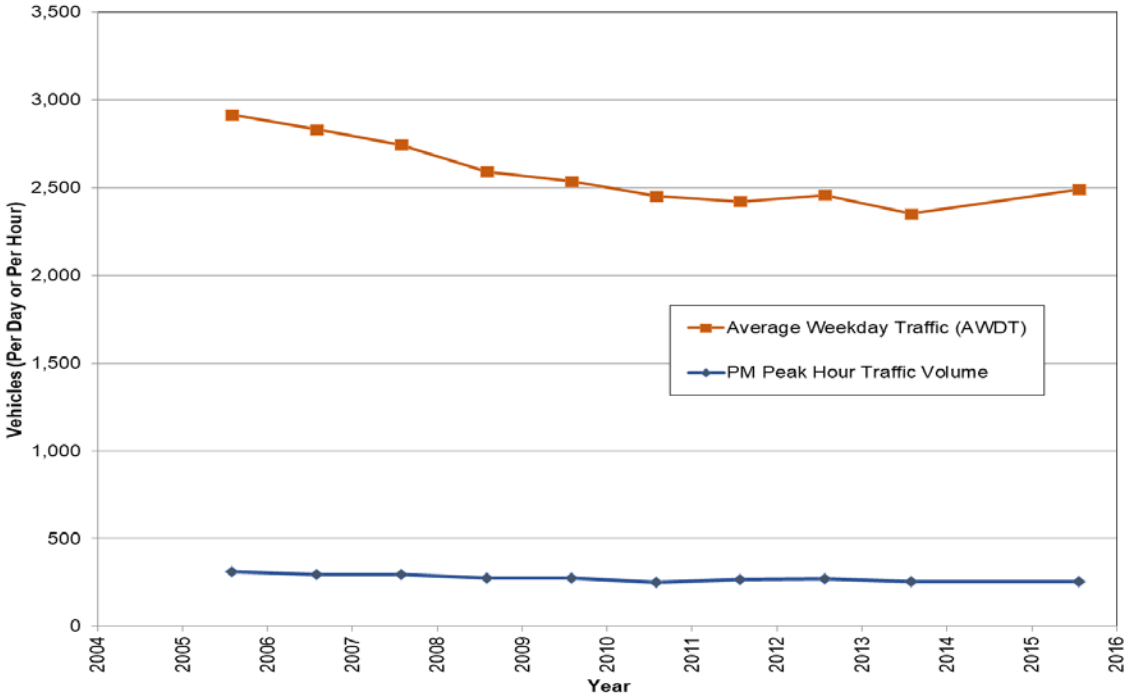
Fort Lawton
Redevelopment

Figure 3
Existing (2017) Peak Hour Traffic Volumes
Near Fort Lawton Site

heffron transportation inc

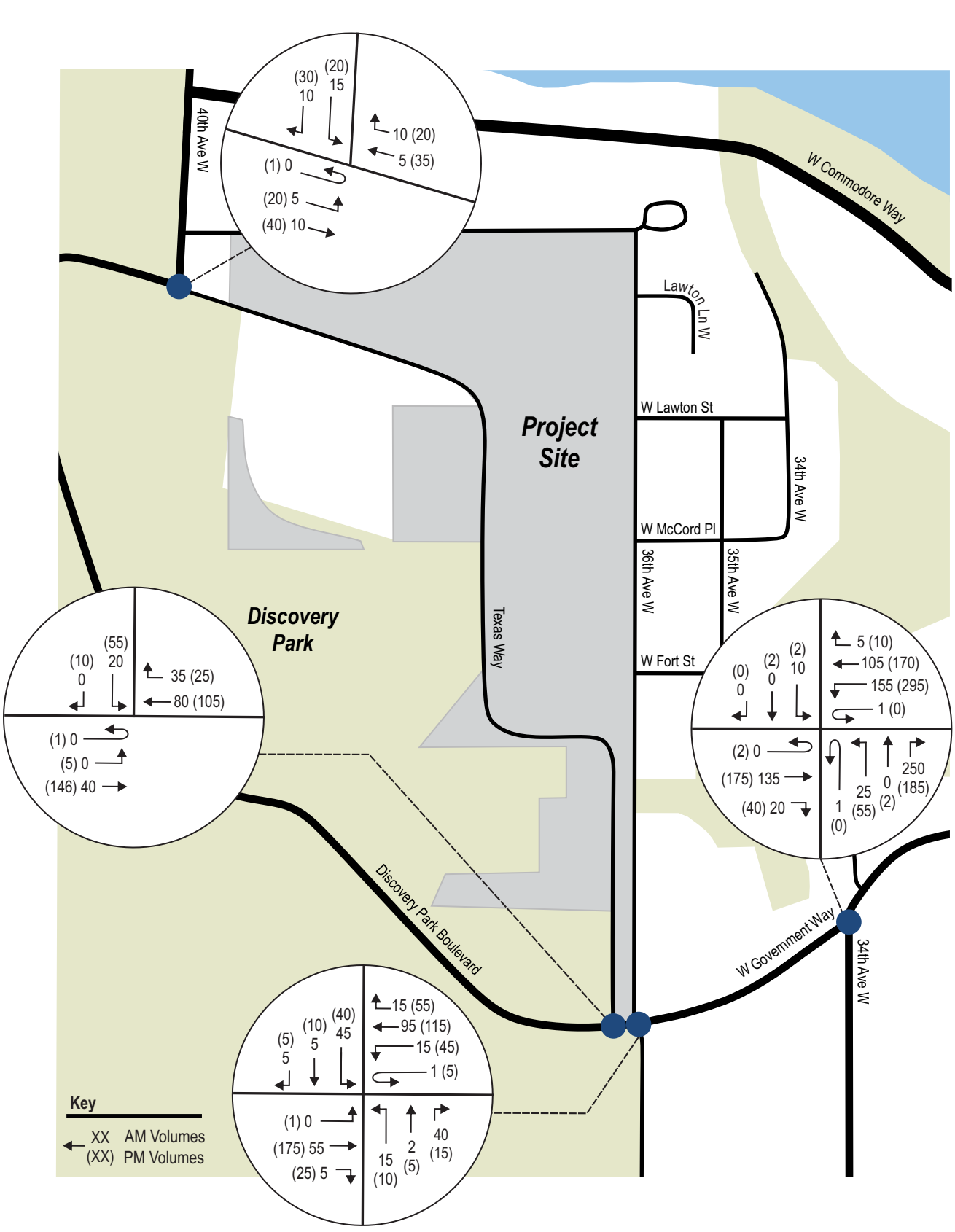
Future traffic volumes were forecast for the year 2030, and reflect a long-term horizon that extends beyond the expected build-out date of the potential redevelopment options, which is 2025. The year 2030 was selected to be consistent with the horizon year of other transportation planning studies in Seattle. Historical traffic counts conducted by SDOT in the study area indicate that both daily and peak hour volumes have decreased in the past decade, as illustrated on Figure 4. In addition, development permit activity was reviewed through the Seattle Department of Construction and Inspections (SDCI) website.[5] The database showed that there are no major development projects planned in the area other than the proposed Fort Lawton Redevelopment. This tool shows that nearly all permits in the immediate site vicinity are to remodel a single-family residence or demolish and replace an existing single-family residence. These projects do not increase traffic since the underlying use of each site would remain. Based upon these trends, it was determined that a rate of 1.0% per year would result in a conservatively high estimate of traffic growth from new development activity in the site vicinity. Therefore, to estimate year 2030 background traffic for the study area intersections, a compound annual growth rate of 1.0% per year was applied to the existing (2017) traffic volumes. The 2030 No Action traffic volumes are shown on Figure 5.

Figure 4. Historical Traffic Volumes on 34th Avenue W (south of W Barrett Street)



Source: Historical counts from SDOT.

[5] SDCI, Property and Building Activity, http://www.seattle.gov/dpd/toolsresources/Map/default.htm, accessed August 2017.



Fort Lawton Redevelopment

Figure 5
Forecast 2030 No Action Traffic Volumes
AM and PM Peak Hours
Near Fort Lawton Site

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2.1.3. Traffic Operations

Level of service (LOS) analysis was conducted for the study area intersections for AM and PM peak hour conditions. Level of service is a qualitative measure used to characterize traffic operating conditions. The quality of traffic conditions is graded into one of six LOS designations, "A" through "F." LOS A is the best and represents good traffic operations with little or no delay to motorists. LOS F is the worst and indicates poor traffic operations with long delays. The level of service definitions and thresholds are provided in Appendix A.

The City of Seattle does not have adopted level of service standard for individual intersections, however, typically considers operation of LOS D as acceptable. The City may tolerate delays in the LOS E or F range for minor movements at unsignalized intersections or at signalized intersections where additional traffic control measures are not applicable or desirable. For signalized intersections that operate at LOS E or F without the project, the City will typically accept increases in delay of less than 5 seconds per vehicle.

Levels of service were determined using procedures in the *Highway Capacity Manual, Sixth Edition*.[6] Delay is calculated using complex equations that consider a number of variables. For example, at unsignalized intersections, delay is determined for vehicles that must stop or yield for oncoming traffic. That delay is related to the availability of gaps in the main street's traffic flow and the ability of a driver to enter or pass through those gaps. At signalized intersections, delay is related to the traffic volume, pedestrian volume, lane geometry, and signal phasing and timing. All level of service calculations were performed using the *Synchro 10.1* traffic operations analysis software. The models reflect current intersection geometries and levels of service were reported using the *HCM 6th Edition* module.

Table 3 presents level of service results for the existing and 2030 No Action (without the project) conditions. As shown, all intersections in the study area currently operate at LOS B or better and are expected to continue at the same levels in 2030 without redevelopment of the Fort Lawton site.

[6] HCM 6th Edition, Transportation Research Board, 2016.

Table 3. Level of Service Near Fort Lawton Site - Existing and 2030 No Action Conditions

Intersection	AM Peak Hour				PM Peak Hour			
	Existing (2017)		2030 No Action		Existing (2017)		2030 No Action	
	LOS[1]	Delay[2]	LOS	Delay	LOS	Delay	LOS	Delay
All-Way Stop-Controlled								
W Government Way / 34th Avenue W	B	10.3	B	11.5	B	11.0	B	12.2
W Government Way / Discovery Park Boulevard / 36th Avenue W	A	8.3	A	8.6	A	9.3	A	10.0
Side-Street Stop-Controlled								
40th Avenue E / Texas Way (*overall*)	*A*	*4.8*	*A*	*4.5*	*A*	*4.6*	*A*	*4.5*
Westbound Movements	A	8.9	A	9.0	A	9.6	A	9.8
Southbound Left Turns	A	7.3	A	7.4	A	7.5	A	7.5
Discovery Park Blvd / Texas Way (*overall*)	*A*	*0.6*	*A*	*0.7*	*A*	*2.5*	*A*	*2.6*
Eastbound Left Turns	A	0.0	A	0.0	A	7.5	A	7.6
Southbound Movements	B	10.3	B	10.6	B	10.7	B	11.2

Source: Heffron Transportation, Inc., September 2017. Determined using the Synchro 10.1 software.

1. *Level of service.*
2. *Average seconds of delay per vehicle.*

2.1.4. Parking

There is one publicly accessible 73-space parking lot on the existing site, between the maintenance facility and the structures to the south, with 73 parking spaces. Three other parking lots on the site are closed to the public and have an unknown number of parking spaces.

2.1.5. Traffic Safety

Collision data for the study area intersections outside of Discovery Park were obtained from SDOT (SDOT does not collect collision data inside the park, and no data are available for the Texas Way/40th Avenue W intersection). The historical collision data, reflecting the period between July 1, 2014 and July 31, 2017, are summarized in Table 4. Two of the intersections had one collision each over the three-year period; the collision at W Government Way/36th Ave W resulted in an injury. Unsignalized intersections with five or more collisions per year and signalized intersections with 10 or more collisions per year are considered high collision locations by the City. These data do not indicate any unusual traffic safety conditions in the study area.

Table 4. Collision Summary - Intersections near Fort Lawton Site

Intersection	Rear-End	Side-Swipe	Left Turn	Right Angle	Ped / Cycle	Other	Total for 3 Years	Average/ Year
Discovery Park Blvd / Texas Way	0	0	0	0	0	0	0	0.0
Discovery Park Blvd / 34th Ave W	0	0	0	1	0	0	1	0.3
W Government Way / 36th Ave W	0	0	1	0	0	0	1	0.3

Source: City of Seattle Department of Transportation, Collision data for the period 07/01/2014 through 7/31/2017.

2.1.6. Transit Facilities and Service

King County Metro Transit (Metro) Route 33 provides two-way bus service along Texas Way through the Fort Lawton site. Within a half mile of the site, Metro Route 24 provides service with stops in both directions along 34th Avenue W. Existing transit service is summarized in Table 5.

Table 5. Existing Transit Service near the Fort Lawton Site

				Number of Peak Period Buses	
Route	Destinations Served	Service Type	Typical Headway (minutes) [a]	Weekday AM Commute Period [b]	Weekday PM Commute Period [c]
24 (& 19)	Magnolia, Seattle Center, Downtown Seattle	Local [d]	20-30	To Downtown: 13 To Magnolia: 6	To Downtown: 6 To Magnolia: 13
33	Discovery Park, Interbay, Seattle Center, Downtown Seattle	Local	15-30	To Downtown: 10 To Discovery Park: 6	To Downtown: 7 To Discovery Park: 9

Source: King County Metro Transit Website, September 2017.

a. "Headway" is the typical frequency between buses

b. AM commute service provided between ~6:00 A.M. and 9:00 A.M.

c. PM commute service provided between ~3:00 P.M. and 6:00 P.M.

d. "Local" service is two-way all-day service, typically provided seven days per week and stopping at all bus stops along the route.

King County Metro's *Long Range Plan*[7] indicates that the existing level of local bus service is planned to remain through its long-range planning year of 2040. It also identifies provision of additional "frequent" bus service (defined as buses that are so frequent that a schedule is not needed, such as that provided by RapidRide service) along a route that includes W Government Way and 34th Avenue W by 2040.

2.1.7. Non-Motorized Transportation Facilities

There is a continuous sidewalk on the park side of Texas Way between Discovery Park Boulevard and the north gate to Fort Lawton; about a 200-foot segment of Texas Way between the gate and 40th Avenue NE has no sidewalk or shoulders. Sidewalks are present on both sides of the street along W Government Way and 34th Avenue W and are intermittent along 36th Avenue W. There is a multi-use path on the south side of Discovery Park Boulevard west of 36th Avenue W, and no sidewalk or walkway on the north side of that street.

W Government Way has marked crosswalks along the north, south, and east legs at its intersection with 36th Avenue W, and across all legs at its intersection with 34th Avenue W. Crosswalks are also present across Texas Way near the Veterans Affairs (VA) facility. Narrow painted bicycle lanes are present on W Government Way in both directions.

Pedestrian and bicycle counts were included in the traffic counts performed for this study and previously described in Section 2.1.2. As noted above, there is a multi-use path on the south side of Discovery Park Boulevard and no sidewalks or walkway on the north side. As such, the counts indicated that almost all pedestrians who cross the Discovery Park Boulevard/36th Avenue W intersection do so across the east and south legs.

There is an extensive non-motorized trail system within Discovery Park just west of the site. The trail system can be reached via Discovery Park Boulevard or Texas Way.

[7] King County Metro, Metro Connects: Long range Plan 2016, Adopted January 2017.

2.2. Talaris Site

Information about the transportation system in the vicinity of the Talaris site was obtained from a recent study of that property, *Transportation Impact Analysis for the 4000 Property*[8] and updated with information from field observation and other sources as described in the following sections.

2.2.1. Roadway Network

The Talaris site is currently accessed from NE 41st Street; a second access to 38th Avenue NE is currently closed to vehicular traffic. As described previously for the Fort Lawton site, speed limits are 25 mph for arterials and 20 mph for non-arterials unless otherwise noted. The street network in the site vicinity is described below.

NE 45th Street/Sand Point Way is a Principal Arterial that provides east-west connection between several Seattle neighborhoods, including Ballard, Fremont, Wallingford and the University District to the west of the site, and Laurelhurst, Windermere, Sand Point and Lake City to the north. In the vicinity of the site, it is six lanes wide to the west of Mary Gates Memorial Drive and four to five lanes to the east. There is a westbound frontage drive on the north side of the street between about 37th Avenue NE and 36th Avenue NE that provides access and parking for adjacent businesses. There is also on-street parking along the south side of the street in this area. There is curb, gutter, and sidewalk on both sides of the street. The posted speed limit in the site vicinity is 35 mph.

NE 41st Street/Mary Gates Memorial Drive NE is a Collector Arterial with one travel lane in each direction and a center two-way left-turn lane. It has curb and gutter on both sides, and a center landscaped median with gaps where left turns are accommodated. Except for along the Talaris site frontage, there is sidewalk on both sides of the street.

38th Avenue NE is a local access street that connects the one-block length between NE 45th Street and NE 44th Street. It is one-way southbound and has head-in angle parking on the west side of the street. It has curb, gutter and sidewalk adjacent to the building located along its west side.

NE 44th Street is a local access street that provides connection between 38th Avenue NE and 36th Avenue NE (the street dead-ends one block to the west). It is a typical 25-foot wide residential street with parking allowed on both sides of the street. When cars are parked on both sides, the travel lane is reduced to one direction at a time.

City plans and programs described in Section 2.1.1 were reviewed to determine if there are any transportation improvements planned for the study area. No specific projects were identified that would affect geometry of the study area streets. However, the City's *University Area Transportation Action Strategy*[9] and the *Children's Major Institution Master Plan*[10] identify Intelligent Transportation System enhancements to improve traffic flows along Sand Point Way NE and NE 45th Street with the use of smart signal systems. To account for this future improvement, traffic signal timings were optimized for analysis of future conditions.

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8 The Transpo Group, October 2013.
9 Seattle Department of Transportation, Mirai Associates, and Underhill Company, August 2008.
10 Seattle Children's and ZGF Architects, Seattle Children's Hospital Compiled Final Master Plan, Approved by City of Seattle, May 12, 2010.

2.2.2. Traffic Volumes

The study area for the Talaris site includes the following four intersections:

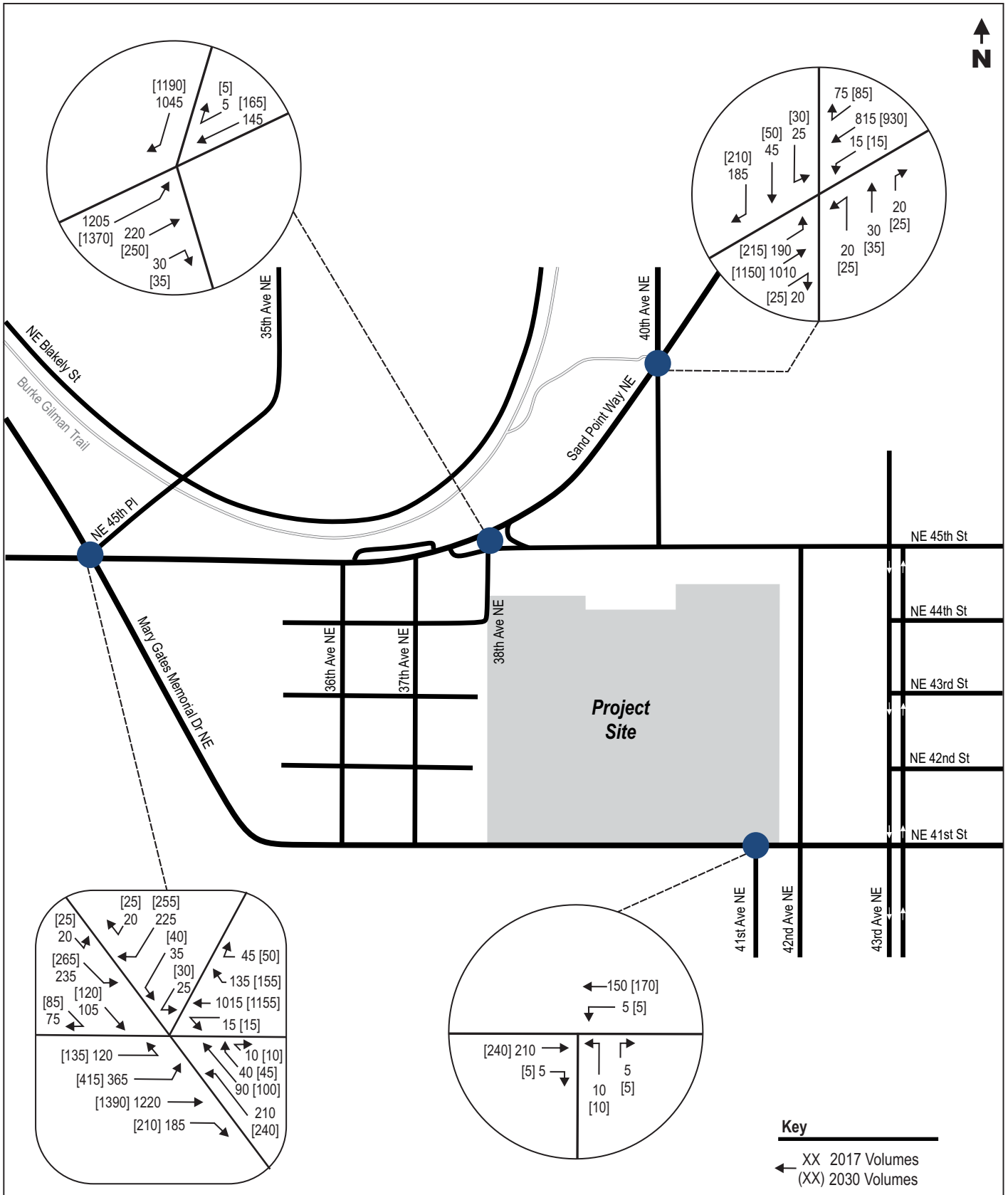
- NE 45th Street/Mary Gates Memorial Drive NE
- NE 45th Street/Sand Point Way NE
- Sand Point Way NE/40th Avenue NE
- NE 41st Street/41st Ave NE

The NE 41st Street/41st Ave NE intersection is unsignalized and the other three are controlled with a traffic signal. Two studies conducted in the area, the *Transportation Impact Analysis for the 4000 Property*[11] and *Sand Point Way Corridor Study*[12] found that the highest volume traffic occurs during the PM peak hour; therefore, the PM peak hour was analyzed for the Talaris site.

PM peak hour intersection turning movements counts for the four study area intersections were performed in October 2013 for the prior study of the Talaris site. That study had forecast conditions to 2017 assuming a 1% per year background growth rate plus traffic generated by three large projects in the vicinity including the Children's Hospital Expansion, the NE 46th Street Multi-Use Building, and the University Village Expansion.

Future traffic volumes were forecast for the year 2030, using a growth rate of 1% per year. This growth rate was derived for the *Sand Point Way Corridor Study.*[13] The Existing (2017) and 2030 No Action traffic volumes for the Talaris site are shown on Figure 6.

11 The Transpo Group, October 2013.
12 Heffron Transportation, Inc., Draft Report, March 2017.
13 ibid.



Fort Lawton
Redevelopment

Figure 6
Existing (2017) and 2030 No Action
PM Peak Hour Traffic Volumes
Near Talaris Site

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2.2.3. Traffic Operations

Traffic operations analyses were performed using the methodology described in Section 2.1.3. Table 6 presents level of service results for the existing and 2030-without-project conditions. As shown, the "five corners intersection" at NE 45th Street/Union Bay Place/Mary Gates Memorial Drive currently operates at LOS E during the PM peak hour, and is expected to degrade to LOS F by 2030. The intersection at Sand Point Way/40th Avenue NE currently operates at LOS D and the other two analysis intersections are operating at LOS B; all are expected to remain at those levels in 2030.

Table 6. Level of Service Near Talaris Site – Existing and 2030 No Action Conditions

Intersection	PM Peak Hour			
	Existing (2017)		2030 w/o Project	
	LOS	Delay	LOS	Delay
Signalized				
NE 45th Street / Union Bay Place NE / NE 45th Place Mary Gates Memorial Drive NE	E	63.7	F	87.4
NE 45th Street / Sand Point Way NE / 38th Avenue NE	B	12.6	B	12.2
Sand Point Way NE / 40th Avenue NE	D	39.7	D	54.7
Side-Street Stop-Controlled				
NE 41st Street / 41st Avenue NE (*overall*)	*A*	*0.7*	*A*	*0.6*
Westbound Left Turns	A	8.2	A	8.3
Northbound Movements	B	11.5	B	11.9

Source: Heffron Transportation, Inc., September 2017. Determined using the Synchro 10.1 software. Cycle lengths, offsets, and splits optimized for signalized intersections in the NE 45th Street / Sand Point Way corridor for the 2030 w/o project condition.

1. *Level of service.*
2. *Average seconds of delay per vehicle.*

2.2.4. Parking

The existing Talaris site has a substantial amount of on-site parking that serves the existing buildings and its function as a conference center. Adjacent to the site, on-street parking is provided along all of the streets that front or connect to the site.

2.2.5. Traffic Safety

Collision data for the study area intersections surrounding the project site were obtained from SDOT. Data reflecting the period between July 1, 2014 and July 31, 2017 are summarized in Table 7.

On average, all of the study area intersections experienced fewer than two collisions per year. One of the reported collisions at the NE 45th Street/Mary Gates Memorial Drive intersection involved a bicyclist. There were no fatalities. As described previously, the City typically considers unsignalized intersections with five or more collisions per year and signalized intersections with 10 or more collisions per year as considered high collision locations. Overall, these data do not indicate any unusual traffic safety conditions, and none of the intersections would meet the definition of a high collision location.

Table 7. Collision Summary – Intersections Near Talaris Site

Intersection	Rear-End	Side-Swipe	Left Turn	Right Angle	Ped / Cycle	Other	Total for 3 Years	Average/ Year
NE 45th St/Mary Gates Mem. Drive	1	2	0	0	1	0	4	1.3
NE 45th St/38th Ave NE	0	0	0	0	0	0	0	0
Sand Point Way NE/40th Ave NE	0	0	0	1	0	0	1	0.3
NE 41st St/41st Ave NE	0	0	0	0	0	0	0	0

Source: City of Seattle Department of Transportation, Collision data for the period 07/01/2014 through 7/31/2017.

2.2.6. Transit Facilities and Service

Metro provides bus service near the Talaris site. The nearest stops, serviced by Route 78, are located at the southeast corner of the site, at the NE 41st / 42nd Ave NE intersection. Metro Routes 31, 32, 65, 67, and 75 also serve the site, with stops along NE 45th Street, at the intersections of 36th Avenue NE and 42nd Avenue NE. Existing transit service is summarized in Table 8.

Table 8. Existing Transit Service near near the Talaris Site

				Number of Peak Period Buses	
Route	Destinations Served	Service Type	Typical Headway (minutes) [a]	Weekday AM Commute Period [b]	Weekday PM Commute Period [c]
31	Magnolia, Queen Anne Fremont, University District, Sand Point Way	Local	15-30	To Magnolia: 4 To Sand Point Wy: 8	To Magnolia: 7 To Sand Point Wy: 6
32	Seattle Center, Queen Anne, Fremont, University District, Sand Point Way	Local	10-30	To Seattle Center: 5 To Sand Point Wy: 8	To Seattle Center: 7 To Sand Point Wy: 10
65	Jackson Park, Lake City, Wedgwood, Sand Point Way, University District	Local	10-15	To Jackson Park: 16 To Sand Point Wy: 17	To Jackson Park: 17 To Sand Point Wy: 17
67	Northgate, Roosevelt, University District, Sand Point Way	Local	10-15	To Northgate: 16 To Sand Point Wy: 18	To Northgate: 18 To Sand Point Wy: 18
75	Northgate Transit Center, Lake City, Sand Point Way, View Ridge, University District	Local	10-15	To Northgate: 11 To Sand Point Wy: 15	To Northgate: 16 To Sand Point Wy: 18
78	UW Medical Center, UW Campus, Montlake, University Village, Seattle Children's Hospital	Local	15-45	To UW: 5 To Sand Point Wy: 5	To UW: 5 To Sand Point Wy: 4

Source: King County Metro Transit Website, September 2017.

a. "Headway" is the typical frequency between buses

b. AM commute service provided between ~6:00 A.M. and 9:00 A.M.

c. PM commute service provided between ~3:00 P.M. and 6:00 P.M.

d. "Local" service is two-way all-way service, typically provided seven days per week and stopping at all bus stops along the route.

King County Metro's *Long Range Plan*[14] indicates that the existing level of local bus service is planned to remain through its long-range planning year of 2040. It also identifies provision of additional RapidRide service (frequent two-way bus service with amenities that facilitate faster passenger loading and unloading) by 2025 for a route that includes NE 45th Street and Sand Point Way NE by 2025.

2.2.7. Non-Motorized Transportation Facilities

All of the study area streets have sidewalks on both sides, except for NE 41st Street, which has no sidewalk along the Talaris site frontage (north side of the street). All signalized intersections have pedestrian crosswalks and signals, and there is a pedestrian-only signal to assist crossing NE 45th Street at 36th Avenue NE.

The Burke-Gilman Trail is located north of 45th Avenue NE and west of Sand Point Way. There are connections to the trail at 36th Avenue NE and from the 40th Avenue NE/Sand Point Way intersection.

Pedestrian facilities on the existing Talaris campus consist of short segments of sidewalk where drop-off/pick-up activities occur as well as paved trails that connect between buildings. There are no pedestrian facilities along the driveways that connect to the city street network.

[14] King County Metro, Metro Connects: Long range Plan 2016, Adopted January 2017.

3. TRANSPORTATION IMPACTS

This chapter describes the conditions that would exist with each of the EIS alternatives at build-out. It includes detailed trip generation estimates for each alternative, and assesses how increased vehicular traffic, transit ridership and pedestrian traffic would affect the transportation system. All impact analysis was performed for year 2030 conditions.

3.1. Fort Lawton Site

3.1.1. Roadway Network

For Alternatives 1 and 3, Texas Way would continue to be the primary vehicle access street for the site, and no vehicular access would be provided on 36th Avenue W. A grid of new local access streets and a shared parking lot would be created east of Texas Way to serve the new housing in that area. Senior housing and its parking would be located on the west side of the street. Pedestrian facilities would be provided along all of the new streets and upgraded along Texas Way. King County Metro bus stops would be located on both sides of Texas Way, approximately where the stops are located today.

For Alternative 2, Texas Way would be reconfigured and extended north to W Lawton Street. The existing street grid in the neighborhood to the east of 36th Avenue W—consisting of W Fort Street, W McCord Place and W Lawton Street—would be extended west to Texas Way. New cul-de-sac streets would extend west of Texas Way. This would create a connected grid for the new single-family neighborhood.

3.1.2. Trip Generation

Trip generation was derived for each of the development alternatives described in Section 1.1.3. The assumptions for each land use type are described below and presented in order of highest trip generators first. The combined trips for each alternative are presented at the end of this section.

Market Rate Single-Family Homes

Trip generation for the market-rate homes was determined using the recommended methodology in the Institute of Transportation Engineers (ITE) current edition of the *Trip Generation Handbook.*[15] ITE recognizes that development projects located in dense urban environments generate fewer trips than those in suburban settings because there are more commute options.

Average ITE trip rates for single-family homes (Land Use Code 210) were adjusted to account for anticipated mode-of-travel characteristics (e.g. carpool, transit, and non-motorized), which were derived from 'Journey-to-Work' survey results from the year 2010 Census compiled by the PSRC. From these surveys, results for residents living in Transportation Analysis Zones (TAZs) 77 and 78 (the zones that include and surround the project site) were applied. The data indicate that about 5% of residents living in these zones walk or bike to work, 5% work for home or do not commute, 25% use transit, and the remaining 65% drive or carpool. The average vehicle occupancy rate for residents in these zones was derived to be 1.08 persons per vehicle. The adjusted rates are summarized in Table 9.

[15] Institute of Transportation Engineers, 3rd Edition, August 2014.

Affordable Townhouses and Homes

The mode-of-travel rates described above were applied to the ITE trip generation rates for low-rise residential condominiums/townhouses (Land Use Code 231), which are defined as ownership units. The adjusted rates are summarized in Table 9.

Affordable-Rental Apartments

The mode-of-travel rates described above were applied to the ITE trip generation rates for apartments (Land Use Code 220), which are defined as rental units. The adjusted rates are summarized in Table 9.

Housing for Formerly Homeless Seniors

Analysis performed for the *Ballard Senior Housing Project*[16] was reviewed to determine the appropriate trip generation for the senior housing element. The project included interviews of administrative staff at five existing low-income senior housing facilities in the Seattle area (Cabrini First Hill, Cascade Senior, Providence Elizabeth, Providence Gamelin, and Providence Vincent). These interviews determined that very few senior housing residents own vehicles. On average, fewer than 14% of the residents owned a vehicle, and very few used their vehicles daily or during peak commute periods. Most trips generated by low-income senior housing projects are generated by staff, caregivers, and visitors. Staff and support trips are typically highest on weekdays and correspond to typical workday hours; visitor trips are highest on weekends. Based on the five surveyed low-income facilities, it is assumed that the senior housing would generate 1 peak hour trip for every 10 residential units (a rate of 0.10 trips per unit). For comparison, the ITE's *Trip Generation Manual*[17] has rates for market-rate senior housing (Land Use Code 252)—which includes retirement communities, age-restricted housing, and active adult communities—of 0.20 trips per unit during the AM peak hour and 0.25 trips during the PM peak hour. Therefore, given the low vehicle-ownership rate for low-income and formerly homeless seniors, the assumed rate is reasonable.

Table 9 summarizes the rates assumed for the various residential land uses. As shown, the highest per-unit rates are associated with the single-family homes, and the rates decline with smaller units and rental condition. The lowest rates are associated with senior housing.

Table 9. Trip Generation Rates Assumed for Various Residential Uses

Land Use	Daily Trip Rate/Unit (50% in/50% out)	AM Peak Hour			PM Peak Hour		
		In %	Out %	Rate/Unit	In %	Out %	Rate/Unit
Single-Family (Market Rate) [1]	6.20	25%	75%	0.49	63%	37%	0.49
Townhomes (Ownership) [1]	5.81	25%	75%	0.43	58%	42%	0.51
Apartments (Affordable/Rental) [1]	4.30	20%	80%	0.33	65%	35%	0.40
Senior Housing (Low Income) [2]	1.70	80%	20%	0.10	20%	80%	0.10

1. *Rates from Institute of Transportation Engineers (ITE) Trip Generation Manual that were adjusted assuming 65% vehicle trips per Puget Sound Regional Council (PSRC) vehicle travel data. Rates for Land Use Codes 210 (Single-family home), 220 (Apartment), and 231 (Residential Condominium/Townhouse) were used as the base rates.*
2. *Derived by Heffron Transportation using data from five existing low-income senior housing projects in Seattle.*

16 Heffron Transportation, Inc., Ballard Senior Housing Project Parking Needs Assessment, July 25, 2012.
17 ITE, Trip Generation, 9th Edition, 2012.

Park and Athletic Fields

Two of the project alternatives (Alternatives 1 and 3) would add acreage to Discovery Park and build new athletic fields. The fields would have no lights, so activities would be limited to daylight hours. Since Discovery Park is very large and already attracts passive use of its many trails and open spaces, the additional passive-use acreage is not expected to generate new vehicle trips to the site. However, the new athletic fields would host scheduled activities such as youth and adult recreational athletic practices and games, and would generate new trips.

Trip generation for the athletic fields was estimating based on analysis presented in the *Parking and Transportation Impact Analysis for the Loyal Heights Playfield Improvements.*[18] That study developed trip rates based on observations and traffic counts at several existing fields throughout Seattle. Surveys were performed at Lower Woodland Field #2, Lower Woodland Field #7, and at Queen Anne Bowl. All three of these fields are used year-round for a variety of activities including youth and adult soccer, lacrosse, and adult and youth ultimate. In addition, these fields have some additional open space that is occasionally used for informal practice activities such as small unorganized football, soccer, rugby, or ultimate.

Unlit fields are typically scheduled for two events each weekday during seasons when natural lighting conditions allow (late spring through early fall), and one event each weekday during seasons with more limited daylight. Scheduled slots usually begin at 4:00 P.M. and 5:30 P.M. and range from 90 minutes to two hours. The peak traffic generation occurs in the period between the scheduled slots when the second set of users arrives and the first set of users departs. To be conservative, this overlap was assumed to occur during the PM peak hour. Athletic fields are assumed to generate no trips during the weekday AM peak hour.

Based on the observations and Seattle Parks and Recreation Department use schedules, trip estimates were prepared for typical adult and youth activities:

1. **Average adult game** (soccer or ultimate) – Participants arrive in the hour preceding the game start time, park for the duration of the game, and then leave after the game ends. To be conservative, it was assumed that each participant in an adult game drives to the field alone, even though some carpooling was observed at other fields. Therefore, each participant generates two trips: one to the site before the game and one from the site after the game. Based on observations, two consecutive adult soccer games are estimated to generate an average of 66 trips (33 in, 33 out).

2. **Average youth activity** (game or practice for soccer, ultimate or lacrosse) – Youth practices typically generate more trips than games since parents will drop children off for the practice and then return to pick them up. At games, however, parents will stay for the event. Carpooling is more common for youth activities because one parent will drive two or more youth to the field. Youth athletics are estimated to generate about three trips per participant on average. Use of a field for youth activities is estimated to generate an average of about 70 trips (35 in, 35 out).

As noted above, youth practices would generate the highest number of trips and was assumed for the purpose of traffic analysis. Each field was assumed to support one set of youth practices. Therefore, two athletic fields would generate 140 peak hour trips (70 in and 70 out). For this analysis, all are conservatively assumed to coincide with the commute PM peak hour. On a daily basis, some casual (unscheduled) use of the fields is also expected, and each field was assumed to generate 50 additional trips during the day (25 in and 25 out).

[18] Heffron Transportation, Inc., March 14, 2006.

Combined Trip Generation for Fort Lawton Site Alternatives

The trip generation rates described above were applied to the three redevelopment alternatives at Fort Lawton (Alternatives 1, 2 and 3). The results are summarized in Table 10. As shown, Alternative 1 would generate the most trips and was used for subsequent traffic operations analysis.

Table 10. Vehicle Trips Generated by Fort Lawton Site Redevelopment Alternatives

Alternative / Land Use	# of Units/ Fields	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
			In	Out	Total	In	Out	Total
Alternative 1								
Senior Housing	86	150	7	2	9	2	7	9
Apartments (Rental)	100	430	7	26	33	26	14	40
Townhomes (Ownership)	52	300	6	16	22	16	11	27
Single-Family (Market Rate)	0	0	0	0	0	0	0	0
Athletic Fields	2	380	0	0	0	70	70	140
Total Vehicle Trips		1,260	20	44	64	114	102	216
Alternative 2								
Senior Housing	0	0	0	0	0	0	0	0
Apartments (Rental)	0	0	0	0	0	0	0	0
Townhomes (Ownership)	0	0	0	0	0	0	0	0
Single-Family (Market Rate)	113	700	14	41	55	35	20	55
Athletic Fields	0	0	0	0	0	0	0	0
Total Vehicle Trips		700	14	41	55	35	20	55
Alternative 3								
Senior Housing	0	0	0	0	0	0	0	0
Apartments (Rental)	0	0	0	0	0	0	0	0
Townhomes (Ownership)	0	0	0	0	0	0	0	0
Single-Family (Market Rate)	0	0	0	0	0	0	0	0
Athletic Fields	3	570	0	0	0	105	105	210
Total Vehicle Trips		570	0	0	0	105	105	210

Source: Heffron Transportation, Inc., September 2016.

3.1.3. Trip Distribution and Assignment

The trip pattern for residential uses at Fort Lawton would differ from those associated with the athletic fields. During the peak hours, most residential trips are associated with commute trips to major employment areas such as downtown Seattle, Ballard, and Interbay; some peak hour resident trips could be to local areas such as schools and shopping districts. As previously described, peak trips to and from the athletic fields would be associated with youth practice activities, and as such, are primarily expected to be attracted from the local Magnolia neighborhood.

The trip distribution pattern for the residential trips was developed using data from the City of Seattle's Concurrency Director's Rule 5-2009. This database provides vehicle trip patterns for various types of land uses for specific zones in the city. The data were compiled to determine inbound and outbound

patterns during the peak hours. The data indicated that 78% of all inbound trips during the PM peak hour would be from areas outside of Magnolia, the remaining 22% would be local Magnolia trips. For the outbound trips, 38% would be local Magnolia trips and the rest are to outside neighborhoods. The reverse of these patterns was assumed for the AM peak hours.

The City's database does not have information about recreational trips. Therefore, the trip distribution pattern for the athletic field trips was based on existing travel patterns at the entrance to Discovery Park as well as trip patterns at the other study area intersections. The two trip patterns are shown on Figure 7.

AM and PM peak hour trips generated by the three different development alternatives were assigned to the study area intersections according to the trip patterns. These trips are shown on Figure 8.

3.1.4. Traffic Operations

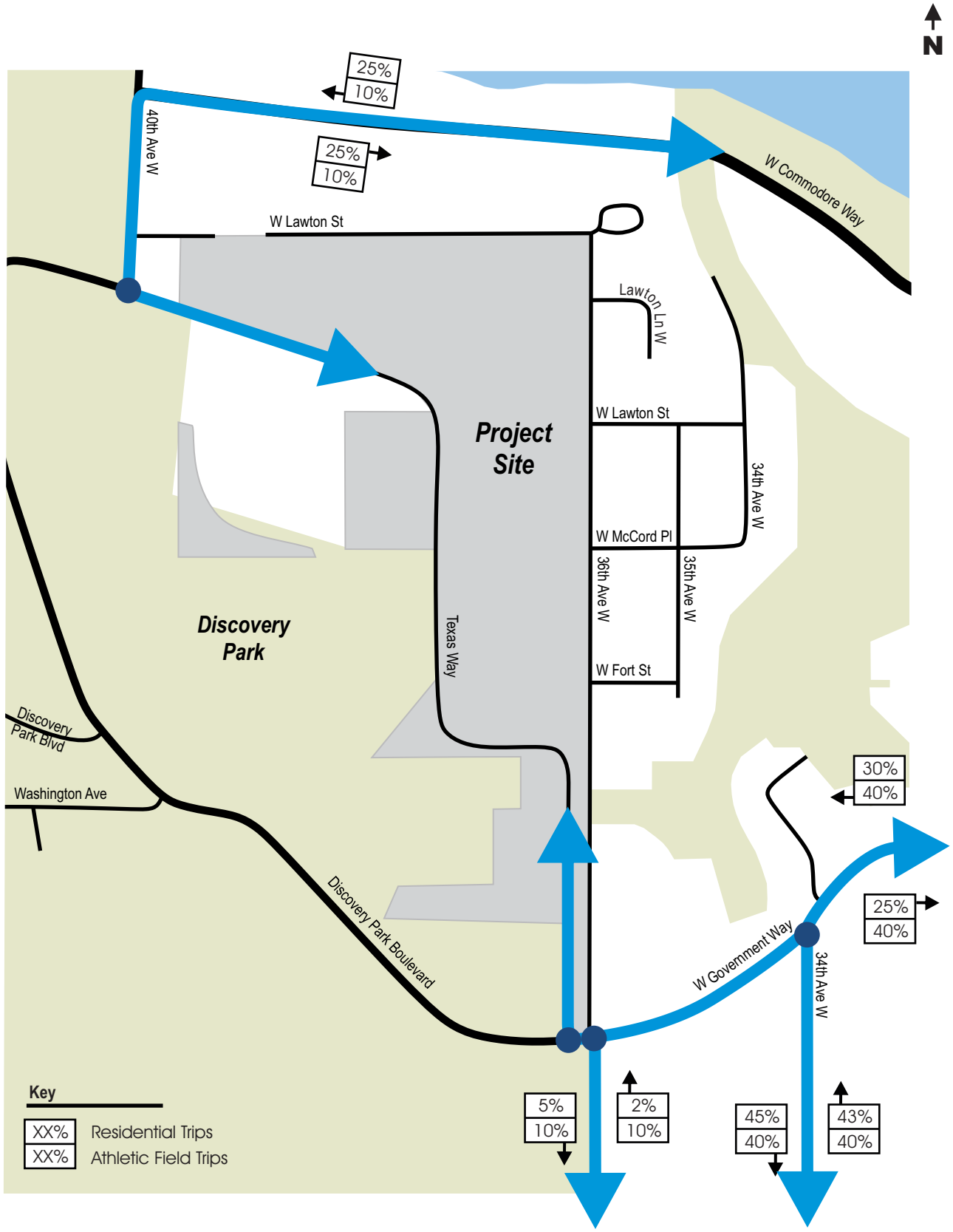
The trip generation and trip assignments determined that Alternative 1 would add the most traffic to area intersections. Traffic operations with Alternative 1 were evaluated to show the potential impact associated with the project. The results are presented in Table 11 and are compared to the No Action condition. As shown, all study area intersections would continue to operate at LOS B or better with slight increases in delay associated with Alternative 1. The other alternatives would operate similar to or better than those presented below.

Table 11. Level of Service near Fort Lawton Site –2030 Conditions

	AM Peak Hour				PM Peak Hour			
	2030 No Action		2030 w/ Alt. 1		2030 No Action		2030 w/ Alt. 1	
	LOS[1]	Delay[2]	LOS	Delay	LOS	Delay	LOS	Delay
All-Way Stop-Controlled Intersections								
W Government Way / 34th Avenue W	B	11.5	B	11.9	B	12.2	B	14.1
W Government Way / Discovery Park Boulevard / 36th Avenue W	A	8.6	A	8.9	A	10.0	B	12.6
Side-Street Stop-Controlled Intersections								
40th Avenue E / Texas Way (*overall*)	*A*	*4.5*	*A*	*5.5*	*A*	*4.5*	*A*	*5.3*
Westbound Movements	A	9.0	A	9.0	A	9.8	B	10.1
Southbound Left Turns	A	7.4	A	7.4	A	7.5	A	7.6
Discovery Park Blvd / Texas Way (*overall*)	*A*	*0.7*	*A*	*1.6*	*A*	*2.6*	*A*	*4.9*
Eastbound Left Turns	A	0.0	A	0.0	A	7.6	A	7.9
Southbound Movements	B	10.6	B	11.1	B	11.2	B	14.5

Source: Heffron Transportation, Inc., September 2017. Determined using the Synchro 10.1 software and the HCM 6th Edition module.

1. *Level of service.*
2. *Average seconds of delay per vehicle.*



Fort Lawton
Redevelopment

Figure 7
Trip Distribution Pattern for Fort Lawton Site

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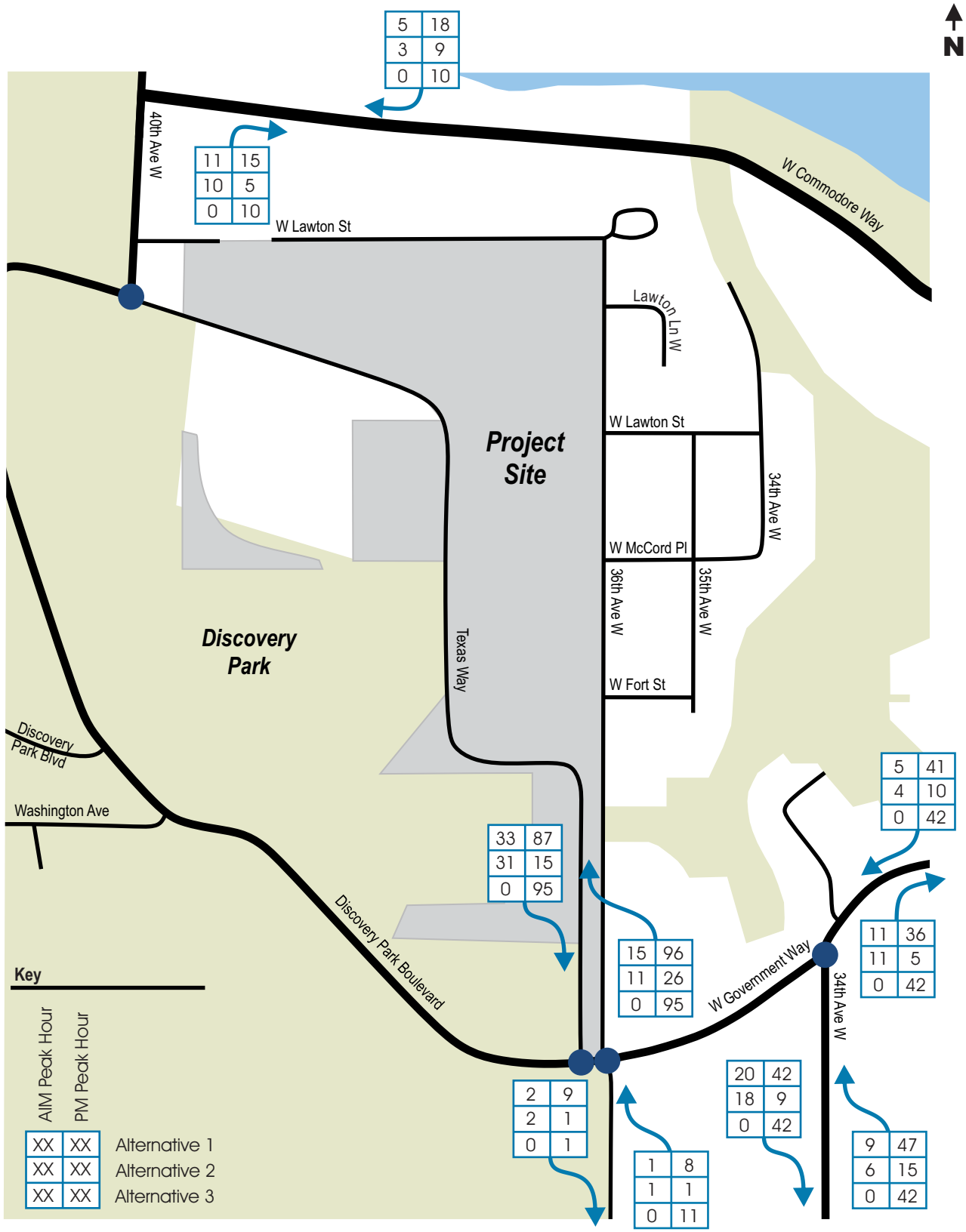

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Figure 8
Project Trips
for Fort Lawton Site

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3.1.5. Parking

Parking supply for each of the alternatives was summarized in Table 2. The proposed parking supply would be per the Land Use Code requirements for various types of uses. The ratios are as follows:

- Single-family housing - 2.25 spaces per unit
- Multi-family housing (rowhouses and townhouses) – 1.24 spaces per unit (including on-street spaces)
- Senior housing – 0.21spaces per unit
- Athletic fields – 30 spaces per field

Parking demand for single-family and multi-family units was determined from data compiled by the Puget Sound Regional Council (PSRC) from the 2010 Census. Data about vehicle ownership showed that the average number of vehicles for owner-occupied residences in the areas closest to the site (Census Tracts 57.00, 58.01 and 58.02) ranged from 1.59 to 1.78 vehicles per dwelling unit. Rental units ranged from 1.14 to 1.38 vehicles per dwelling unit. If the multi-family units generated demand at the upper rate, it would exceed the proposed supply by about 22 vehicles. Parking management measures that should be considered to reduce demand are described in the *Mitigation* section of this report.

Parking demand for the senior housing component was determined from the previously described analysis for the *Ballard Senior Housing Project.* The parking rate for a low-income senior housing project was determined to be 0.21 spaces per unit, which accounted for residents with vehicles, staff, caregivers, and visitors. Therefore, the proposed supply would accommodate the peak demand of 18 vehicles.

Parking demand for the proposed athletic fields was based on analysis presented in the previously described *Parking and Transportation Impact Analysis for the Loyal Heights Playfield Improvements*. That study developed parking rates based on observations and traffic counts at several existing fields throughout Seattle including Lower Woodland Field #2, Lower Woodland Field #7, and at Queen Anne Bowl. Those studies determine that the typical peak parking demand for each athletic field was 33 vehicles for either a youth game (for which parents would park and watch) or an adult game or practice. This demand would exceed the 30 spaces proposed for each field. Given that the peak demand would occur in the evenings, it may be possible to share existing parking with either the VA facility or the Seattle Parks Maintenance Facility. This measure is described in the *Mitigation* section of this report.

Table 12 summarizes the parking supply and estimated demand for the Fort Lawton site

Table 12. Parking Supply and Demand – Fort Lawton Site

	Alternative 1		Alternative 2		Alternative 3	
	Proposed Supply	Estimated Peak Demand	Proposed Supply	Estimated Peak Demand	Proposed Supply	Estimated Peak Demand
Multifamily Housing	188	173 to 210	--	--	--	--
Single-family Housing	0	--	254	180 to 201	--	--
Senior Housing	18	18				
Athletic Fields	60	66	--	--	90	99
Total	266	257 to 294	254	180 to 201	90	99

Demand estimated by Heffron Transportation, Inc, September 2017. Based on rates described above.

3.1.6. Traffic Safety

The project would increase traffic at the study-area intersections and statistically, the number of collisions could increase as traffic increases. However, historical collision data show that there are no existing safety issues in the site vicinity. Alternatives 1 and 3 would not change the roadway network, although several new intersections would be created along Texas Way. Alternative 2 would extend the existing grid of streets, creating several four-legged intersections where T-intersections now exist along 36th Avenue W. The volumes at these intersections are expected to be low and operate similar to other intersections in the residential neighborhood, and are not expected to result in new safety issues in the neighborhood.

3.1.7. Transit

Mode-of-travel data from the 2010 Census determined that 25% of residential trips in Magnolia occur by transit. None of the athletic field trips are expected to use transit. At this rate, Alternative 1 is expected to generate 28 peak hour transit trips, Alternative 2 would generate 21 peak hour transit trips, and Alternative 3 would generate no transit trips. The projected additional transit demand for each alternative averages to about 2 to 3 riders per bus that currently serves the project site during the peak hour, as summarized previously in Table 5. The existing bus service would be adequate to serve this demand; therefore, no adverse transit impacts are expected to result from the Fort Lawton site alternatives.

3.1.8. Non-Motorized Transportation

For Alternative 1, 2 or 3, Texas Way W would be improved to add a sidewalk or walkway on the east side of the street adjacent to new development areas. In addition, the existing sidewalk on the west side of the street would be maintained.

Several new pedestrian new crosswalks are proposed to connect with housing clusters and transit stops. All new crosswalk locations should have adequate sight lines for motorists and pedestrians, and should be designed to meet *Manual on Uniform Traffic Control Devices* (MUTCD) *for Streets and Highways*[19] standard ladder stripe standards (existing crosswalks are now painted in non-standard yellow). ADA curb ramps and landings should be provided on both sides of the street.

[19] US Department of Transportation – Federal Highway Administration, *2009 Edition*.

3.2. Talaris Site

3.2.1. Roadway Network

Analysis of the Talaris site assumes that under Alternatives 2 and 3 existing buildings would be repurposed and new buildings would be constructed for housing, and existing site access would likely remain in the existing configuration. Some existing internal access roads may be removed or relocated to allow for new buildings. Access was assumed to be retained at NE 41st Street and re-established to 38th Avenue NE. All roadways would be upgraded to include a sidewalk and/or separated walkways as needed to meet the City's street standards.

3.2.2. Trip Generation

The same methodology used to derive trip generation rates described previously for the Fort Lawton site alternatives was applied to the Talaris site. The mode-of-travel rates for residential uses in the neighborhood surrounding the Talaris site differs slightly from that of the area around the Fort Lawton site. A higher percentage of residents walk or bike to work given the proximity to the Burke-Gilman Trail and the University of Washington; however, fewer ride transit. Overall, the percentage of residents who use vehicles (either drive alone or carpool) is nearly identical to Fort Lawton, at 64.4% of all residents (compared to 65% at Fort Lawton). For this reason, the same adjusted trip rates previously summarized in Table 9 were applied to the residential components for the Talaris site alternatives. No athletic fields are proposed as part of the Talaris site alternatives. Estimated trips for the Talaris site alternatives are summarized in Table 13.

No development of the Talaris site is proposed under Alternative 1. Alternatives 2 and 3 would generate the same number of trips, with an estimated 880 trips per day (440 in and 440 out), 64 trips during the AM peak hour, and 76 trips during the PM peak hour.

Table 13. Vehicle Trips Generated by Talaris Site Revelopment Alternatives

Alternative / Land Use	# of Units/ Fields	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
			In	Out	Total	In	Out	Total
Alternative 1	No development of Talaris Site Proposed							
Alternative 2								
Senior Housing	86	150	7	2	9	2	7	9
Apartments (Rental)	100	430	7	26	33	26	14	40
Townhomes (Ownership)	52	300	6	16	22	16	11	27
Single-Family (Market Rate)	0	0	0	0	0	0	0	0
Athletic Fields	0	0	0	0	0	0	0	0
Total Vehicle Trips		880	20	44	64	44	32	76
Alternative 3								
Senior Housing	86	150	7	2	9	2	7	9
Apartments (Rental)	100	430	7	26	33	26	14	40
Townhomes (Ownership)	52	300	6	16	22	16	11	27
Single-Family (Market Rate)	0	0	0	0	0	0	0	0
Athletic Fields	0	0	0	0	0	0	0	0
Total Vehicle Trips		880	20	44	64	44	32	76

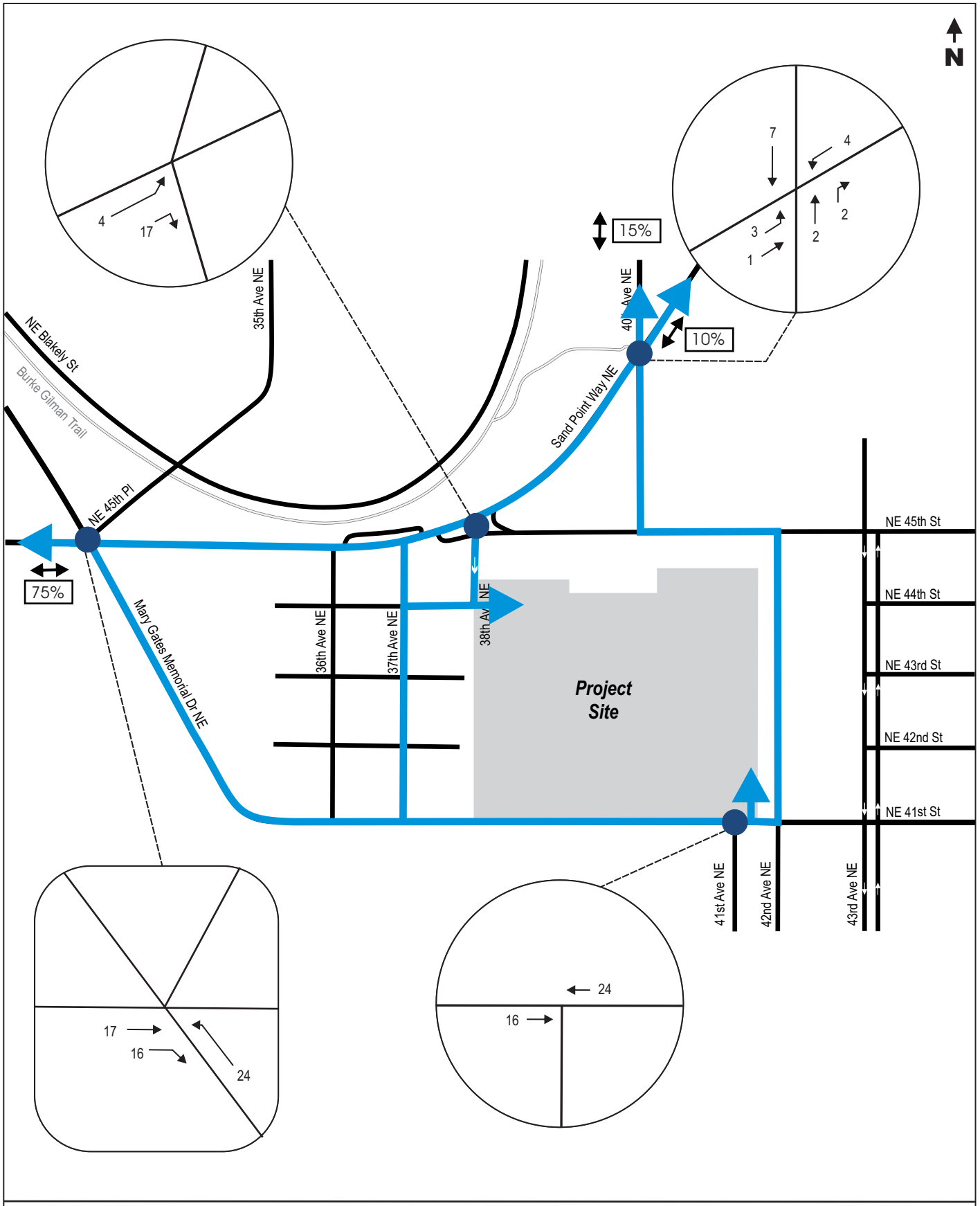
Source: Heffron Transportation, Inc., September 2017.

The existing Talaris site does generate traffic. However, no credit has been taken for these existing trips, which reflects a conservatively high estimate of site impacts.

3.2.3. Trip Distribution and Assignment

A residential trip distribution pattern had been developed for the *Transportation Impact Analysis for the 4000 Property*, the previous analysis for the Talaris site. It projected that about 75% of the site trips would be to and from the west on NE 45th Street. The other 25% of the trips would use 40th Avenue NE and Sand Point Way NE north and northeast of the site, respectively. The trip distribution pattern is shown on Figure 9.

Trips for Alternative 2 (or 3) were assigned to the roadway system. These trips are also shown on Figure 9.



Fort Lawton
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Figure 9
Trip Distribution Pattern and Project Trips
Talaris Site

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3.2.4. Traffic Operations

Intersection levels of service for future with-project conditions were determined using the same methodology described previously in Section 2.1.3. Table 14 shows the results of the analysis; levels of service for the 2030 No Action conditions are shown for comparison.

As shown, the project would add less than one second of delay to the intersections at NE 45th Street/Mary Gates Memorial Drive NE and Sand Point Way/40th Avenue NE intersections, which are projected to operate at LOS F and E with the project, respectively. This level of increased delay would not be considered a significant impact, and no mitigation is recommended.

Table 14. Level of Service Near Talaris Site –2030 Conditions

Intersection	PM Peak Hour			
	2030 No Action		2030 w/ Alternative 2 or 3	
	LOS	Delay	LOS	Delay
Signalized Intersection				
NE 45th Street / Union Bay Place NE / NE 45th Place Mary Gates Memorial Drive NE	F	87.4	F	88.7
NE 45th Street / Sand Point Way NE / 38th Avenue NE	B	12.2	B	12.2
Sand Point Way NE / 40th Avenue NE	D	54.7	E	55.5
Side-Street Stop Controlled Intersection				
NE 41st Street / 41st Avenue NE	A	0.6	A	0.6
Westbound Left Turns	A	8.3	A	8.4
Northbound Movements	B	11.9	B	12.1

Source: Heffron Transportation, Inc., September 2017. Determined using the Synchro 10.1 software. Cycle lengths, offsets, and splits optimized for signalized intersections in the NE 45th Street / Sand Point Way corridor for the 2030 project conditions.

1. *Level of service.*
2. *Average seconds of delay per vehicle.*

3.2.5. Parking

Redevelopment of the Talaris site would utilize existing parking areas and create new parking on the site. A total of 206 parking spaces are proposed. The parking ratios per unit would be the same as for the Fort Lawton site, and are:

- Multi-family housing (row houses and townhouses) – 1.24 spaces per unit
- Senior housing – 0.21spaces per unit

Parking demand for multi-family households was determined from data compiled by the Puget Sound Regional Council (PSRC) from the 2010 Census. Data about vehicle ownership showed that the average number of vehicles for rental units in the area closest to the site (Census Tracts 41.00) was 1.24 vehicles per unit. Parking demand for the senior housing component was determined from the previously described analysis for the *Ballard Senior Housing Project.* The parking rate for a low-income senior housing project was determined to be 0.21 spaces per unit, which accounted for residents with vehicles, staff, caregivers, and visitors. Overall, the projected peak parking demand of 180 to 201 spaces would be accommodated by the proposed supply of 254 spaces, with no overflow.

3.2.6. Traffic Safety

The project would increase traffic at the study-area intersections and statistically, the number of collisions could increase as traffic increases. However, historical collision data show that there are no existing safety issues in the site vicinity. The project does not include any changes to the roadway network that are expected to result in new safety concerns.

3.2.7. Transit

Mode of travel data from the 2010 Census determined that 14% of residential trips in the Laurelhurst neighborhood occur by transit. At this rate, Alternatives 2 and 3 are expected to generate 17 peak hour transit trips. The projected additional transit demand for each alternative averages to less than one rider per bus that currently serves the project site during the peak hour, as summarized previously in Table 8. The existing bus service would be adequate to serve this demand; therefore, no adverse transit impacts are expected to result from the Talaris site alternatives.

3.2.8. Non-Motorized Transportation

The project would construct a new sidewalk along its NE 41st Street frontage where no sidewalk exists today. In addition, it would add new sidewalk or a separated walkway along internal roadways as required by the City.

3.3. Construction Impacts

The construction impacts to the transportation system would be similar for both the Fort Lawton and Talaris sites. The build alternatives would generate construction truck and employee traffic associated with demolition, excavation, infrastructure construction, building construction, and landscaping. Internal roadways would be upgraded and/or replaced depending on the alternatives. The highest number of truck trips per day would be generated during excavation activities when large quantities of materials can be stockpiled on site and then hauled off in a compressed schedule. Based upon typical construction shifts, it is anticipated that construction workers would arrive at the construction site before the morning peak traffic period on local area streets and depart the site prior to the evening commute peak period. The number of workers at the project site at any one time would vary depending upon the construction element being implemented. Construction worker trips typically peak during building construction when many trades can be working simultaneously at the site.

For all of these construction activities, it is unlikely that the site would generate more trips per hour than evaluated for the full build condition. Therefore, the vicinity roadway systems would be able to accommodate construction traffic generated by each site. All truck staging and contractor parking should be able to be accommodated on each of the sites.

Prior to commencing construction, the selected contractor(s) would prepare a Construction Management Plan. This plan would include information related to truck haul routes, staging areas, sidewalk and street detours, and employee parking. Details that should be included in the plan are described in the *Mitigation* section.

4. MITIGATION

Redevelopment of either the Fort Lawton or Talaris site is not expected to significantly affect traffic operations in the vicinity of each site. Therefore, no mitigation would be needed to the vicinity street system. Internal roadways would need to be improved, and for the Fort Lawton site, some parking management measures should be implemented to reduce the potential for parking overflow. The following mitigation measures are recommended for each site:

4.1. Construction

Prior to commencing construction of any build alternative on either site, the selected contractor(s) should be required to prepare a Construction Management Plan that documents the following:

- Truck haul routes to and from the site;
- Truck staging areas (e.g., locations where empty or full dump trucks would wait or stage prior to loading or unloading);
- Construction employee parking areas;
- Road or lane closures that may be needed during utility or street construction;
- Sidewalk, bike lane, and/or bus stop closures and relocations;
- Mechanism for notifying community if street, sidewalk, bike lane, or bus stop closures would be required.

4.2. Fort Lawton Site

A. Improve pedestrian facilities on Texas Way – For Alternatives 1, 2 or 3, Texas Way should be improved to add a sidewalk or walkway to the east side of the street adjacent to new development areas. New crosswalks should be located where there is adequate sight distance for both motorists and pedestrians, and all should be designed to meet MUTCD.[20] Standards. ADA curb ramps and landings should be provided on both sides of the street.

B. Implement parking management strategies for multi-family residential uses – To reduce the potential for overflow residential parking for Alternative 1, the Office of Housing and its partners could implement programs that reduce a resident's need to own a vehicle. Such programs could include providing a shared bicycle fleet or encouraging use of bike sharing programs; encouraging use of car sharing programs; and providing information about bus service.

C. Share parking with athletic fields – With Alternative 1 or 2, peak parking for the athletic fields is expected to occur in the evenings and on weekends. Seattle Parks could work with the VA to share existing parking spaces during these times when parking demand at the nearby VA is low.

[20] Federal Highway Administration, Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways, May 2012.

4.3. Talaris Site

A. Improve pedestrian facilities on internal roads– For Alternatives 2 or 3, all new or retained internal roads should have a pedestrian walkway on at least one side of the street. Any internal crosswalks should be located where there is adequate sight distance for both motorists and pedestrians, and all should be designed to meet *Manual on Uniform Traffic Control Devices* (MUTCD) *for Streets and Highways.* ADA curb ramps and landings should be provided on both sides of the street.

B. Construct sidewalk along N 41st Street frontage – For Alternative 2 or 3, sidewalk should be constructed along the site frontage where there currently is none.

5. SIGNIFICANT ADVERSE IMPACTS

With implementation of mitigation measures such as those described above, no significant unavoidable adverse transportation impacts are anticipated.

APPENDIX A
Level of Service Definitions

Levels of service (LOS) are qualitative descriptions of traffic operating conditions. These levels of service are designated with letters ranging from LOS A, which is indicative of good operating conditions with little or no delay, to LOS F, which is indicative of stop-and-go conditions with frequent and lengthy delays. Levels of service for this analysis were developed using procedures presented in the *Highway Capacity Manual* (Transportation Research Board, 2016).

Level of service for signalized intersections is defined in terms of delay. Delay can be a cause of driver discomfort, frustration, inefficient fuel consumption, and lost travel time. Specifically, level-of-service criteria are stated in terms of the average delay per vehicle in seconds. Delay is a complex measure and is dependent on a number of variables including: the quality of progression, cycle length, green ratio, and a volume-to-capacity ratio for the lane group or approach in question. Table A-1 shows the level of service criteria for signalized intersections from the *Highway Capacity Manual, Sixth Edition.*

Table A-1. Level of Service for Signalized Intersections

Level of Service	Average Delay Per Vehicle	General Description
A	Less than 10.0 Seconds	Free flow
B	10.1 to 20.0 seconds	Stable flow (slight delays)
C	20.1 to 35.0 seconds	Stable flow (acceptable delays)
D	35.1 to 55.0 seconds	Approaching unstable flow (tolerable delay—occasionally wait through more than one signal cycle before proceeding.
E	55.1 to 80.0 seconds	Unstable flow (approaching capacity)
F	Greater than 80.0 seconds	Forced flow (jammed)

Source: Transportation Research Board, Highway Capacity Manual, 2016.

For unsignalized intersections, level of service is based on the average delay per vehicle for each turning movement. The level of service for a two-way, stop-controlled intersection is determined by the computed or measured control delay and is defined for each minor movement. Delay is related to the availability of gaps in the main street's traffic flow, and the ability of a driver to enter or pass through those gaps. Table A-2 shows the level of service criteria for unsignalized intersections from the *Highway Capacity Manual, Sixth Edition.*

Table A-2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Delay (seconds per vehicle)
A	Less than 10.0
B	10.1 to 15.0
C	15.1 to 25.0
D	25.1 to 35.0
E	35.1 to 50.0
F	Greater than 50.0

Source: Transportation Research Board, Highway Capacity Manual, 2016.