The Interbay Project

A Health Impact Assessment

Seattle, WA | June 2020

UNIVERSITY of WASHINGTON
College of Built Environments & School of Public Health

ACKNOWLEDGEMENTS

We acknowledge that we live, work, and study, and that the Interbay site likewise sits on the traditional land of the first people of Seattle, the Duwamish People, past and present. We honor with gratitude the land itself and the Duwamish Tribe and other Coast Salish peoples.

This report was written by graduate and undergraduate students as a class project for EnvH/UrbDP 536 Health Impact Assessment in Spring Quarter 2020 at the University of Washington.

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EXECUTIVE SUMMARY

EQUITY STATEMENT

In this report we have done our utmost to address equity in each of our chapter topics. From equity considerations regarding land use centering the history of the Indigenous people of this land that we live, work, study and build our lives on; to recognizing that this site and its neighboring areas have been racially segregated in the past, we looked at the history and past uses of this land, and balanced our recommendations and priorities on what future communities of this area will need, in terms of their health, as well as the indirect effects of these on the city of Seattle as a whole.

While we, the students in this class, were tasked with doing the research, talking to experts and developing recommendations that take the intersectional needs of the community into consideration, you, as government officials, will be making the decisions. It needs to be said, especially in this current political and social climate, that the needs of the communities in Seattle, especially Black, Indigenous, minority and immigrant communities should be held in at least equal consideration as the points made throughout this presentation. Racism, and other related forms of structural privilege and harm, do not occur in a vacuum, and unless they are specifically named and considered in our work as public health practitioners and urban planners, we will see the current social conditions continue, or worsen.

There is an undeniable trove of scientific evidence which speaks to the correlations between health and the environment in which we live: built, natural and social. While this research speaks to many injustices, now is no longer the time to speak, but the time to act. We urge you, as decision-makers with power to affect real change in how the conversation and development of this land proceeds, to uphold and prioritize the goals of equity in your work.

PROJECT BACKGROUND

In the Spring of 2020 an interdisciplinary team of students from the University of Washington's School of Public Health and College of Built Environments with backgrounds and specialties in public health, urban planning, public policy, and architecture conducted this Health Impact Assessment (HIA) to illustrate the potential health impacts of various redevelopment concepts for the Interbay Project. This HIA built off of the work completed by an interdisciplinary studio and practicum in the fall of 2019 within the University of Washington College of Built Environments to study the Interbay site's development opportunities.

The Interbay site in Northwest Seattle has served many users and purposes. From its indigenous origins as a fishing site and waterway of the Duwamish people, to its large scale industrial use and utilization as a US military site, ranging from the National Guard to the Navy, the Interbay site is uniquely positioned as a strategic location for a multitude of uses.

The National Guard currently resides on the Interbay property site and utilizes the site for the Seattle Readiness Center, which was built in 1974. The current facilities are not able to provide the requirements necessary for mission support. With more than 600 personnel intermittently based at the Center, the necessity to deploy large military equipment into and out of the city in the case of a disaster is unmet. The new preferred site is located in North Bend, roughly 30 miles southeast of Seattle. The relocation to the new King County Readiness Center could occur within three and a half to five years pending financial resources.

The Interbay Golf Course is located just north of the site and with potential changes to the policies that govern public golf courses, there is an opportunity for that land to be repurposed in conjunction with the Interbay site. The downtown to Ballard Link light rail expansion will also greatly influence the future of the Interbay site, connecting the site to the rest of the city and offering more opportunities for pedestrian traffic in the area. With the arrival of the Smith Cove and Interbay stations, a new

nearby campus for Expedia's headquarters, and the shifts in community and industrial needs, the potential uses of this land should be given much thought and consideration.

Furthermore, given how production and population needs in the City of Seattle are changing, the City has opened up discussion regarding the rezoning of industrial lands in Seattle. There are limited industrially zoned sites in Seattle, and once rezoned, industrial land is unlikely to return. Therefore the proposed discussion about rezoning publicly owned land on the Interbay site holds much significance. This rezoning discussion is in coordination with the National Guard relocation, which in 2018 led to the establishment of an Advisory Committee to steer the investigation, planning, and decision-making process regarding the Interbay site development. This HIA explored in detail three redevelopment concepts and their connection to health: Industrial Only, Mixed-Use Commercial and Residential, and Mixed-Use Light Industrial, Commercial and Residential.

METHODS AND PROCESS

The HIA team, consisting of University of Washington graduate students across the School of Public Health and College of Built Environments, identified the five focus areas which are examined as distinct chapters in this HIA:

- Health and Well-Being
- Housing and Employment
- Transportation and Accessibility
- Land Use
- Environment

The HIA Team conducted an extensive literature review for each focus area to assess potential positive and negative health impacts of three proposed redevelopment concepts for the Interbay site: Industrial Only, Mixed-Use Commercial and Residential, and Mixed-Use Light Industrial, Commercial and Residential. Additionally, the team reviewed appropriate reports and data recommended by the Seattle Department of Transportation (SDOT) and Office of Planning and Community Development (OPCD), completed a review of the existing conditions of the site and project using the Department of Commerce's Interbay Public Development Advisory Committee's Recommendations and Implementation Plan, and participated in a videotaped virtual Interbay Project site visit.

KEY FINDINGS

HEALTH AND WELL-BEING

This chapter examines the physical, mental and emotional health impacts of urban development on the Interbay site, with the goal of upholding health equity, both in individual and community health and access to care. Many studies have shown that individual and neighborhood health can be affected by a sense of community. Social connectivity is a key to the emotional and mental health of individuals, and therefore communities as a whole. While sociology explains some of this, understanding the impacts of urban planning on health is essential to making the most equitable decisions for the health of the Interbay community. Similarly, perceived safety has obvious connections and implications for physical, emotional and mental health. The complexity arises from the diverse array of needs in Seattle, with potentially conflicting priorities for decision-makers regarding the Interbay site's land use zoning, from the need for more jobs to the need for more affordable housing. Conversely, increasing access to healthcare on this land benefits not only those who reside in and near the Interbay site, but also those who live further away but are able to access the Link light rail. This will be of particular importance given the upcoming development of both the Interbay and Smith Cove stations. Lastly, upholding social well-being and equity for all also corresponds to mutually beneficial short- and long-term health outcomes for residents of the Interbay and the greater Seattle area, from a decrease in racial segregation and related inequity to greater social and physical connectivity between Interbay and neighboring communities.

HOUSING AND EMPLOYMENT

This chapter examines the complex relationship between health, housing, and employment, emphasizing accessibility, stability, and safety for individuals and households. The Interbay site, surrounded by industrial activity, pockets of commercial work, and residential neighborhoods may be transitioning from its industrial past. Currently,there is no housing that exists at the Interbay site, and employment is under the jurisdiction of the Federal Government, home to 600 National Guard personnel. When the National Guard relocates from Interbay to North Bend, there will be potential to expand both housing and employment opportunities to individuals from varying socioeconomic backgrounds. The Washington State Department of Commerce Interbay Project report has identified that housing and employment will both be factored independently and/or collectively into the range of redevelopment concepts. The potential range of compatible industrial, light industrial, and commercial uses for employment would provide a variety of employment opportunities. Community members have

strongly identified the need for affordable housing, living wage jobs, preservation of industrial land, health services, office space, and retail, among many other elements. As noted in our review of existing conditions and literature, industrial jobs are crucially important to protect; they serve as an equitable avenue for securing the livelihood of residents and households. Similarly, Seattle continues to face a shortage of housing for low- and middle-income groups, and expanding access to affordable housing could provide a much needed boost to the local market. A mixed-used development has the potential to create valuable resources for the livability of the city at large. However, as with all industrial-mix areas in the region, precautions must be taken to guarantee the health and wellness of current and future workers and residents.

TRANSPORTATION AND ACCESSIBILITY

This chapter examines the existing conditions of transportation infrastructure and accessibility throughout the Interbay Armory site as well as its greater connection to the city of Seattle. The chapter assesses a wide range of topics including access to public transportation, pedestrian accessibility, biking accessibility, parking and traffic, disability accessibility, healthy and affordable food access, and emergency services and evacuation routes. The goal of the chapter is to evaluate the potential impacts that the current conditions and redevelopment concepts may have on the health and well-being of future community members, employees, and residents of the Interbay Armory site. The assessment demonstrates that existing conditions at the site pose a number of health risks, such as inadequate pedestrian infrastructure, limitations on accessibility for people with disabilities, insufficient access points to and from the site, and lack of accommodation for emergency vehicles, evacuation routes, and access to healthy and affordable food. These conditions inequitably expose the population the health risks, therefore the city will need to implement a variety of strategies to protect and promote health pertaining to transportation and accessibility.

LAND USE

This chapter examines the history of the Interbay site, the threats of climate change and liquefaction, and the need for open space and parks as it pertains to future development. The site was originally a shoreline composed of tidal flats and marshlands, where the Duwamish (Dkhw Duw Absh) would fish and hunt. The site is vulnerable to many effects of climate change, including increased heat, increased precipitation, and sea level rise. Tidal flooding is anticipated as early as 2090. Land use strategies, including placement of natural and green spaces, can help manage those threats. Green infrastructure, including tree canopy, open green spaces, green roofs, and green façades, can mitigate high temperatures and excessive stormwater and enhance the health of residents and workers. Public open spaces, paths and parks on/near the Interbay site will positively impact the physical and mental health and social capital of future residents and workers. The distribution of green spaces often disproportionately benefits White and more affluent communities. Currently, the Interbay area enjoys relatively low levels of poverty and good health metrics compared to surrounding neighborhoods, and there are seven public open spaces within one mile of the Interbay site. Greenspaces may be leveraged to decrease health inequity for lower-income future residents and workers. The City will need to acquire at least 40 acres of parkland by 2035 to meet the needs of projected population growth, and the Interbay site represents an opportunity to meet some of that need.

ENVIRONMENT

This chapter examines the effects that the changing environment could have on the health of site occupants. This is assessed through an analysis of the existing conditions, environmental tests that have been conducted on the site, and potential environmental health effects of each of the proposed redevelopment concepts. Due to the Interbay Project's location in the city, there are many environmental factors that create vulnerabilities, including water, soil, and air quality and proximity to other environmental hazards such as the abandoned landfill just North of the Armory site. Many of these environmental challenges can be mitigated through proper techniques during development. For example, to mitigate rising sea levels and the quality of ocean water and stormwater, green infrastructure and natural drainage can be implemented to improve the quality of the water and to retain during storms. The soil content on site lacks the ability to retain stormwater, so design strategies that incorporate water catchment or retention would be best used on site. A border of some sort, either built or natural, placed along the Western edge of the Interbay Property will provide both a buffer for noise and air pollutants that may contaminate the site due to the nearby Balmer railyards. With the implementation of noticeable environmental techniques, this site could be equitable for all people to reside on site. The city will have to use proper mitigation strategies for all contaminants to ensure that the site is equitable and safe for all residents, whether that be industrial only or a mixed-use site for the future.

PRIORITY RECOMMENDATIONS

This section categorizes all priority recommendations based on their application to the specific redevelopment concepts.

FOCUS: ALL PROPOSALS

RECOMMENDATION 1: AFFORDABLE HOUSING

This report highlights the fact that community members highly value and prioritize the use of the Interbay site for increased affordable housing units and improved equity in housing. Should the Interbay redevelopment include housing we recommend that the developer choose the concept that provides the most affordable housing units for Seattle residents and the local workforce. This would provide 1,630 affordable housing units under the mixed-use commercial/residential plan and 600 units under the mixed-use light industrial/residential plan. Health, employment, education, and strong social networks rely on stable housing, and Seattle's communities value affordable housing options. Should the Interbay redevelopment include housing (mixed-use commercial/residential and mixed-use light industrial/residential), we recommend that a local housing authority be developed to protect the rights of low income residents. Additionally, we recommend that tenants be connected to all Mandatory Housing Affordability (MHA) services and social supports provided by the City of Seattle once settled in the Interbay community. Strong social networks and support systems are proven to strengthen communities and improve housing stability.

RECOMMENDATION 2: CREATE JOB OPPORTUNITIES FOR INCREASED EMPLOYABILITY

We recommend that the Interbay Project redevelopment project take into consideration the most possible number of employment opportunities created to maximize the greater benefit. As employment has proven to be directly associated with health, providing such opportunities for individuals from different socioeconomic backgrounds would assist with minimizing health disparities locally. Task forces, community engagement opportunities, and employment agreements at the city and county level should be created between relevant stakeholders to support such efforts. This recommendation should be implemented to all three redevelopment concepts to distribute employment in an equitable manner across the neighborhood.

RECOMMENDATION 3: AIR QUALITY STUDIES

The HIA team recommends that an air quality study be conducted along with an environmental impact assessment to understand the air conditions, risks, and hazards. In addition, the City of Seattle and the State of Washington should create a mitigation plan to reduce air pollution from the BNSF railway, taking into account occupational health and safety in industrial areas for workers and EPA guided policies for mixed use land involving residents and potential consumers.

- If residential uses are to be built, collaboration with stakeholders and future residents would be recommended to provide high quality conditions to residents. Well ventilated buildings would be recommended on the site to reduce future health concerns.

RECOMMENDATION 4: INCREASE ACCESS POINTS THROUGHOUT THE SITE

We recommend the site provide multiple access points for emergency vehicles, pedestrians, and bicycles throughout the Interbay site. Washington State Chamber of Commerce plans feature only one point of access to the Interbay site, which presents accessibility challenges for emergency and service vehicle access to the site. Moreover, it potentially creates increased risk of contact between pedestrians, bicyclists and vehicular traffic.

RECOMMENDATION 5: INTEGRATED SITE DEVELOPMENT

With the proximity to the Balmer Railyards, the Western border of the Interbay property is subjected to more potential issues regarding noise and air particulates. We recommend that a buffer zone is created along the Western border to reduce noise and vibration issues as well as capture air particles. This could be implemented with a built strategy such as a wall or a natural barrier including large evergreen trees. However, tree barriers are generally not good noise barriers. Industrial buildings could also be used as a noise buffer on the Western edge of the site, many of the student proposals in the Interbay studio highlight this idea.

This development would also provide an opportunity to combine green infrastructure strategies, such as bioswales or retention ponds, to be able to mitigate rising water levels due to climate change. However, the current soil conditions and high groundwater levels creates limitations to the type of water retention development that can happen on site. Innovative built environment strategies would be recommended to retain or manage stormwater in new ways.

RECOMMENDATION 6: BUILD A COMMUNITY HEALTHCARE FACILITY

We recommend that a community health center be built on this site. This facility should offer primary and urgent care services to residents, or in the case of industrial zoning, care provided should be tailored for workers on the site. The unique geographic location and convenience of the Interbay site positions it to receive frequent traffic, both vehicular and pedestrian, which will increase with the arrival of two new Link light rail stations which will bookend the site on the North and South ends. Prioritizing the health and well-being of the public means upholding their right to achieve the highest potential of health possible; since there is potential for the site to be used for industrial purpose, building a healthcare facility not only

aligns with those priorities, but also promotes health equity and social well-being among both workers and residents in the Interbay area.

RECOMMENDATION 7:
RETURN THE LAND, RESTORE THE SHORELINE

We recommend that the Washington State National Guard and the City of Seattle arrange an exchange of Interbay site land and the Interbay Golf Course land. Subsequently, the State may sell the current golf course land for development to finance the National Guard move. We recommend that the City return the Interbay site land to the Duwamish Tribe via the Duwamish Tribal Council. Prior to this land transfer, the City should collaborate with the Tribal Council and possibly conservation groups to develop a plan for this site and conduct any restoration of the Interbay site. We recommend restoring the site to tidal flats and marshland, as the shoreline and segments of the southern half of the site are vulnerable to future sea level rise, and are better suited to restoration than development; deliberately designating low-lying, flood-prone areas as marshy wetlands will help to manage the destructive impact of water.

RECOMMENDATION 8:
IMPLEMENT UNIVERSAL DESIGN PRINCIPLES

Our recommendation is to incorporate principles of Universal Design on the development of the Interbay site and surrounding streets to facilitate access to the site. The site should incorporate Universal Design strategies including Leading Pedestrian Intervals, slower crosswalk speeds, even surfaces with minimal inclines and declines, accessible street furniture, visual and informative signage, and adequate lighting along all walkways. SDOT should consider using the findings from implementation of Pedestrian Wayfinding Program pilots in Westlake and Jackson Hubs to inform design plans for the Interbay site.

FOCUS: CONCEPTS 2 AND 3; MIXED-USE COMMERCIAL AND RESIDENTIAL; MIXED-USE LIGHT INDUSTRIAL, COMMERCIAL, AND RESIDENTIAL

RECOMMENDATION 1:
UTILIZE EPA'S INDOOR AIRPLUS STANDARDS

We recommend that housing units follow the Environmental Protection Agency's Indoor airPLUS program standards and guidelines. This program lays out a set of standards and guidelines for ensuring safe air quality indoors for new housing construction. Following established Environmental Protection Agency (EPA) guidelines can greatly reduce indoor air pollution in housing, especially exposure to volatile organic compounds (VOC). We recommend that each housing unit (if the proposal includes housing) include airPLUS standards into the development and identify indoor air quality products and features. It is important to remember that even in new construction, indoor pollutants can cause harm to people's health. Indoor VOCs come mainly from nearby engine systems, especially attached garages, and from building materials in new buildings, such as plywood and carpet, which can release chemicals like formaldehyde and benzene. Housing developers and construction companies should implement such guidelines in accordance with Seattle housing codes.

RECOMMENDATION 2: BUILD A COMMUNITY CENTER

We recommend that a community center be built on this site, with similar goals of equity and well-being as recommendation one. Given the plundering and subsequent colonization of this land, followed by racial segregation of this neighborhood in recent decades, intentionally creating spaces for people of all backgrounds, races, socioeconomic levels and cultures to find and build community in their neighborhood is a powerful step towards undoing the harm that people of color of all ethnicities have faced on this land. Building a community center not only builds connections within the communities that will live or work on the Interbay site, but further builds trust between the community and larger institutional stakeholders of the Interbay site, such as the City of Seattle government officials, SDOT, OPCD and even the US military.

RECOMMENDATION 3: PRIORITIZE GREEN SPACE

We recommend the site strategically employ parklands, tree canopy, green façades and green roofs to enhance the health of its residents and workers and to improve resilience to climate change, especially heat and increased precipitation. Given the threats of climate change and liquefaction, the health benefits of parks, as well as the City's need for 40 additional acres of parkland by 2035, we recommend a portion of the Interbay site should be reserved by the City of Seattle for public open space/ parkland. There is community support for retention and expansion of publicly accessible greenspaces, including tree-lined bike paths, green roofs, and park areas suitable for walking dogs, expressed at community meetings and public comment periods. Developers should be required to create a minimum of 30% tree canopy coverage on the site, utilizing a mixture of native broadleaf and coniferous species should be used. Pedestrian walkways are priority areas for tree canopy coverage. Green façades and green roofs are recommended for buildings with large and south- or west-facing façades and broad, low roofs.

CONCLUSION

This report was created for partners at the Seattle Department of Transportation and Office of Planning and Community Development. It is our suggestion that this report be shared with additional stakeholders and community members as future decisions are determined for the Interbay site. Redevelopment of the Interbay site presents a critical opportunity to create a new vibrant and healthy community within the Ballard Interbay Northend Manufacturing and Industrial Center (BINMIC). Continuous planning, collaboration, communication, and community involvement in the development of this site will assist in creating a healthy, lively, and equitable Interbay. This HIA has not selected one proposal as the best option for moving forward, but provides recommendations for the various proposals as each has the potential to impact health outcomes for Interbay and Seattle. By building upon the existing findings of the Interbay Project Advisory Committee Report, as well as the recommendations presented in this Health Impact Assessment, there is a great opportunity to create a community that serves the historical, physical, economic, mental, social, and environmental needs of the current site and future populations in and around the Interbay neighborhood and Seattle.

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INTRODUCTION

PROJECT BACKGROUND

THE INTERBAY PROPERTY

The state-owned Interbay property is located at 1601 West Armory Way. The 24.74 acre site is located in the Interbay neighborhood between the Magnolia and Queen Anne neighborhoods. This site provides a unique development opportunity for the city due to the size of the property and its proximity to downtown. The proximity to the future light rail station will provide excellent means of connection for the site. The land is currently zoned for industrial use and supports office and retail uses. The property is located at the southern end of the Ballard Interbay Northend Manufacturing and Industrial Center (BINMIC), east of the BNSF Railway Company railyard. The BINMIC is designated as an Industrial Center to provide employment for the local maritime and manufacturing industries. A location map has been provided to explain the current context of the site.

HISTORY OF INTERBAY

The Interbay Property is a tidal flat nestled in the valley between two inclined residential neighborhoods, Magnolia to the west and Queen Anne to the east. The valley in which this tidal flat sits was carved by the Vashon Glacier over 10,000 years ago. The Duwamish people built a settlement with cedar long-houses on the current Interbay Property. They also used this land to hunt and fish native species such as waterfowl, salmon and shellfish (Wilma 2001; Abrahamson, 2019). Americans of European descent arrived in and colonized this area in 1850. The land was used primarily as settlements. In 1892, a terminal for the Great Northern Railway was built. North of the Interbay site, The Ballard Locks were constructed in 1917 to connect Lake Washington to the Puget Sound. This development flooded the low-lying area of Interbay. Reclaimed earth from the channelizing Ballard Locks project was utilized to infill the site, which has since become an industrialized area (ILWU 2019). The US Navy acquired Pier 91 (located south of the Interbay site) by 1942, and during WWII it was used as a port of embarkation. In 1976, The Port of Seattle re-acquired the land and replaced the war-time barracks and warehouses on the site with contemporary industrial facilities (Denfeld 2014).

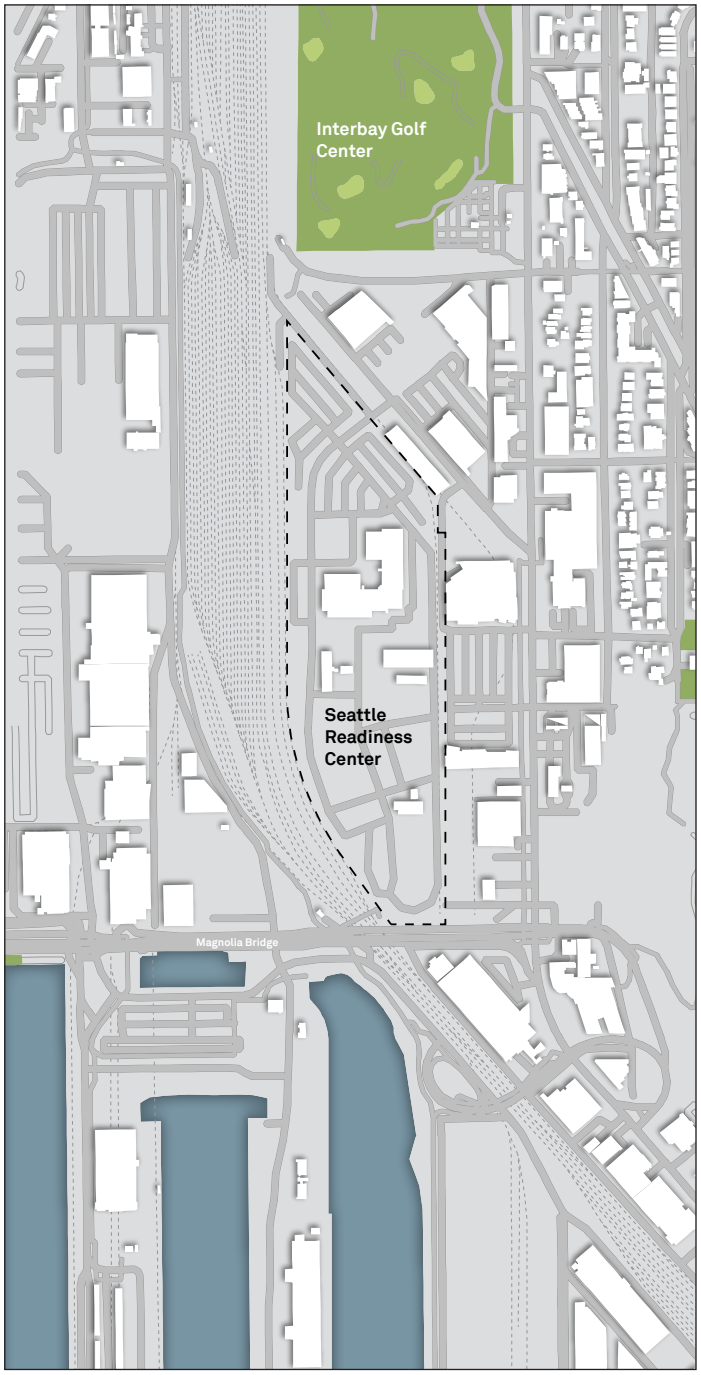
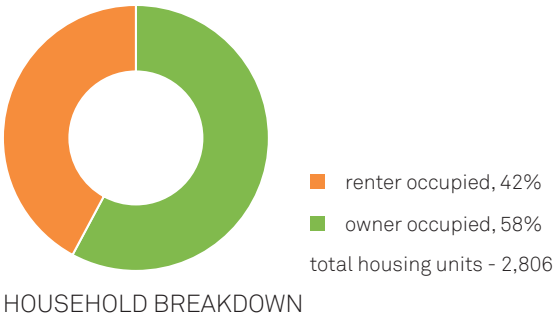
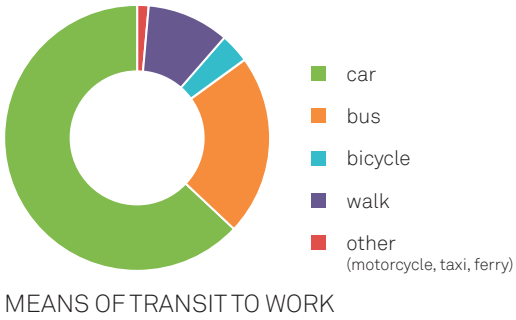


Figure 1.1 *Interbay Context Map*

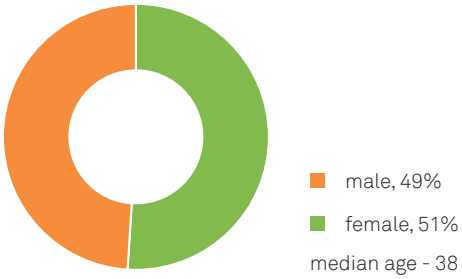
DEMOGRAPHICS



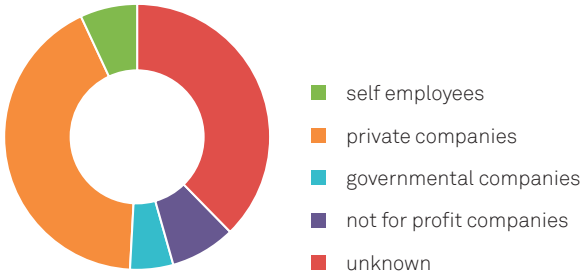
HOUSEHOLD BREAKDOWN



MEANS OF TRANSIT TO WORK



POPULATION



EMPLOYMENT TYPE

Figure 1.2 *Demographics of Census Tract 58.02*
Figure 1.3 (upper right) *Census Tract 58.02, encompasses Interbay Property*
Source: US Census

NATIONAL GUARD RELOCATION

The National Guard currently resides on the Interbay property site and utilizes the site for the Seattle Readiness Center, which was built in 1974. The current facilities are not able to provide the requirements necessary for mission support. With more than 600 personnel intermittently based at the Center, the necessity to deploy large military equipment into and out of the city in the case of a disaster is unmet. Many of the personnel live outside of the Seattle city limits which causes transportation and congestion issues for them to fulfill their duties. Due to these circumstances, the guard must relocate to a facility that is better equipped to fulfill their duties.

Figure 1.4 *National Guard Services at Interbay Property*
Source: Professor Dannenberg

The relocation of the Seattle Readiness Center is not able to rely solely on traditional government funding due to the high cost and the need to compete for federal funding. Instead, the Legislature has allocated funds ($6.6 million) for the National Guard to acquire the land that is suitable for a new Readiness Center, with their preferred location roughly 30 miles southeast of Seattle in North Bend. The relocation to the new King County Readiness Center could occur within three and a half to five years from the time of authorization by the Washington Military Department for financial resources.

CURRENT SITE CONDITIONS & OPPORTUNTITIES

The studied area of the Interbay property encompasses 24.75 acres in two adjacent parcels owned by the State of Washington. The property provides a unique development opportunity for the city, as it is rare to find such a large and flat site with a single owner in Seattle.

The Interbay property has many valued interests including:

- The state-owned property will likely be vacant within the decade due to the National Guard relocation. The State has many alternative uses that are being studied for the property.

- The Interbay Golf Course located just north of the Armory site is also a large piece of property owned by the City of Seattle. With the future of Seattle's publicly owned golf courses uncertain, this leaves another potential opportunity for redevelopment. The proximity between the properties allows for the leveraging of both properties to be used in conjunction with one another.
- The Smith Cove and Interbay light rail stations are expected to be in use by 2035 and they will serve the entire Interbay property on the North and South ends of the site.
- The majority of the site is zoned industrial, which currently prohibits residential use on the site. However, the City of Seattle has opened up discussion on the future of industrial lands and how the change in automation and industrial production may shift the needs for industrial lands. This is a timely conversation that is important for the future uses of the site.

Figure 1.5 (top) *Existing rail line along west edge of Interbay Property*
Figure 1.6 (middle) *Existing facilities at Interbay Property*
Figure 1.7 (lower) *Existing conditions at Interbay Property*
Source: Professor Dannenberg | Rick Mohler

ADVISORY COMMITTEE

In order for the State to fund the National Guard relocation to North Bend, the State will need to develop the Interbay property. In anticipation of the development, the state Legislature established the Interbay Public Development Advisory Committee in 2018. Their work was completed in October of 2019. They were tasked with the challenge of:

- Collaborating with the Washington State Military Department to determine the Department's needs regarding relocation from the Interbay site.
- Exploring the economic development opportunities that would provide the greatest public benefit if the site is vacated.
- Exploring the potential funding, partnerships, and/or transactions that need to be made to carry out recommendations that are made by the committee.

REDEVELOPMENT CONCEPTS DEFINED BY THE ADVISORY COMMITTEE REPORT

The advisory committee established three redevelopment concepts: Industrial Only, Mixed-Use Commercial and Residential, and Mixed-Use Light Industrial, Commercial and Residential. Spanning these three frameworks, six conceptual proposals were produced for evaluation. The redevelopment concepts were largely informed by adopted guiding principles, input from the public, as well as analysis involving various topics in order to create proposals that respond appropriately to the potential development opportunity on the site.

These elements are incorporated into the proposals to help provide the highest public benefit and economic advancement opportunities for the Interbay community, while acknowledging the existing context and major public investments planned for the neighborhood. The advisory committee emphasized that the ultimate goal of the proposals does not include maximizing financial return in supporting the relocation cost of the National Guard.

UNIVERSITY OF WASHINGTON INTERBAY STUDIO REPORT

REDEVELOPMENT CONCEPTS CONSIDERED

The University of Washington's College of Built Environments conducted an interdisciplinary studio and practicum to study the Interbay project as a development opportunity. The studio consisted of undergraduate and graduate students in architecture, landscape architecture, and urban planning disciplines to understand what the opportunities might be for the Interbay site. This was a great opportunity to assist the State, City, and an array of stakeholders in exploring the relationships that the site provides. Students in the studio were encouraged to

speculate what the future of urban industrial employment might entail, consider new prototypes between urban settings and architecture that combine industry with other uses, and propose land use or policy changes that might be necessary in response.

The studio also explored potential economic impacts of the new developments, including the cost of industrial production from increased land values that might result from a rezoning process, and also the potential financing and property ownership models that could ensure the retention of industry through the changing urban context (University of Washington BE Studio Report, 2019).

The studio explored the proposed development changes at multiple development scales, including:

- Regional demand for **industrial land**
- Regional demand for **affordable housing**
- **Emerging trends** in industrial operations including automation and small-scale production
- The City of Seattle's position on **industrial land and the conflict with regional transit** infrastructure
- New forms of **transit-oriented development**
- **Ecological strategies** for soil remediation and stormwater management
- **Resiliency strategies** related to sea-level rise and seismic events
- The potential for new **place-making strategies** that combine industrial uses with other uses such as residential, commercial, retail and civic.
- New public space and right-of-way typologies that **enhance the pedestrian experience**
- New **hybrid building typologies** that integrate uses that have been deemed "incompatible" in the past.

BACKGROUND AND SCREENING

WHAT IS HEALTH IMPACT ASSESSMENT?

A Health Impact Assessment (HIA) is a process through which the potential public health effects of a proposed public policy, plan, or project may be characterized. HIAs bring experts and policymakers from a range of fields together in a collaborative decision-making process to identify potential positive and negative health outcomes of specific policies. HIAs advance the use of evidence-based decision making, inform discussions of different options within a project, and shift decision making towards health and quality of life frameworks. HIAs prioritize health equity and are especially concerned with health implications for vulnerable or marginalized groups. The primary goal of HIAs is to influence decision making in order to reduce harmful health effects and promote public health-enhancing elements of public policy decisions.

HIAs use six basic steps: screening, scoping, assessment, recommendations, reporting, and monitoring.

PHASE	GOAL
SCREENING	determine whether an HIA is feasible and useful
SCOPING	create a plan and timeline, define the scope of the HIA
ASSESSMENT	determine baseline conditions and evaluate potential health impacts
RECOMMENDATIONS	provide recommendations to improve the project
REPORTING	create a presentation of HIA results and communicate those results
MONITORING	track the HIA's impact on the decision-making process

Table 1.1 *HIA Steps*

HIA GOALS

The goals of this HIA are to assist decision-makers including the Seattle Department of Transportation (SDOT) and the Seattle Office of Planning and Community Development (OPCD) to maximize public benefits of the Interbay Project site proposals by:

1. Examining potential implications for public health related to possible residential, commercial, and industrial redevelopment concepts;
2. Investigating a range of negative cross-sector impacts on current and future community members of the Queen Anne and Magnolia neighborhoods through mitigation strategies; and
3. Highlighting the possible positive effects of the proposed redevelopment concepts for both local and regional benefit.

HIA TEAM

The HIA Team consisted of undergraduate and graduate students and faculty from the University of Washington's School of Public Health and College of Built Environments, spanning backgrounds from public health, urban planning, architecture, landscape architecture, education, psychology, and public policy. The team conducted a voluntary HIA on the Interbay Project site development proposals over 10 weeks, from April 2nd to June 11th, 2020.

HIA PROCESS

The following six categories outline the process used to conduct this HIA:

- **Screening:** Prior to the beginning of the 2020 Spring Quarter, Dr. Andrew Dannenberg assessed the feasibility and usefulness of conducting an HIA on the Interbay Project site redevelopment proposals. In collaboration with Diane Wiatr of the Seattle Department of Transportation and Jim Holmes of the Seattle Office of Planning and Community Development, they determined if the scope and importance of the development project was appropriate for conducting an HIA.
- **Scoping:** In an interactive and collaborative online session, the HIA team divided themselves into five focus areas to examine through a lens of public health and equity: Environmental Conditions; Land Use; Health and Well-being; Transportation and Accessibility; Housing and Employment.
- **Assessment:** In the assessment phase, we gathered and analyzed many sources of information pertaining to land use development and health impacts in these five focus areas. The HIA team conducted an extensive literature review for each focus area, reviewed reports and data gathering recommended by SDOT and OPCD, and assessed the current conditions of the site and project using the Department of Commerce's Interbay Public Development Advisory Committee's Recommendations and Implementation Plan and other sources.
- **Recommendations:** For each focus area, the HIA team provided recommendations within the scope of the project and proposed development options. Recommendations were created with consideration of the feasibility of the recommendations and involvement of relevant stakeholders. Each chapter selected two priority recommendations to highlight.
- **Reporting:** Working within chapter teams, twenty four class members contributed to the writing of the report. The editing and the synthesis of the report was completed by five editors of the HIA team and presented to partners from SDOT and OPCD on June 4th, 2020. Their comments and feedback were incorporated into the final report.
- **Monitoring and evaluation:** Due to the nature of an academic term, as well as the short and unknown long term consequences that the novel coronavirus (COVID-19) will impose on this project, the HIA team is unable to provide monitoring or evaluation for the Interbay site Project.

ASSUMPTIONS

During the development of this health impact assessment, several assumptions were made with regard to this HIA and its recommendations:

- **COVID-19 and Development:** Given the ongoing impact of the novel coronavirus (COVID-19) pandemic on Washingtonians and the State of Washington, the HIA team is unaware of how the current economic conditions will impact progression towards proposal selection. Furthermore, the National Guard is moving according to their own internal timelines and operational procedures, which are currently unknown to us, and their relocation may also be impacted by the pandemic. This HIA was completed under the assumption that construction and development of the Interbay site will continue as proposed.
- **Zoning Proposals:** We are assuming that the three land use zoning proposals that were outlined by the Advisory Committee are the only proposals being considered, as decided by the City of Seattle.
- **Health and Equity are a Priority:** Given the history of colonization and recent racial segregation throughout Seattle in the 1970's, we assume that protecting the health of marginalized people living and working on this land in the future will be paramount. We also assume equity in access to and activities on the land itself are of utmost importance, and assume it will be shown through the land's zoning and Committee's leadership in these matters.
- **Monitoring:** As the HIA team was constrained to 10 weeks to complete this project, we assume that Professor Dannenberg and partners from OPCD and SDOT will continue to monitor and evaluate the recommendations provided in this HIA after the 10-week quarter at the University of Washington is complete.

SCOPE OF THE HIA

OVERVIEW OF FOCUS AREAS

The HIA team identified five focus areas to be researched and reviewed. Each focus area team was tasked with completing an extensive literature review, as well as providing detail on potential positive and negative health-related impacts of the three proposed development options. Each focus area is presented as a separate chapter of this HIA report. Each chapter is composed of key subtopics that shape our research and recommendations. The five focus areas of the Interbay Project include:

CHAPTER FOCUSES:

HEALTH AND WELL-BEING	HOUSING AND EMPLOYMENT	TRANSPORTATION AND ACCESSIBILITY	LAND USE	ENVIRONMENT
◦ Connectivity ◦ Safety ◦ Health Access ◦ Social Well-being and Equity	◦ Housing Stability and Affordability ◦ Quality and Safety ◦ Employment Opportunities ◦ Economic Stability ◦ Access to Private Services	◦ Public Transportation and Bike Accessibility ◦ Pedestrian Accessibility ◦ Parking and Traffic ◦ Disability Accessibility ◦ Healthy and Affordable Food Access ◦ Access to Emergency Services	◦ Ancestral Lands and Culture ◦ Climate Change ◦ Liquefaction ◦ Access to Parks, Recreation Facilities and Open Space	◦ Air Pollution ◦ Water Quality and Access ◦ Noise Pollution ◦ Soil Contamination ◦ Impact on Surrounding Site

Table 1.2 *Interbay HIA Chapter Topics*

HEALTH AND WELL-BEING

INTRODUCTION

Analyzing the potential impacts on health and social well-being are undoubtedly core to the purpose of a health impact assessment. While this land has had many historical and cultural uses throughout time, it is critical now more than ever before to consider fully the potential that this site carries, and what the potential health benefits and impacts are to the people who will live on and utilize this area.

In this chapter, we consider four focus areas:

- *Connectivity:* the neighborhood's connectivity to community resources such as community centers, education and libraries available to people who travel through and to the Interbay site, as well as the connectedness within the community(interpersonal connectivity), and the impact of that connectedness on public health.
- *Safety:* The security and protection of people who live, work, use and travel to and through the Interbay site.
- *Health Access:* the accessibility of health- and health-related facilities to people who live in and work at the Interbay site.
- *Social Well-being and Equity:* the social well-being of people who live, work, use and travel through the Interbay site, as well as for Seattle and King County at large.

FOCUS AREAS

CONNECTIVITY

Redevelopment of the state-owned Interbay property represents a rare development opportunity on land near Seattle's downtown, and a significant opportunity for the city, region, and state. Among all of the three future use proposals, the importance of connectivity to community centers, education, libraries, and other resources should be considered by the city and state governments. Connectivity is central to the planning process and is a key factor to increase physical and mental well-being. The neighborhood surrounding the Interbay property is evolving, thus leading to a potential increased need for neighborhood connectivity. To maximize public benefit, the better and more efficient this connectivity is, the greater the social and economic benefits of urban living will be.

COMMUNITY CENTERS

Neighborhood and individual health can be substantially impacted by a sense of community. Feelings of community increase the likelihood of making positive changes for healthier behavior and taking action to improve the health of others (Hystad and Carpiano 2012; Walter, Rasugu and Omariba 2010; Ross 2002). The redevelopment of the Interbay property gives planners the opportunity to build a community center focused on promoting social cohesion and bolstering health. Community centers serve as public locations where people can gather for group activities, social support, and public information to enrich their bodies and minds, as well as foster feelings of community and civic pride. Every-day public spaces such as community centers and outside meeting places build

sense of community and foster social interactions (Cattell et al. 2008) Furthermore, activities and educational programming provided in community spaces such as community centers allow residents to gain valuable civic and professional skills and create deeper social networks which, as part of building community, build health (London et al. 2010; Glover 2004; Morgan et al. 2016).

The Interbay neighborhood does not currently have available community centers. There are several community centers in the nearby Queen Anne neighborhood and Magnolia neighborhood. Based on the Figure 2.1 existing community condition, these community centers are 0.5mi to 1mi distances away from the Interbay property.

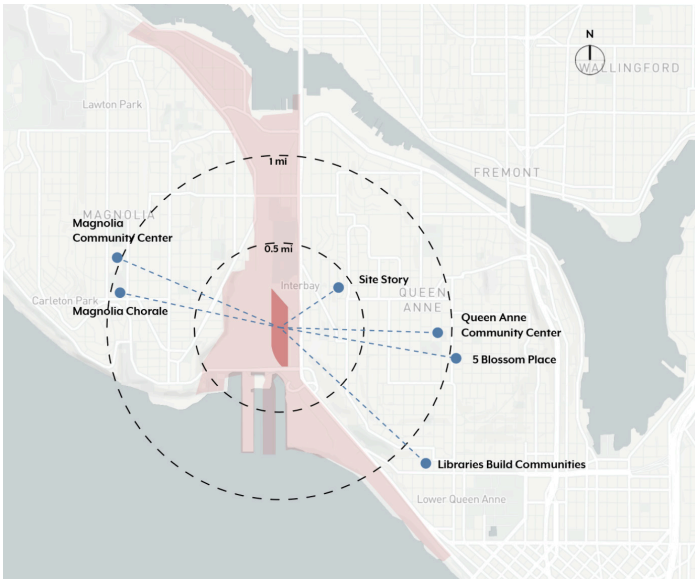


Figure 2.1 *Existing Community Centers Condition (Created by Shanshan Shang)*

EDUCATION

Education is significant for an individual's self-improvement and lifelong health status. For children, higher-quality early learning experiences are more likely to result in future success and better health outcomes (Georgia Health Policy Center 2015). For some ethnic minorities, education opportunities, such as English language classes, may help them avoid isolation caused by language obstacles, increase their awareness of a health or safety risk, and provide them with better educational and career opportunities (Kochtitzky 2011).

According to figure 2.2, the surrounding neighborhoods of the Interbay property currently have six elementary schools, three middle schools, and one high school. Based on the potential evolution of the surrounding neighborhoods, the Interbay neighborhood will experience an education shortage. If all the children who live in the Interbay neighborhood attend schools in surrounding neighborhoods, this could contribute to potential education inequity, due to the increased commuting time and safety concerns such as road accidents for children.

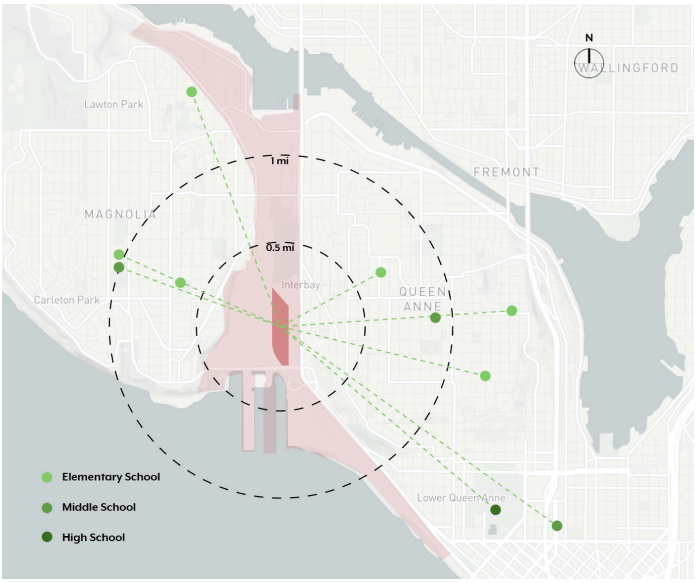


Figure 2.2 *Existing Education Condition (Created by Shanshan Shang)*

LIBRARIES

Libraries are important cornerstones of a healthy community because they connect communities by offering free educational resources and gathering space to everyone in the community. Libraries give people the opportunity to explore academic research, experience new ideas, find jobs, and get lost in wonderful stories, while at the same time providing a sense of place for gathering. They are also safe refuges for the homeless and underserved populations. Libraries and similar spaces benefit health by increasing feelings of community and developing cultural, civic, and professional assets (Stern and Seifert 2017; London et al. 2010; Glover 2004; Morgan et al. 2016).

Providing access to libraries is fundamental to a sustainable community. Unfortunately, there is sparse library accessibility within the Interbay neighborhood. Additionally, the report does not include a recommendation or commitment to building a library in the Interbay property. Based on the figure 2.3 existing libraries condition, the distances between the Interbay property and libraries in surrounding neighborhoods range from 0.5mi to 1 mi. 20min to 60min by walking, 5min to 10min by driving.

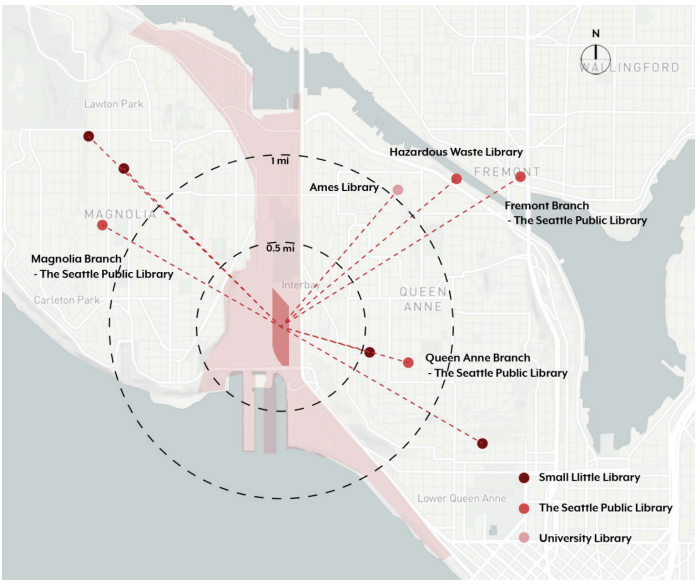


Figure 2.3 *Existing Libraries Condition (Created by Shanshan Shang)*

INTERNET ACCESSIBILITY

The rapid adoption of the Internet and computing technologies by all sectors of modern society has made them an indispensable part of our daily work and life. Access to these resources is taken for granted by public agencies providing services to the community, by those who conduct business and commerce, and by those who use them to stay current on public affairs and in touch with their families and friends on a daily basis. Yet not all individuals have consistent access to these resources—they may be unable to afford them, they may need basic training in how to use them, or they may be displaced from their normal access points. (Becker, 2010) Many communities in the United States continue to suffer from a lack of Internet connectivity or from unsatisfactory quality and affordability of their Internet connection. Since telecommunications utilities are all private, we will only discuss public Wi-Fi access in this report. In the increasingly globalized world, it is necessary to have access to public Wi-Fi services. Access affects job opportunities, safety, and human connection. Public Wi-Fi provides a key bridge between the information and access gap. Most commercial areas and educational areas like schools and libraries can provide Wi-Fi access to the public. For example, public libraries have taken on the role as the provider of free public access to the Internet and computers for those who are not able to gain access elsewhere. Sixty percent of the public access computer users reported using library internet to maintain person connections. (Becker, 2010)

SAFETY

The alternative futures for the Washington National Guard Armory Site in the Interbay neighborhood have the potential to transform the area into one that is optimally utilized to promote healthy and active lifestyles of community members and visitors. However, safety considerations, such as physical safety and crime must be factored in when city and state governments weigh the three different options for the site. This assessment of these factors will help prevent new or compounded potential threats to community members after land use changes are implemented. Seattle's growing population comprises a wide variety of community members from different socio-economic backgrounds and with conflicting priorities.

Additionally, there is a consensus between public health experts and design and planning teams that the built environment has a significant influence on human health (Dannenberg, Frumkin, & Jackson, 2011). With this knowledge, land use decisions and urban plans are obligated to align with recommendations from the health sector in order to prevent new plans from posing potential threats to the communities that live on and use the areas, and to influence the safety and well-being of communities. Planning and design crews must consider factors such as traffic volume, crime rates, lighting, law enforcement regulation capacity, and physical hazards and injury prevention on the landscape, which may all impact urban safety in any of the land use options under consideration at the Armory Site and Interbay.

HEALTH ACCESS

Availability of healthcare services are an essential aspect of ensuring the health, safety, and wellbeing of a community. Access to healthcare goes beyond just the physical location of facilities. There must also be consideration placed upon the types of healthcare facilities in the area, ease of access, level of care offered by the facility, cost to utilize the services provided, and medical coverage accepted by the facilities (Gulliford, et al., 2002). The safeguarding of a healthy population and workforce rests in individuals being able to access the care that is needed and be able to continue to maintain access while dealing with ongoing health related issues (OurHealth, 2018).

Healthy citizens and employees also contribute productively to their places of work. The ease to which people can seek out and utilize healthcare services are also a vital consideration for healthcare access (Andersen & Aday, 1978). Addressing concerns regarding the ease of access should be taken from an equitable and intersectional lens. This means accounting for ways that certain populations (e.g., lower socio-economic

status, Black and Indigenous People of Color, individuals with disabilities, etc.) and individuals with intersecting identities may lack access to healthcare. For the purpose of this assessment the primary focus for healthcare access will be on the proximity of facilities located near the Interbay site. The types of facilities and services offered will also be considered in the analysis.

SOCIAL WELL-BEING AND EQUITY

Another important consideration when transforming the Interbay site is the social well-being of the residents, business owners, industrial workers, or commuters in the area. Social capital, defined as the resources accessed by individuals and groups through social connections, can have positive impacts on health outcomes in the community, ranging from improved mental health to lower rates of obesity (Carrillo-Alvarez, 2018). These resources can include community centers, common spaces, parks, theaters, and other places for people to connect, as mentioned in the Interbay Advisory Committee Report (Appendix F). This is an incredibly important factor to consider whether the site is industrial, mixed use, or residential.

Equity is a part of social capital that should be addressed throughout the development of this site. While racism, classism, and sexism may be the first to come to mind, ableism, homophobia, and many others should also be considered in the transformation of this site. These considerations and recommendations will be outlined in detail below.

ANALYSIS AND HEALTH IMPACT ASSESSMENT

The studio report evaluating the Interbay site on Armory Way for its many potential uses investigated 6 potential uses, which were then narrowed down to three, upon further examination and refinement. These three recommended land use zoning options are:

- *Industrial Land Use Zoning*
- *Mixed-Use (Commercial, Residential)*
- *Mixed-Use (Light industrial, Commercial, Residential)*

OPTION #1 - INDUSTRIAL LAND USE

CONNECTIVITY

According to the current zoning, the Industrial only redevelopment concept that creates the greatest total economic output (p.53) is consistent with the existing land-use code. This option meets the job demand but will not address the potential connectivity needs including access to community centers, education, libraries, and other internet sites. Providing more living-wage jobs to the Interbay property will attract more people to move to the Interbay and surrounding neighborhoods, because living near the property will reduce the commuting time through a walkable distance. Therefore, the increase in employment opportunities will result in a potential increase of families moving to the neighborhood, which will lead to an growing need for community services that are supported by the public comments in the report. (p.18)

SAFETY

If the site is used as industrial only, safety implications will mainly apply to workers with less considerations for children, families, or general pedestrians. Therefore, existing Occupational Safety and Health Administration (OSHA) standards should be enforced to protect workers. Worker protections must be the focus, with involvement from safety teams/committees in each business. Manufacturing activities that are included in plans for an industrial only site would pose physical hazards such as electrical hazards, fall hazards, flying debris and dust, heavy equipment including large trucks, confined spaces, and other occupational exposures associated with manufacturing activities. If the space was designated as industrial only, then primarily the hazards on this site would be restricted to workers who should be trained in mitigating these hazards. However, the Interbay site still may host the Smith Cove Station and there are plans to grow and sell food in the middle of the site according to design plans. This would attract traffic from outside the working population and could expose travelers and food customers to industrial hazards and injury.

In an industrial-only setting, building security will be essential to the prevention of crime, such as trespassing, drug use, and theft. Buildings should be secured during working and non-working hours; security guards should be employed to monitor the area. This site in its urban setting could attract further criminal activity that is already common in the area. The Interbay area currently has a higher crime rate than the surrounding neighborhoods in Seattle (Seattle Police Department, 2020). The most common crimes include property crimes and theft. These are risks in an industrial area, where individuals seeking to commit these crimes may view the area as an easy target during non-business hours. Two primary models of crime prevention in the built environment are acknowledged by Stevenson, 2006; the enclosure and encounter models. The theory of enclosure to prevent crime suggests that a physical barrier to enclose a space will secure it from criminal activity. Encounter models suggest that traffic in an area will prevent the opportunity for crime (Stevenson, 2006). The industrial only use of this site would benefit

from the enclosure model to prevent crime, since the encounter model will not be likely to be effective during weekends and after hours.

HEALTH ACCESS

Seattle offers numerous options for health and medical care that are in close proximity to the Interbay area. Development of increased industrial usage would mean that although the residential population is not increasing, the amount of people working in the area has the potential to increase. With this influx of people into the area, the need to access healthcare providers will likely increase. The accessibility of health care clinics that offer walk-in services and same day appointments would be beneficial to workers who may need to have quick access to certain health services due to unforeseen health issues or injuries that could occur while on the job (OurHealth, 2018).

Ease of access to healthcare that can treat urgent needs of employees will help both employees and industry (Piuma, 2018). If employees are able to access the medical treatment they need without having to travel far, and they can be treated in a relatively short amount of time without the burden of making an appointment; then the barriers that can prohibit individuals from seeking medical attention can be mitigated (OurHealth, 2018). Maintaining the health of staff will also prove beneficial for businesses that are impacted by workers being absent (Mills, 2007). Employee time away from work due to medical needs is reduced because care is available as soon as needed and employees are likely to recover sooner due to receiving early treatment. Workplaces that also promote worker health not only reduce risk but also see increased productivity from employees (Mills, 2007).

At the moment there is one urgent care clinic within the vicinity of the Interbay Project (Google Maps, 2020). There are facilities such as hospitals, and mental and behavioral health clinics in the area, but they are all approximately 3-5 mile away from the site(Google Maps, 2020). Citizens needing to access these services are likely to be impacted by access to transportation and traffic issues. Increased travel time away from the work site, means more time away from work. Additional issues regarding emergency transportation services specific to the Interbay project are discussed in the Transportation and Accessibility section.

SOCIAL WELL-BEING AND EQUITY

When taking into consideration that this site could be used as a solely industrial site, what should be at the forefront of decisions are the types of people that will inhabit the space in and around the site. In the industrial case, working people would be the main target of the social recommendations.

This population would typically consist of older adults making low- to middle-income wages. This is inferred from the typical demographic of people that work in industrial jobs (U.S. Bureau of Labor Statistics, 2020). Currently, there is only one restaurant and one grocery store in walking distance (1-mile radius) where people would be able to gather. To reduce the stress on this working population, there needs to be more space for people to gather to have lunch or a drink after work, which are both affordable and safe for working-class people. Safety in this context constitutes a safe space for people to be able to relax and enjoy themselves for a small portion of the day without feeling as if they are intruding, and without having to spend all of their hard-earned money.

In this case, it is incredibly important to consider the working people that will be accessing the site every day. Their needs should be taken into account at every point from creating safe spaces on the sites to relax, providing affordable food options, and creating equitable work-spaces.

OPTION #2 - MIXED-USE (COMMERCIAL, RESIDENTIAL)

CONNECTIVITY

The commercial and residential mixed-use option provides mid-use and/or high-rise mixed-income housing to address the future increasing population in the surrounding neighborhoods. This option will also provide additional job opportunities. As the public comments presented in the report, the future community services and spaces for public gathering are crucial in the future plan. Commercial use coupled with supportive retail, civic uses, and community resource space provided by residential uses can enhance the community's social connectivity through creating access to community centers, educational facilities, libraries, as well as increasing social connectivity by increasing access to the Internet.

SAFETY

The commercial and residential mixed-use site plans focus on addressing the increasing population in the area. Criminal activity is a concern with a population increase in an urban area where criminal activity is already relatively high in Interbay (Seattle Police Department, 2020). Building security is essential where the plans include high rise residential buildings with first floor commercial spaces, since home invasion, theft, and trespassing can occur more readily in this mixed use setting due to loitering and shopping traffic close to residences.

Mixed commercial and residential plans include elevated

paths planned, which can help prevent pedestrian hazards where shopping traffic may be increased around residential settings which include children. Therefore, design plans should include speed limit considerations.

HEALTH ACCESS

While there is no established recommendation on the optimal ratio of doctors to citizens, the World Health Organization (2020) did establish a minimum threshold for providing necessary and essential maternal and child health services as 23 doctors, nurses and midwives per 10,000 citizens. As of 2018, Seattle had a population of 753,675 (U.S. Census Bureau, 2020). With an increase in population due to increased residential use, the need for health care providers will increase. Should the current availability of health services remain the same this could lead to an increased strain on the existing health care infrastructure. A search for medical doctors practicing in Seattle indicated that there are 500 physicians in the area, meaning that there is approximately 1 physician to every ~1,500 people (AAMC, 2020). Statewide Washington has a ratio of 278.8 physicians for every 100,000 people which is comparable to the national average which is 277.7 physicians for every 100,000 people (Gooch, 2019).

While there is currently an urgent-care in walking distance, the nearest hospitals offering emergency care, or hospital services are approximately 3 to 5 miles away (Google Maps, 2020). The nearest emergency services hospital is 2.7 miles away but requires the crossing of the Ballard bridge, an active draw-bridge, which means that access to the hospital could be delayed. Though there are emergency transport services, those without medical coverage and minimal financial support may not opt to use these services and could be limited by what they can afford. The addition of mixed income housing would also mean that the healthcare provided will need to serve the varying needs of all people living within the area.. Ongoing healthcare support and maintenance will also be needed to sustain the wellbeing of the people. Additionally access to a local drug store will provide people in the area with the needed s over the counter or prescription medical supplies.

There are mental and behavioral supports also within the 3 to 5-mile radius of the Interbay site (Google Maps, 2020). These services are also increasing the availability of their services by providing access through telehealth. There is also an inpatient facility for mental health issues with the 5-mile radius as well. The need for doctors and therapists who offer mental health services will be a continuing need that should not be ignored. Currently there are no community health providers who provide comprehensive services including mental health directly within the vicinity of the project.

SOCIAL WELL-BEING AND EQUITY

When considering social welfare in a commercial/residential site, a critical piece of that is equitable housing. Seattle is known for its increasing rent prices and homeless population, and it is imperative to think about who will have access to these residential and commercial spaces. Offering affordable housing and commercial opportunities could greatly increase the social welfare of important vulnerable populations and relieve some of the population's stress. However, even if affordable housing is not a priority for this site, it is still important to create spaces and opportunities to connect for whoever may be residing in this area. Everyone needs social interaction and cohesion, so community spaces, green spaces, and parks should be seriously considered (Thoits, 2011).

Inevitably, there will be children living in the area if residential space is placed on this site, so this is yet another consideration that would look very different. Children need parks and green space that is all safe and easily accessible and facilitate easy visual supervision by adult caregivers. For children to connect and cultivate social relationships, specific child-friendly spaces need to be a part of residential areas. Whether that is in the form of safe playgrounds and parks or a commercial space marketed for children should be required so that children are able to develop with the proper social interactions and connections without putting a strain on caregivers to find these types of places outside of their residential area.

The final consideration when thinking about the social wellbeing of a mixed place is to have a space for the community gatherings for interface between commercial owners and residents. This is imperative to the happiness of both parties, and a strong relationship between the two groups could prevent a lot of stress and strain on these populations in the future.

OPTION #3 - MIXED-USE (LIGHT INDUSTRIAL, COMMERCIAL, RESIDENTIAL)

CONNECTIVITY

The light industrial and residential mixed-use option will provide family wage jobs that can mitigate the public concerns regarding loss of industrial land. The residential use will provide more affordable housing that is required by the public comments, this will increase the population in the Interbay property and the needs for infrastructure that enhance community connectivity. This redevelopment concept has opportunities to fill some needs of community centers, access to education, libraries, and other internet sites through the supportive retail, civic uses, and community resource space of the residential use.

SAFETY

Mixed-use combining industrial and residential use plans include a family-focused public park on the former golf course. Physical safety implications should be considered when converting a former golf course to a park, including fall hazards from leftover golf holes in the ground, and potential soft ground from golf course irrigation posing slipping hazards. The plans also include close proximity between breweries and residential buildings. This poses multiple safety concerns, including increased crime such as public intoxication, violence or domestic abuse due to alcohol use and abuse (Picone et al., 2010). Introducing these factors in a family-focused residential area can lead to these problems disproportionately affecting children and young adults and may lead to teen alcohol abuse as well.

Conversely, the argument could be made that close proximity between breweries and residential buildings should discourage drinking and driving, because brewery customers can walk home instead of drive. However, the breweries will likely bring in more customers commuting from outside of the area since the residential setting is targeted to families and people of all ages who may not include brewery customers. This could lead to increased instances of driving under the influence of alcohol within residential areas, endangering residents including children. Therefore, mixed industrial and residential areas should exclude close proximity between breweries and residential family buildings.

In addition, the mixed residential and industrial setting can pose physical hazards to resident pedestrians. These plans include hosting timber industry in close proximity to residences; large trucks entering and exiting the area as well as timber could be dangerous for children in the area as well as general residents. This mixed use also prioritizes a transit-oriented neighborhood which will be developed in tandem with the 2035 Ballard Light Rail Smith Cove Station. It is important to consider crime rates associated with light rail stations, and the potential risks for crime that could be introduced into this mixed residential setting. The plans for a mixed light industrial and residential use for this site include the industrial area flanked by two outer residential neighborhoods; this would help eliminate noise hazards from industry to the outer perimeter of neighborhoods but may increase noise exposures to the neighborhoods closest to the industrial core.

HEALTH ACCESS

The need for healthcare access will still remain should a light industrial and residential model of land use be implemented. Those living in the area and those working will need easily accessible healthcare. As previously mentioned, there is only an urgent care facility located within the direct vicinity of the area and having additional access to health resources would be beneficial. There are also no drug stores within walking distance of the immediate area to provide needed supplies to people in the area.

SOCIAL WELL-BEING AND EQUITY

In an industrial/residential mixed-use space, similar considerations should be taken into account as a mixed-use commercial/residential site. Industrial site workers and owners will need safe spaces to relax, eat food, and connect, while residents will need safe spaces for themselves and their children. It is also imperative here that these two groups have space to connect and interface with each other. This should also include a design that keeps both areas distinctly different because of the inherent danger of an industrial site, especially for children. The site should be designed to stay separate when necessary but connected when needed.

RECOMMENDATIONS

PRIORITY RECOMMENDATIONS

RECOMMENDATION 1: BUILD A COMMUNITY-CENTERED HEALTH FACILITY

Each of the land use proposals would benefit from the addition of healthcare services. The increase of people in the area will mean that the only nearby urgent care facility in the area might not be enough to meet all of the needs for the influx of people. Whether people are working in the area or living there they will have healthcare needs. Thus, with regards to proposals 2 and 3, both of which incorporate residential zoning into the development of the Interbay site, the recommendation is to build a community health center, offering primary, pediatric and urgent care services at a minimum, with the potential for adult medicine and other relevant specialty considerations to be made. These considerations can be made by input from residents and community development groups made up of socially- and socioeconomically- diverse representatives and stakeholders of the Interbay site and community. Even if an industrial zoning option is finally chosen, the prioritization of access to healthcare is recommended; industrial workers need healthcare too, especially when spending working hours onsite. In this case, an urgent care facility, or similar, is recommended, with the needs of the workers of the area in mind.

RECOMMENDATION 2: BUILD A COMMUNITY CENTER

Given the recommendation and need for an equitable and people-centered approach, especially in the current political climate it is imperative to make space for the community to come together and share space, ideas and lessons. A community center would not only meet this community need, but also improve social connectivity and access to community resources. This creates more social capital which leads to greater social well-being. Lessons from licensed instructors and experienced members of the community could be taught, some of which incorporate tenets of health and well-being (exercise classes, a fitness center, walking groups and spaces, social and hobby groups) safety (self-defense and martial arts classes) and social equity (working spaces for health advocacy groups and nonprofit organizations). The options are endless. Furthermore, creative considerations can be made to incorporate public comments on the Advisory Committee report expressing a preference for green spaces e.g. a dog park, which would similarly meet many of the recommendations for social connectivity and well-being. Many proposals from the UW students in the Built Environment Studio report also gave thought to the incorporation of green spaces in their ideas, with bike-paths and parks for social gatherings.

OTHER RECOMMENDATIONS FOR CONSIDERATION

CONNECTIVITY

- Among all the redevelopment options, all current and future City operated health and human services could consider holding a meeting to discuss future services needs in the Interbay neighborhood. All included entities could consider compiling a master Interbay Property Service Extension Plan that is available to the public. This would allow for residents to understand current and future services accessibility.

- In the mixed-use commercial/residential redevelopment option, the city and state governments could consider building a community center that could provide public activities, social support, and public information. Or increase other buildings transitioning from light industrial use.

- We recommend a proposal for future educational facilities In the mixed-use commercial/residential redevelopment option. This will support children in the surrounding neighborhoods as the population continues to grow. This includes sites of new schools and school routes for students who live farthest away from their designated school location.

- In the mixed-use commercial/residential redevelopment option, the city planners could consider advocating public libraries as an equal place for gathering that will enhance the community connectivity, and promoting free educational resources can be available to everyone in the neighborhood and other supportive facilities such as restrooms.

- Increasing more public spaces that can provide internet access. The expected population influx will increase the demand for Wi-Fi. We suggest starting this planning process by looking at similar areas in the United States that have city Wi-Fi and how they prepared for anticipated growth.

SAFETY

- The industrial only use of this site would benefit from the enclosure model to prevent crime (Stevenson, 2006). Our recommendation would be to secure the area with a physical enclosure and install security measures with the enclosure to prevent crime during weekends and after hours, and also to protect the general public from entering the space and the potential injury that could occur in from industry and manufacturing environments to untrained pedestrians (those who don't work in the area). In addition, injury prevention is essential in this industrial setting. Our recommendation would include the requirement for manufacturing and industrial businesses to have comprehensive health and safety plans in place and restricting pedestrian access to industrial zones with physical enclosures to prevent injuries to the general public would address this concern as well.

- In the industrial and residential mixed-use setting, from a safety standpoint, we would recommend excluding breweries within a mile radius from residential areas, due to safety concerns they may cause or lead to with respect to residents and families. This is also an equity issue, as women and children are more likely to be the victims of domestic violence and secondary victims of alcohol abuse in the household (Picone et al., 2010). Additionally, in this setting, bike paths and residential traffic would conflict with truck access for industrial purposes. For the physical safety of residents and cyclists, we would recommend that truck circulation be contained to the perimeter of the residential area rather than through it as outlined in the design diagrams.

  In the residential and commercial mixed use, our recommendations would be to install sophisticated

- In the residential and commercial mixed use, our recommendations would be to install sophisticated building security systems, including key fob entries, alarm and camera systems, and security personnel as preventive measures for protecting residents from criminal activity (loitering, theft, property crimes and trespassing) compounded by shopping centers mixed within close proximity to residences. In addition, controlling speed limits would be important to protecting child and pedestrian safety when residences are mixed in commercial shopping centers which are expected to bring in increased volumes of car traffic.

HEALTH ACCESS

- Establishing a healthcare facility such as an urgent care facility or walk-in clinic within walking distance of the Interbay sitae and near one of the future Light rail stations. This will not only increase access to healthcare for people in the area, but also for those who live near a light rail station that does not have a healthcare facility in their area. There are emergency services located within the area but establishing services such as either an urgent care facility or walk-in clinic will allow for minor and acute medical needs to be met. If these services accepted various insurances, and Medicare and Medicaid it would help to ensure access to individuals of varying healthcare coverage.

- Increase access to a drug store that offers needed over-the counter and prescription medications and medical items. This service will allow potential workers and residents in the area the ability to gain needed supplies that will help them to maintain their health. Establishing this facility within walking distance of the Interbay site and the light rail facility will also help to increase access to those not directly in the area but within proximity to a light rail station. Being within walking distance will also increase access for those who have a limited means of transportation. Including service providers who accept Medicare and Medicaid will help make sure that people of varying means will get the products and services they need.

SOCIAL WELL-BEING

In all of the site options, people should be at the forefront of the design. In all cases, it is important to create safe spaces for people to connect with each other within the site because there are not sufficient affordable audience-specific options around the site currently.

EQUITY EVALUATION

The Advisory Committee report received comments and suggestions from the public emphasizing the need for connectivity through community services. Comments have suggested the Advisory Committee includes considerations for vulnerable populations, such as people experiencing homelessness, veterans, and youth programs. Development of any of the proposed options should consider all stakeholders' comments and integrate community input into the planning process. Due to the scarcity of connected community centers, access to education, libraries, and Internet sites, people who live in the Interbay neighborhood have to use community services in surrounding neighborhoods, which could contribute to a potential inequity. Hence, more community services should be advocated in the Interbay property.

One of the best and most effective systems for affecting change to improve safety (both from physical safety hazards and crime) in an area is the ability for collective action in the local community to identify problems and take action for the common good (Stevenson, 2006). This is an equity matter; traditionally, socioeconomically stressed communities have had less of the ability to come together and take this type of collective action to protect their communities and their families. To promote this collective action, communities who live and work in this site should be educated by licensed instructors on the awareness of safety solutions and physical safety. Businesses in the area can market safety solutions and safety communication mechanisms to promote this awareness. Community groups should be organized to facilitate community members voicing their concerns to one another despite differences in socio-economic backgrounds, to give them the tools to take collective action.

Access to healthcare facilities is impacted by access to transportation (Syed, Gerber, and Sharp, 2013). For residents who do not own their own vehicle, access to quality healthcare or healthcare in general will be limited by public modes of transportation available to them.

Furthermore, racial residential segregation remains one of the most widely studied institutional mechanisms of racism and has been identified as a fundamental cause of racial health disparities due to the multiple pathways through which it operates to have ubiquitous negative consequences on health (Bailey et al., 2017; Williams, Collins, 2001; Gee & Ford, 2011; Kramer & Hogue, 2009). Although segregation has been illegal since the Fair Housing Act of 1968, its basic structures established by the 1940s remain largely intact (Williams, Lawrence, & Davis, 2019). Research has found that segregation (experienced in childhood) reduces economic status in adulthood by reducing access to quality elementary and

high school education, preparation for higher education, and employment opportunities (Williams, Collins, 2001). In 2016, for every dollar of income that White households received, Latinx people earned 73 cents and Black people earned 61 cents (Semega, Kollar, Creamer, & Mohanty, 2019). Schools in segregated areas have fewer high-quality teachers, lower levels of educational resources and per-student spending, and higher levels of neighborhood violence, crime, and poverty (Orfield, Frankenberg, & Garces, 2008). Thus, racialized segregation is responsible for the large and persistent racial/ethnic differences in socioeconomic status.

Segregation can also negatively affect health by creating communities of concentrated poverty with high levels of neighborhood disadvantage and low-quality housing, and with both government and the private sector showing disinterest or simply divesting from these communities. In turn, the physical conditions (poor-quality housing and neighborhood environments) and social conditions that characterize segregated neighborhoods lead to increased exposure to physical and chemical hazards, increased prevalence of psychosocial stressors, and reduced access to resources that enhance health (Williams, Collins, 2001; Kramer & Hogue, 2009; Williams et al., 2019).

We must assert that racism as a social condition is a fundamental cause of health and illness (Link & Phelan, 1995) , and a social determinant of health (Jones, 2002). Health disparities, discrimination, and residential segregation are by-products of racism (Ford & Airhihenbuwa, 2010a, 2010b; Jones, 2002). Yet, these topics are often discussed without explicitly mentioning the connection to racism. As the Interbay site is developed, it is incredibly important to take the role of racism into account. This can be done by ensuring a socially and socioeconomically diverse team of developers as well as engaging a wide variety of Interbay residents and neighbors through constant communication with representatives from marginalized communities as well as with the team of decision-makers. As mentioned previously, some sort of committee that is representative of the community living there should be involved throughout development of the site. Undermining or hiding the impact of racism on racialized health disparities further enables the perpetuation of these inequities (Jones, 2002). Furthermore, to improve health outcomes, racism must be addressed not only by all public health professionals. Healthy People 2020 states “achieving health equity requires valuing everyone equally with focused and ongoing societal efforts to address avoidable inequalities, historical and contemporary injustices, and the elimination of health and health care disparities” (“Social Determinants of Health | Healthy People 2020,”).

SUMMARY

ASSUMPTIONS AND LIMITATIONS

The community connectivity and access to education, libraries, and internet services should be considered in the future plan. One of the challenges in the redevelopment of the Interbay property is this area lacks a large population, so the need for services is not as urgent and can be acquired from surrounding neighborhoods. As a result, it is difficult to implement the community services in the property. However, planners have significant power in promoting physical and mental well-being and can anticipate features of a healthy community in the design process. We recommend that planners consider community connectivity and access to public services which will help establish and maintain an equitable as well as a resilient community in the Interbay property.

In order for this site to be used to its full potential requires it to be safe (crime controlled, and injuries prevented), and for the people who live and work in the area to perceive it as safe. Therefore, systems must be in place to prevent short term decision making, where safety has not been fully considered. In addition, our recommendations outline steps that planners and designers should take to ensure the safety and well-being of the community.

Access to healthcare has made assumptions regarding the need for certain medical facilities based on available data and recommendations made by different health care organizations. Due to the variability in healthcare access, the health insurance industry, and the cultural expectations regarding medical care, different researchers have not been able to identify an optimal ratio of physicians to population. This lack of information made it necessary to compare current Seattle ratio to national trends. This comparison allowed for some considerations to be made regarding what might be deemed acceptable health care resources for a community. Different cultural expectations of what is appropriate access to health care varies and so considerations need to be made about what Seattleites will deem is necessary.

One of the largest limitations in considering this assessment for social well-being is that it is difficult to know what the needs are of the people that are already in the area and how they will conflict and coincide with those of residents, workers, and commercial users of the Interbay site. Creating an equitable space is imperative, but this goal may be impacted by the surrounding communities, so this is something to keep in mind. In 2014, prominent social epidemiologist Nancy Krieger published a study in which she wrote “studies remain focused primarily on interpersonal discrimination, and scant research investigates the health impacts

of structural discrimination, a gap consonant with the limited epidemiologic research on political systems and population health." (Armstrong et al., 2008). Naming and studying structural racism more closely now than ever is becoming critical to this nation's health. Unfortunately, while we know more about how racism pervades society, and the many faces it can take and the many levels at which these faces can emerge, it is of critical importance that the current and future generations of public health practitioners focus on weeding out the root causes of structural racism, arguably the most pernicious form of racism as it supports the perpetuation of racism at the lower levels (personally-mediated and internalized).

Fortunately, the Interbay site development poses an exciting opportunity to take into account the health and wellbeing of the people that will be either living, working, or shopping in the area. While there is a pattern of racism, sexism, and others mentioned in this section, developers have a chance to break this oppressive cycle. By taking into account the recommendations in this chapter, developers and other key stakeholders will be taking important steps in the right direction to uplift equity and health for all.

HOUSING AND EMPLOYMENT

INTRODUCTION

Complex in nature, the relationship between housing and employment continues to remain a constant variable for individuals, households and communities striving to live prosperous, healthy, and satisfying lives. Prior to the drastic impacts that COVID-19 had on local-to-nationwide employment,the unemployment rate had continued to decrease steadily, providing new economic growth and stability for individuals employed across various job sectors and industries (U.S. Bureau of Labor Statistics, 2020). As Seattle, King County, and the State of Washington face new economic challenges as they continue to respond to COVID-19, employment will continue to be a topic of concern across both old and new communities. Furthermore, housing prices across the country continue to rise, adding to the creation of inequities and barriers for low-and moderate-income families to enter into the housing market (FRED, 2020). When housing prices continue to outpace income growth, households may find it burdensome to access a range of daily needs and services (Organization of Economic Cooperation and Development, 2020). In areas of the country where housing prices outpace employee wages or are generally higher than average, policy makers, employers, and housing programs continue to feel that unaffordable housing could adversely affect local economic growth (Chakrabarti & Zhang, 2010). Additionally, higher housing prices may negatively impact an individual or household's ability to provide for non-housing needs, such as daycare, groceries, healthcare services, and savings for emergencies (Wardrip et al., 2011). As such, the housing-employment relationship can have a profound effect on the overall health and well-being of individuals living and working in and around the proposed developments of the Interbay site. This chapter assesses the numerous housing and employment factors regarding the existing and possible future conditions of the Interbay site, and their relationship to health. Health elements assessed in this chapter include:

- Housing Stability & Affordability
- Quality and Safety
- Employment Opportunities
- Economic Stability
- Access to Private Services

CONNECTION TO HEALTH

HOUSING AND HEALTH

Housing is one of the most extensively researched social determinants of health, and there is strong evidence of the connection between housing and health. Health outcomes are affected by housing quality, safety, affordability, and stability, as well as the physical and social characteristics of neighborhoods (Taylor, 2018). For the purpose of this assessment, we will explore two distinct pathways to health; the housing affordability and stability pathway and the housing quality and safety pathway.

Housing instability, which includes being behind on rent, frequent moves, and homelessness, has been associated with adverse outcomes in caregivers and children (Sandel, 2018). The lack of stable housing can also cause unemployment, disrupted education, and social service benefits to be interrupted (Taylor, 2018). Finally, housing instability can lead to adverse health outcomes including depression, anxiety, increased substance abuse, psychological distress, and suicide (Taylor, 2018). Alternatively, provision of affordable housing to low income

households has been proven to reduce healthcare costs and improve mental and physical health outcomes (Wright, 2016). Housing affordability is similarly linked to healthcare stability, improved educational outcomes, and food stability. Not surprisingly, families that are designated as "cost-burdened" and "severely cost-burdened," defined as spending more than 30% and 50% of their income on housing, respectively, are less able to invest in health-generating goods (Taylor, 2018).

Housing quality and safety is also strongly correlated with positive health outcomes. For example, studies where asthma triggers are removed from the living environment have demonstrated improved health outcomes among children and adults, and reductions in health-related expenses (Taylor, 2018). The federally funded Low Income Housing Assistance Program (LIHEAP), which provides financial assistance for medically necessary home heating and cooling expenses and covers fuel expenses during emergencies, has proven to improve healthy weight and nutritional outcomes of children in participating families (Frank, 2006). On the other hand, low quality housing conditions, such as pest infestations, dirty carpets, poor ventilation, and water leaks have been associated with poor health, especially in children and with regards to asthma (Saeki, 2015). Overcrowding and exposure to extreme temperatures are also associated with physical illness, infectious diseases, and cardiovascular events (Solari, 2012). Vulnerable populations, such as children and the elderly, are at higher risk for adverse health outcomes associated with poor housing conditions, although housing quality and safety impact health across age and income levels.

Investment, including new development, infrastructure, improved public services, can potentially increase property values and the cost of living or doing business in a particular area. This phenomenon, known as gentrification, can impact health by forcing low-income households out of the community and increasing housing instability, increasing the costs of remaining in the neighborhood, and by stimulating the local economy and benefitting the neighborhood (Ito, 2013). Redevelopment of the Interbay site has the potential to increase access to affordable and safe housing for low-income families, but may also inflate the cost of living in the neighborhood.

For these reasons, the Interbay redevelopment concepts should consider the opportunity to improve access to affordable housing and improve housing stability, as a pathway for improved health outcomes. Low-income and mixed-income housing have the potential to improve physical and mental health, and reduce both personal and State health expenditure. Additionally, redevelopers should consider the safety and quality of future housing plans on the Interbay site, as air quality, housing conditions, and building materials all impact health at the household level.

EMPLOYMENT AND HEALTH

The connection to employment and health for the general population is well established, and spans a range of variables pertaining to different individuals and the different types of employment they hold. Job types, such as temporary, part-time and full-time can contribute to a change in physical and mental well-being (Goodman, 2015). The physical and social working conditions to which an individual is exposed varies greatly across industry, job types, and employee wages. Additionally, frequency in job turnover, physical commute, and range of wages and benefits an employee receives act as important factors in an individual's overall health (Clougherty et al., 2010). Moreover, an individual's health directly contributes to an increased risk of job loss, while access to needed health and wellness services too impacts their ability to obtain and maintain employment (Antonisse, 2018).

Figure 3.1 below illustrates Braveman et al's conceptual model for the social determinants of health (Braveman et al., 2011). This model reveals that an individual's health is not independent of other factors, but is impacted by the conditions, opportunities, and resources we are surrounded by.

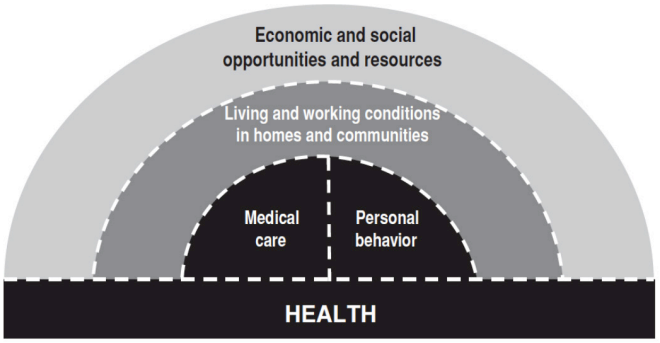


Figure 3.1 *The Social Determinants of Health Conceptual Framework (Braveman et al, 2011)*

Furthermore, figure 3.1 illustrates that health related behaviors and the ability to access and receive medical care can be shaped both indirectly and directly by 'upstream conditions', such as the living and working conditions individuals and families experience. Employment opportunities - positive and negative - and the multiple pathways that arise from it, such as working conditions, work-related resources, and income, can directly lead to a variety of health-related outcomes. These outcomes may include work-and home-induced stress, access to health insurance and financial protection from unexpected medical visits, sick leave, exposure to hazards, housing, nutrition, and neighborhood environment (Braveman et al., 2011). As part-and full-time employment may provide the opportunity for an individual and household to improve their physical and mental well-being, health outcomes negatively related to job displacement can be exacerbated by additional upstream factors, such as poorly declining regional and national economic stability, lack of social

networks, access to both public and private services (Pearlman, 2015).

When considering the Interbay site and the proposals at hand, future redevelopments should specifically consider how employment opportunities, local and regional economic stability, and access to private services will be impacted. For example, understanding employment types and who will be able to most likely secure those jobs based on zoning regulations, income potential, and transportation accessibility may assist in distributing positive health outcomes. As mentioned in the disability access section of Chapter 1, Health and Well-Being, the site proposals may wish to consider jobs that are equitable provided to working age people with disabilities. Lack of employment for people with disabilities exacerbates health conditions, such as chronic diseases including obesity, heart disease and diabetes, anxiety, and depression. Historically, unemployment for both the general population and people with disabilities leads to a cycle where lack of employment opportunities can lead to poor health outcomes, and poor health outcomes will lead to unemployment (Pearlman, 2015).

Several studies have looked into how type of employment, workplace setting, and irregular work hours have contributed to health disparities (Bouwhuis et al., 2019; Burgard & Lin, 2013; Danielsson & Bodin, 2008). One study in particular concluded that a society's occupational structure and economic development (i.e. industrial, professional, managerial, agricultural, production) directly influences the types of employment that is available to workers, as well as both the positive and negative outcomes associated with such work (Burgard & Lin, 2013). Given that employment can be associated with positive health outcomes, and a lack of employment can be associated with negative outcomes, it is likely that expanded employment opportunities may additionally lower healthcare costs, both individually and systematically (Goodman, 2015). As such, assessing the current and future employment conditions and opportunities associated with the Interbay site proposals will provide policy makers an ability to appropriately consider the ideal type of work-related opportunities and resources needed to positively influence health.

EXISTING CONDITIONS

HOUSING CONDITIONS

Currently, there is no housing on the Interbay site, meaning the displacement of existing homes and apartments is fortunately not a concern for any of the proposed redevelopment concepts. For the purpose of this HIA, we looked to the surrounding neighborhoods and existing housing in the Interbay area to assess affordability, safety, and quality. In the neighborhoods surrounding the Interbay area, rent continues to increase annually and there are low vacancies in rental units (Heartland, 2019). For example, in Queen Anne and Magnolia, vacancy rates are around 6%, and annual rent growth in these neighborhoods are around 2% (Heartland, 2019). According to 2018 census data, the percentage of homeowners and renters in Magnolia is 85.1% and 14.9% respectively, and 56.7% and 43.3% in Queen Anne, the two neighborhoods surrounding the Interbay redevelopment site (Balk, 2020). The average home value in these two neighbors is around $990,000 (NWMLS, 2020). Finally, 95.6% of the people living in Magnolia and Queen Anne live in households and only 4.4% live in group quarters, like apartment buildings (ACS, 2017).

As the number of renters continues to rise across Seattle, housing affordability and availability is a growing concern. According to the City of Seattle, over 40,000 households are classified as severely cost-burdened, spending over 50% of their income on housing (Heartland, 2019). In the Magnolia and Queen Anne neighborhoods, roughly 30% of renter-occupied and 21% of owner-occupied housing units are cost-burdened (ACS, 2017). The City of Seattle has committed to funding 2,500 fixed-income housing units over the next 4 years, but this will not come close to meeting the demand of Seattle's low-income residents (Heartland, 2019). Additionally, there are no section 8 or section 515 public housing units in the area surrounding the site, although the Affordable Housing Advisory Board recognized the need for subsidized units in Seattle (AHAB, 2015).

Figure 3.2 *Interbay Safe Harbor Village (LIHI, 2019)*

In late 2017, Tent City 5, a homeless encampment in the Interbay, moved into the Interbay Safe Harbor Village on the Port of Seattle's Tsubota property, adjacent to the Interbay redevelopment site (Homelessness Response, 2019). This community of tiny homes is managed by the residents and the Low Income Housing Institute (LIHI) in Seattle. The original lease was for two years, from November 2017-2019, but the Port of Seattle recently extended the lease for 12 months, which is set to expire in November 2020 (Homelessness Response, 2019). The tiny home village is located along the southeast corner of the site, but will be relocated before the redevelopment of this site. However, many residents of Safe Harbor Village have been living in

the Interbay for more than four years and have developed social support systems in the area, so it is likely that these residents will remain in the area after the lease is terminated in late 2020 (LIHI, 2019).

The Interbay redevelopment site is located between the Magnolia and Queen Anne neighborhoods, which is an area of Seattle with relatively high homeownership, low housing vacancy rates, and increasing rent prices. It is crucial that the redevelopment concepts for this site consider the impact on home and property values, the cost of living and working in the area, and the availability of housing, as housing instability and quality are inextricably linked to health outcomes.

EMPLOYMENT OPPORTUNITIES

As it is currently built, the Interbay site falls within one of the most important areas of Seattle's industrial output. The Ballard-Interbay Manufacturing and Industrial Center (BINMIC) includes: 70% of 879 acres of land designated to industrial use; 56% of 12,158,966 total building square footage dedicated to industrial use; 51% of the 20,239 total jobs in the BINMIC areas are related to industrial work (Washington State Department of Commerce, 2019). The site itself is currently occupied by the Washington National Guard, meaning that opportunities for employment are coordinated through the state government and includes largely active and reserve members of the National Guard making up approximately 600 personnel (Iwaszuk, 2018). Employment has also been on a steady increase surrounding the Interbay site. In 2010 alone, there were a total of 14, 237 civilian employees within the BINMIC area. According to more recent data, there are an approximate 11,300 civilian employees alone within a 1-mile radius of the Interbay site. Spanning two miles further into Downtown Seattle and Ballard outside of the BINMIC area, approximately 280,000 employees exist (Merisko & Herting, 2020).

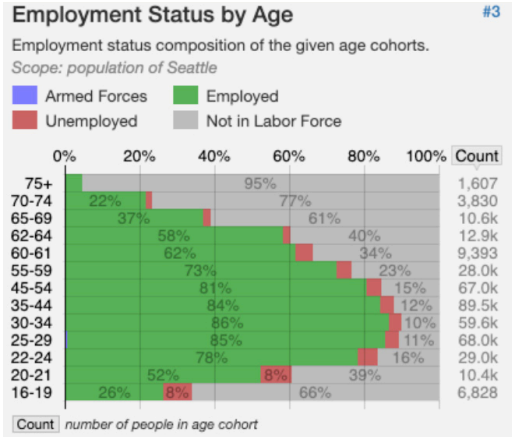
Most streams of non-industrial employment currently found around the Interbay site are through professional services (19.2%), retail (13.2%), education (10.5%), healthcare (8.2%), finance and insurance (5.8%) and real estate (4.6%) (U.S Census Bureau, 2019). These "pink-collar" jobs employ a reasonably diverse population in terms of race/ethnicity and age, as well as offer paths to career development to those with less than a Bachelor's degree or less (Washington State Department of Commerce, 2019). Adjacent to the site, the Interbay Urban Center houses shops and restaurants in a facility over 80,000 square feet, including Whole Foods Market, Petco, Verizon Wireless, Wells Fargo Bank and others.

Located on the highest trafficked thoroughfare in Greater Seattle, this area alone acts as the standalone neighborhood shopping center, serving the communities of Queen Anne, Magnolia, and Ballard (Donahue Schriber, 2020). Furthermore, Expedia, one of the largest travel site

Figure 3.3 *Interbay Urban Center (Donahue Schriber, 2020)*

companies in the world, has begun moving their headquarters to within a quarter of a mile to the current Interbay site. Currently, this site houses approximately 4,500 employees, and is expected to move all of their 8,000 employees to their new location by 2031 (Groover, 2019). Additionally, this has potential repercussions for the housing market within and around the Interbay, Queen Anne, and Magnolia neighborhoods as the demand for close, safe, and affordable housing may result in bottlenecking.

As seen through the two figures below, employment composition within and surrounding the Interbay project site represent a relatively average profile when compared to wider city statistics (U.S. Census Bureau, 2019):



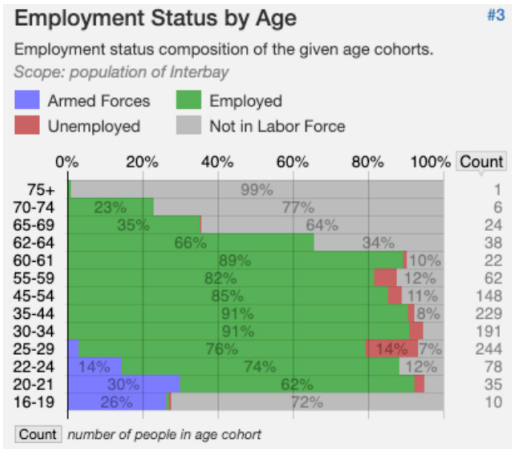


Figure 3.4 (top) *Employment Status by Age, Seattle*
Figure 3.5 (bottom) *Employment Status by Age, Interbay (U.S. Census Bureau, 2019)*

Most notably, the Interbay neighborhood provides a significant amount of employment to young adults in the Armed Forces. As the National Guard vacates the site, there will be potential for an increase in employment opportunities, as well as other necessary factors that may contribute to positive health outcomes. Lastly, as the redevelopment concepts of the Interbay site present different opportunities for future employment, employment status, occupational statistics, and demographic data will certainly change over the foreseeable future.

ECONOMIC FOOTPRINT

As previously mentioned, the Interbay site is set within one of the most industrial zones in the Seattle Metropolitan area. As the Interbay neighborhood, as well as the surrounding areas within and around the BINMIC are industrial in nature, there is evidently an economic value of such a property being redeveloped. A 2018 analysis completed by the Washington Army National Guard concluded that the total value of the land at the Interbay site to be worth approximately $32 million (Iwaszuk, 2018). Given this price tag, the site could be sold to a variety of stakeholders, such as private entities, non-profit organizations, public facilities districts, and public development authorities - specifically those that may provide the highest economic value back into the neighborhood - to develop a range of property types and zoning uses (Washington State Department of Commerce, 2019).

The footprint of the real estate market surrounding the Interbay site may provide further insight into the value of a proposed one property type over another. Although rental rates specific to the BINMIC area for both commercial and industrial properties have remained fairly steady over the past years, the value of commercial rent remains well above that for industrial . Due to the historical demand on the real estate market in Seattle, vacancy rates for both commercial and industrial properties in this area have seen a decrease of more than 5% between 2012 and 2017 (Office of Economic Development, 2017). Moreover, the current area is notably surrounded by numerous industrial, manufacturing, and commercial properties which certainly is providing sustained economic value to the city and State of Washington.The Port of Seattle Marine Terminals, which houses cruise line departure and arrivals, operational, and maintenance services adjacent to the Interbay site, generated an average revenue of $136 million over the past three years (Port of Seattle, 2019). Similarly, The BNSF Railway Company, the largest freight railroad network in North America, owns and operates a railroad yard on the edge of the Interbay site.

This railroad yard is crucial to the economic vitality of Seattle, as it assists in transferring goods that are essential to the continuity of business for large and small

Figure 3.6 *Port of Seattle Terminal 91 (Port of Seattle, 2019)*

regionally and nationally, such as Boeing fuselages, United States Army equipment, and additional agricultural, consumer, industrial and environmental products (BNSF, 2020).

While the Interbay site may provide an unknown economic value under its current operation, it is surrounded by both commercial and industrial areas with large potential for an increased improvement value. Improvement value is derived to take into account the potential value increase of a property when improvements are made. For example, medium-size retail and commercial properties directly adjacent to the Interbay site, such as the Interbay Urban Center, present an improvement value of more than $25 per square foot (Office of Economic Development, 2017). Regardless of the identified proposal, the current Interbay site may increase the improvement value of the surrounding properties, as well as provide an increased economic value to the surrounding neighborhoods and city.

ANALYSIS AND HEALTH IMPACT ASSESSMENT

HOUSING STABILITY & AFFORDABILITY

The Interbay property is currently zoned for industrial use only, which would limit the opportunity to expand affordable housing options in the area. However, significant investment in the property would likely increase the surrounding home and property values, thus increasing the cost of living in the area. All three redevelopment concepts (industrial only, mixed use commercial/residential, and mixed use light industrial/residential) should consider the impact on current residents if the investment causes housing instability. As mentioned above, 30% of renters and 21% of homeowners in this area are cost-burdened - spending over 35% of their income on housing - so an increase in the cost of living (including housing, food, and

transportation) could negatively impact the surrounding community (ACS, 2017).

According to the Advisory Committee Communications Report (Appendix F), there is overwhelming support for the development of affordable housing on this site (Washington Department of Commerce, 2019). In an open house meeting in March 2019, community members from neighborhoods surrounding the Interbay site were able to express their values and priorities for the site's redevelopment. Table 1 from the open house meeting provides the results of this priority setting activity with community members. Additionally, participants expressed an interest in prioritizing senior citizens, communities of color, immigrants, and indigenous communities for the affordable housing units (Washington State Department of Commerce, 2019).

PRIORITY	WHAT DO YOU VALUE MOST?
Creating living-wage jobs	7
Preserving industrial land	5
Building affordable housing	47
Movement of people and goods	5
Using State resources efficiently	3
Providing additional open space	10

Table 3.1 *Community Priorities (Washington State Department of Commerce, 2019)*

The Interbay property is not currently zoned for mixed-use housing and modification to the land use code would require an update of the City's comprehensive plan and policy. If the land use code is modified in the future, the developer will be required by the Mandatory Housing Affordability (MHA) legislation to provide affordable housing to residents making below 60% of the area median income (Heartland, 2019). According to the Interbay Public Development Advisory Committee's recommendations, the mixed use commercial/residential option would provide 556-978 affordable units at MHA standards and 371-652 workforce units at 60%-120% of the area median income (Washington State Department of Commerce, 2019). The mixed-use light industrial/residential would provide 176-360 affordable units and 117-240 workplace units (Washington State Department of Commerce, 2019). The industrial use only redevelopment concept will not provide any housing units.

The developer may instead opt to pay a fee in lieu of offering affordable housing and if the property is redeveloped for industrial use only, the developer will not be subject to the MHA requirements. However, the two redevelopment concepts that include residential units propose to provide housing for a range of income levels, which has the potential to increase access to affordable housing and reduce housing instability. Additionally, these two proposals include affordable housing for the employees of the commercial and industrial tenants, which benefits the health and safety of the workers and their families. As previously stated, housing stability and affordability have been linked to improved health outcomes, such as decreased asthma, cardiovascular disease, malnutrition, depression, and anxiety.

HOUSING QUALITY & SAFETY

This site currently has no housing. However, both in the public outreach performed and in the studio class whose work this report is following, building affordable housing on this site were highly supported ideas.

Given code requirements, it is likely that the building standards will be consistent with many reasonable standards of health and safety. However, even in new construction, volatile organic compounds (VOCs) can be released, especially from building materials. This is of particular concern with regard to formaldehyde used in the production of plywood products. Formaldehyde, benzene, and other common chemical agents used in their manufacture can irritate eyes and mucosa, leading to symptoms such as nausea, fatigue, and headache. In the long-term, these can contribute to Sick Building Syndrome (SBS), and have life-threatening effects (Jiang, et al., 2017). While in traditional housing, VOCs and particulate pollution are most often attributed to attached garages, in this case a main concern at the site comes from the rail yard immediately adjacent, that is planned to remain next to any new housing. Diesel trains create both nitrogen oxides (NOx) and VOCs, which form ozone, and particulate matter (PM). Over time consistent exposure to ground-level ozone can lead to lung disease, premature aging of the lungs, and increased mortality. Exposure to PM is linked to premature death, aggravation of cardiopulmonary disease, and changes in lung function and structure (US EPA, 2000). While it is true that all urban sites have exposure risks to these types of pollutants, exposure at this site is likely far higher than average. Therefore, special precautions must be taken to protect those living in any proposed housing. Rigorous adherence to the EPA's Indoor airPLUS strategies, including the use and maintenance of energy recovery ventilator systems and other manner of air quality control methods, is necessary to preserve and promote the health of both families and workers on this site (US EPA, OAR, 2013).

Figure 3.7 *(US EPA, OAR, 2013)*

EMPLOYMENT OPPORTUNITIES

Due to the industrial nature of the BINMIC area, the Interbay site has been and will remain an economic region for the Seattle Metropolitan area. With the expansion of the Seattle Light rail into Ballard set for 2035, the potential for improved economic value by industrial and commercial properties, as well as the impending redevelopment of the Interbay site, future employment composition within this area will surely change (Sound Transit, 2020). Within this HIA, the three redevelopment concepts (industrial only, mixed use commercial/residential, mixed use light industrial/residential) will all provide some potential impact on the future employment opportunities in this area.

As industrial and/or commercial properties are developed for the Interbay site, there will be an influx of various employment opportunities made available to individuals spanning various socioeconomic backgrounds. Industrial jobs are not only important to the economic vitality of Seattle; they provide employment opportunities specifically to individuals in the labor force who do not have a bachelor's degree (Draut, 2018). As seen in a 2016 Seattle Employment Analysis, a majority of industrial jobs (75%) were employed by individuals with either only high school diplomas or no formal educational credential. Contrastingly, more than 60% of non-industrial jobs in the same region were employed by individuals with a bachelor's degree, or higher (Office of Economic Development, 2017). As all proposals indicate the development of properties for industrial, commercial, or light-industrial use, we can assume that a large amount of jobs that become available will be distributed to similar populations. Utilizing the redevelopment concept evaluation proposed in the Interbay Project Report, an industrial only design would create an output of approximately 840 jobs, 240 more than the current personnel total at the National Guard Facility. A mixed-use light industrial design would create an output of approximately 30-60% less jobs, decreasing the total annual economic output of $460 million by $130-220 million. The development of a mixed-use commercial design would provide for no industrial jobs, and total annual economic output to less than $115 million (Washington Department of Commerce, 2019). While this provides a fair estimation of the value of adding industrial and commercial jobs to the site, it would be inappropriate to assume which redevelopment site would lead to the most positive health outcomes, as large assumptions would need to be made regarding new employment and their connection to compensation, employee benefits, and suitable work hours. That being said, industrial jobs within Seattle have proven to supply a wide range of compensation, and we assume that the recent data for both industrial and non-industrial jobs is fairly representative to the types of employment and wages that will be made available for all redevelopment concepts.

INDUSTRIAL	COMMERCIAL	LIGHT INDUSTRIAL
Foreman Mechanic Welder	Software Developer Analyst Sales Associate Cashier Waiter / Waitress	Electrician Tanner Carpenter Baker Butcher Textile Worker

Table 3.2 *Potential job types for Interbay site redevelopment options*

ECONOMIC STABILITY

In the Interbay Public Advisory Committee's Recommendations and Implementation Plan, community feedback and comments are clearly incorporated into a number of sections across the plan. Key themes were incorporated from the input of more than 20 community members and representatives. One of these noted sentiments was that the arrival of the Link light rail resulted in requests for greater employment opportunities nearby and on the site. For each of the proposed zoning designations, the Interbay site has the ability to accommodate either industrial, commercial/retail, and light industrial jobs. Individual level economic stability is affected by factors such as the accessibility of resources - like transportation, food, or financial support - income, employment, and work environment (Healthy People, 2020). A consistent stream of income is often the result of long-term, sustainable employment, and job insecurity, which has been defined as "the subjectively perceived and undesired possibility to lose the present job in the future" represents a threat to one's economic stability (Nella, 2015). Moreover, certain job types associated with high-turnover rates as the result of factors such as stress produced by the environment, a perception of being under-valued, and the demand or length of shifts and work hours too contribute to the economic instability at both the individual and community level. These are often jobs in food service and retail; the mental, physical, and emotional tolls of customer-facing waged labor contributes to the industry's high turnover rates (Gerencher, 2005). These associations between high turn-over rates and employment are not nearly as prevalent in the literature in industrial, or light industrial, work. One argument is that the investment into specific skills or disciplines is either a result of or cause for a greater sense of commitment to the work.

ACCESS TO PRIVATE SERVICES

In the United States, most employers offer employees some degree of access to resources such as private insurance, childcare and childcare subsidies, sick paid leave, and parental leave (Healthy People, 2020). These services offer users comparable or exceptional access to

healthcare and supportive care and payment when compared to Medicaid alone.There is not considerable literature indicating that industrial, light-industrial, commercial, or retail sectors are more or less likely to offer access to private services. According to the US Bureau of Labor Statistics "71% of private industry workers had access to employer-sponsored medical care plans and 52% participated in such plans" (DeVaney, 2007). Additionally, " access to and participation in benefit plans for workers in private industry varied by occupational group, full- and part-time status, union membership or representation, and earnings. White-collar workers, full-time workers, union workers, and workers who earn at least $15 per hour were more likely to be covered by benefits" (DeVaney, 2007). This underscores the associated benefit of offering full-time employment on the Interbay site, which can occur in any of the proposed zoning designations and industries. But greater access to private services is a passive intervention in the health of workers. The location and type of work are not the only factors that impact health; working conditions themselves play a significant role in employee health and safety. Studies have estimated that the employers spend up to $250 billion a year as the result of workplace injuries and the payout of sick days (Robert Wood Johnson Foundation, 2013). One strategy to combat these injuries and associated costs is the promotion of workplace wellness programs. Such programs "reduce sick leave, health plan costs, worker compensation, and disability costs by about 25%" (Robert Wood Johnson Foundation, 2013). These proactive strategies have positive impacts on employees and employers alike.

RECOMMENDATIONS

PRIORITY RECOMMENDATIONS

RECOMMENDATION 1: UTILIZE EPA'S INDOOR AIRPLUS STANDARDS

This program lays out a set of standards and guidelines for ensuring safe air quality indoors. Following established EPA guidelines can greatly reduce indoor air pollution in housing, especially exposure to VOCs. We recommend that each housing unit (if the proposal includes housing) include airPLUS standards into the development and identify indoor air quality products and features. It is important to remember that even in new construction, indoor pollutants can cause harm to people's health. Indoor VOCs come mainly from nearby engine systems, especially attached garages, and from building materials in new buildings, such as plywood and carpet, which can release chemicals like formaldehyde and benzene from adhesives used to make or install these products. Holding to these standards at the highest level, the developers can offset much of the long-term exposure effects of the nearby sources of pollution. This standard should apply to all housing sites built near known pollution sources, citywide.

RECOMMENDATION 2: CREATE JOB OPPORTUNITIES FOR INCREASED EMPLOYABILITY

We recommend that the Interbay Project redevelopment concepts take into consideration the most possible number of employment opportunities created to maximize the greater benefit. As employment has proven to be directly associated with health, providing such opportunities for individuals from different socioeconomic backgrounds would assist with minimizing health disparities locally. This recommendation should be implemented to all three redevelopment concepts to distribute employment in an equitable manner across the neighborhood:

- A task force between the Office of Planning and Community Development and the Office of Economic Development could convene to create a young-adult employee program specifically tailored to provide employment at the Interbay site.
- We recommend that the employers of the redevelopment site partners with local industrial and/or commercial and retail businesses to support applications for employment specifically to individuals experiencing poverty, homelessness, and barriers to secondary education.

It is important that these recommendations continue to be evaluated before, during, and after the development of any proposed site begins. In order to assure that employment opportunities are not dominated by a small fraction of the greater Seattle population, continuous communication and collaboration with employers should target an action plan for inclusion criteria in future employment.

OTHER RECOMMENDATIONS FOR CONSIDERATION

HOUSING STABILITY & AFFORDABILITY

- This report highlights the fact that community members highly value and prioritize the use of the Interbay site for increased affordable housing units and improved equity in housing. Should the Interbay redevelopment include housing (mixed use commercial/residential and mixed use light industrial/residential), we recommend that the developer choose the concept that provides the most affordable housing units for Seattle residents and the local workforce. This would provide 1,630 affordable housing units under the mixed use commercial/residential plan and 600 units under the mixed use light industrial/residential plan. Health, employment, education, and strong social networks

rely on stable housing, and Seattle's communities value affordable housing options.

- Should the Interbay redevelopment include housing (mixed use commercial/residential and mixed use light industrial/residential), we recommend that a local housing authority be developed to protect the rights of low income residents. Additionally, we recommend that tenants be connected to all MHA services and social supports provided by the City of Seattle once settled in the Interbay community. Strong social networks and support systems are proven to strengthen communities and improve housing stability.

HOUSING QUALITY AND SAFETY

Technologies exist to capture PM and ozone precursors in engine systems, which could be retrofitting to resident diesel systems. It would be cumbersome to expect all incoming diesel systems to hold to this standard, since federal guidelines do not require it. However, it is reasonable to expect that systems that remain on premises be held to this higher standard for the sake of the health of the proposed workers and residents. "Living walls" used around the perimeters of freight zones, and trees planted in high density throughout the campus, can also be used to successfully scrub some ozone precursors and PM from the air around housing. Reducing these pollutants would have a direct, positive effect on the health of people onsite, as well as reduce long-term soil and water pollution in the surrounding area.

EMPLOYMENT OPPORTUNITIES

We recommend that policymakers involved in finalizing the redevelopment of the Interbay site should focus on boosting job quality of both new and existing jobs. As industrial and commercial jobs are one of many sectors in the U.S experiencing near-stagnant wage growth, we recommend identifying and monitoring the job quality for low- and moderate-wage workers through a range of policy interventions, including continuous surveillance of self-reported job quality, turnover specific to the site, and utilization of education and training tools for accessing workplace benefits (Coate, 2020).

ECONOMIC STABILITY

Across all of the potential zoning designations the Interbay Project might become, commerce and economic activity will be produced at the site. It is critical to recognize, and plan for, the need for economic stability - both of the site itself and the impacted areas around it, but also of the individuals who will work on the site.

- Policymakers, in working with the city of Seattle and the future site developer, should develop a long-term economic plan for the site which would include strategies to ensure the economic stability of the area. For sole industrial use, this would entail a plan for the future preservation of that industrial land and the continuous and active use of the land for that purpose. For the other zoning designations, this would include strategies to improve the area's walkability score, housing stock across all levels of AMI, and increasing the property value of the land over time.

- In terms of employment, knowing what specific communities and individuals will be directly impacted by the site's future development is not possible at this time. However, in order to proactively promote the economic stability of those people, policymakers should develop long-term, once the zoning designation is confirmed, to equitably increase the diversity of works on the site. This would include a more diverse representation of populations in terms of race, ethnicity, gender, socioeconomic status, and level of education.

ACCESS TO PRIVATE SERVICES

A committee should be developed to expand on it's previous public outreach as part of the Communications Report in order to further identify more specific social and medical services the community wishes to see at the Interbay site. In the initial Communications Report, childcare facilities and social services were identified as desirable elements to the community members participating in open houses. Little detail is offered beyond those services but an opportunity to voice more specific needs could prove important to the community. The committee should survey those who attended any of the open houses and public presentations and left a phone number or email.

EQUITY EVALUATION

HOUSING

As discussed in further detail in the Land Use Chapter, the historical segregation of housing has had a profound impact on the Interbay area's racial diversity. In order to address racial and income equity, it is suggested to build income-adjusted housing on this site. However, from the perspective of impact to health, we must examine the racial implications of locating housing, especially racially and economically diverse housing on this site. Historically, minority communities have been forced to locate on chemically contaminated sites. In America, race is the most significant factor for the location of hazardous waste facilities in residential communities (Austin, Schill, 1991). It must be considered if this is simply an extension

of this historic trend and what can be done to reconcile this pattern at this and other sites in Seattle.

EMPLOYMENT

There are a number of worthwhile considerations to be made about the equitable inclusion of job opportunities, their related risk, and related benefits. It is clear in the literature that job loss and job displacement are not experienced equitably across socioeconomic or ethnic/racial groups. Beyond outright job loss, earnings are not equitably distributed among populations either: "low wages are more likely among workers with characteristics typically associated with low wages: younger workers, less education, being female or a racial/ethnic minority, poor, or receiving public assistance" (Klawitter, 2014). Across industries, exposure to a variety of risks is higher in certain fields that others, and demographic disparities exist there too. "Industrial workers experience considerable physical and general health risk in the course of work; in the United States, manufacturing workers are disproportionately white (79.5%) and male (70.6%)" (US Bureau of Labor Statistics 2019). An equitable approach to ensuring job security and safety must include a variety of job types and payment structures but perhaps more importantly, would take active steps to increase the diversity of its workers on the basis of race, gender, socioeconomic status, and education level.

SUMMARY

For the purposes of this HIA, the team used a variety of research sources to compile recommendations to preserve, promote, and improve the healthiness of this site. As there is no existing housing and a limited amount of light industrial employment on the site, the team had to make assumptions to produce our work.

Limitations for Employment:

- The team had to assume the type of jobs that will ultimately be put in place there and how those jobs will be shaped to assist in positive health outcomes.
- It is difficult to ascertain if employers will provide opportunities for positive workplace conditions and pathways for employees to limit negative outcomes of all types of labor.
- There is no way to tell, at this stage, if employment can be specifically targeted to individuals from lower socioeconomic backgrounds.

Limitations for Housing:

- The team assumed that other developments in the Seattle area were an example of the way this would be constructed, and that it would have a similar effect on the areas surrounding other new developments.
- It is assumed that planted walls, trees, and air quality safety measures will receive consistent maintenance, in order to meet these recommendations over time, not just at the time of construction.

Industrial jobs are crucial to protect as an equitable avenue to secure the livelihoods of individuals and households within Seattle. Similarly, Seattle is facing a huge shortage of housing for low- and middle-income groups, and expanding access to affordable housing could provide a much needed boost to the local market. These mixed-used campuses have the potential to create valuable resources for the livability of the city at-large. However, as with all industrial-mix areas in the region, precautions must be taken to guarantee the health and wellness of current and future workers and residents.

TRANSPORTATION AND ACCESSIBILITY

INTRODUCTION

This chapter examines the role that transportation and accessibility play in health, the existing conditions related to transit and access in Seattle and at the Interbay site, and the potential impacts that redevelopment concepts may have on the health and well-being of potential future community members, employees, and residents at the Interbay site and surrounding area. Considering potential redevelopment concepts for the Interbay site, we offer recommendations to protect and promote health pertaining to transportation and accessibility. We demonstrate that the ways people move throughout the city and access essential goods and services are critical to building healthy communities.

Health elements assessed in this chapter include:

- Public Transportationand Bike Accessibility
- Pedestrian Accessibility
- Parking and Traffic
- Disability Accessibility
- Healthy and Affordable Food Access
- Access to Emergency Services and Evacuation Routes

CONNECTION TO HEALTH

PUBLIC TRANSPORTATION AND BIKE ACCESSIBILITY

Vehicle emissions are the predominant contributor to air pollution and greenhouse gases, which in turn cause detrimental health repercussions such as respiratory illnesses and cardiovascular diseases (Farhang & Bhatia, 2005). Vehicles are also the most critical source interference for sleep, work performance, and childhood brain development (Farhang & Bhatia, 2005). Vehicle-oriented neighborhoods often miss the opportunity to provide adequate access to public transit and other modes of commute such as biking and walking, and it impacts various groups of people in terms of both health and equity. A study points out that lack of transit access leads to severe consequences including inadequate access to medical services and facilities, when hospitalizations for many chronic diseases can be prevented with effective and timely care (Farhang & Bhatia, 2005). Adequate access to public transportation and bike networks is an essential component of a healthy and equitable community; a number of studies (Noland & DiPetrillo, 2015; Pucher & Buehler, 2010; Farhang & Bhatia, 2005) indicate that providing (1) frequent access points for public transit and (2) extensive bicycle networks and amenities — essentially establishing a transit-oriented neighborhood — encourages active transport and inclusive means of travel. It leverages physically and socially healthier lifestyles for different populations as it promotes walking, cycling, and taking transit for access to necessities while reducing demand for vehicle travel.

In Seattle, residents use transit more frequently than those living in any other cities in the Pacific Northwest region of the United States. Seattle's progressive development in public transit and bike networks benefits residents in various ways other than just basic mobility (Washington State Department of Commerce, Appendix M, 2019):

- **Transit Encourages Compact Development**
  It encourages compact development where people have easy access to basic services and recreation without having to drive

- **Compact Development has Environmental and Public Health Benefits**
  It reduces carbon emissions and particulate levels while using the land more efficiently

- **Transit Provides Mobility for Everyone**
  It provides means of travel at all times of the day for frequent commuters, those with non-commute purposes, and those who may not have access to private vehicles.

PEDESTRIAN ACCESSIBILITY AND SAFETY

One key component to building healthy communities is to provide people with opportunities to be physically active in safe, connected and engaging environments. Studies have shown that regular and moderate physical activity are positively associated with decreases in some cardiovascular diseases, obesity levels, hypertension, and osteoporosis (Warburton, 2006). The benefits of physical activity even extend to improvements in mental health, with research demonstrating that physical activity can improve people's mood, reduce depression and relieve anxiety (Penedo & Dahn, 2005). Increased pedestrian activity in high walkability environments (e.g. those described as having greater residential density, street network connectivity and accessible amenities) have been associated with lower blood pressure, lower rates of diabetes mellitus, and lower rates of metabolic syndrome (Malambo et al., 2016; Sallis et al., 2004; Smith et al., 2019). Walking is perhaps the most common form of physical activity and transportation among all people. It is the most sustainable and cost-effective mode of transportation. According to the City of Seattle, between 2009-2015 the number of people walking to work increased by 60%, making it "the fastest growing mode of transportation" in the city (City of Seattle Pedestrian Master Plan, 2017). In recognition of the importance of walking and pedestrian networks, the City of Seattle passed its Pedestrian Master Plan in 2009, with the vision of making Seattle, "the most walkable and accessible city in the nation" (City of Seattle Pedestrian Master Plan, 2017).

However, according to the National Center for Health Statistics, only 53% of adults aged 18 and over get the recommended levels of daily physical activity (FastStats, 2019). The built environment can present several obstacles to physical activity, such as walking. These can include the lack of sidewalks and their condition, poor drainage of walkways that results in puddles, the absence of street lighting, and the perception of risk or danger (Rosenberg et al., 2013). The perception of risk though, may not simply be a matter of opinion. According to the U.S. Department of Transportation (USDOT), pedestrian fatalities increased by 39% from 2010-2016 and accounted for 16% of all traffic fatalities in 2017 (Mansfield et al., 2018). Within urban built environments, USDOT studies have shown that the density of vehicle traffic has significant effects on the rate of pedestrian fatalities. Specifically, non-access-controlled principal arterials and minor arterials were strongly associated with pedestrian fatalities. These street types are present within urban environments and can be characterized by intersections, medians, egressing and entering traffic (e.g. driveways and on-street parking), and pedestrian crossings. The same study also showed that an increase in employment density (e.g. retail locations) positively correlated with an increase in pedestrian fatalities (Mansfield et al., 2018).

PARKING AND TRAFFIC

In light of more industrial, commercial and residential building within the projects, more cars or truck traffic are inevitable in the area. A report (National Center for Healthy Housing, 2007) suggests that increased traffic may lead to many health problems for locals. This could be seen that increased traffic may have a negative impact on air quality and noise. It would even increase the mortality rate. Roadway traffic also has high correlation with decreased residential property values. Significant decrease in property value may even result in economic hardships and threats of housing stability for those homeowners because of equity loss.

For the parking part, scientific evidence suggested that reduced parking would increase the physical activities and public transit ridership in the regions(Michelle et al.,2007).

DISABILITY ACCESSIBILITY

According to the American Disabilities Association, an individual is considered to have a "disability" if they have a physical or mental impairment that substantially limits one or more life activities. The ADA does not specifically name all of these impairments, but they can include (but are not limited to) blindness, deafness, intellectual disabilities, autism, living with HIV infection, depressive disorders, and mobility impairments that require a variety of walking assistance.

When considering disabilities in urban planning, most considerations for people with disabilities center on physical impairments that limit mobility, per the requirements of the 2010 ADA Standards for Accessible Design (U.S. Department of Justice, 2010). However, the needs for people with disabilities in urban planning go far beyond the need for a sidewalk. The Aging and Disability Services of Seattle and King County reported in their Area Plan that one of their five priorities for improvement of conditions included creation of livable communities, which

covers health and wellness, housing, income/financial assistance, safety, socialization, and transportation (Lester, Quinn, & Levin, 2015). The issues from their Area Plan that pertain to the development of the Interbay site include:

- Housing: need for affordable housing and spaces that incorporate Universal Design
- Community mobility: Increase availability of transportation options; promote community design that supports mobility, such as public transportation, walking, and biking
- Economic security: encourage hiring and retention of older workers, allowing them to work and save longer, by promoting age 55+ employment programs

To that end, any proposed options for the Interbay site could have impacts on people with disabilities in Seattle and King County.

HEALTHY AND AFFORDABLE FOOD ACCESS

Access to healthy and affordable food is well-established as a key determinant of health (Access to Foods that Support Healthy Eating Patterns, 2020). Poor nutrition is associated with increased risk of high blood pressure, diabetes, and cancer. Conversely, healthy eating, defined as eating a variety of foods and beverages from all food groups with limited intake of saturated and trans fats, added sugars, and sodium, can help reduce the risk of chronic disease (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2020).

Additionally, there is moderate evidence to support that in areas where individuals have to travel further to access food, health is poorer. Individuals who do not have a private vehicle, access to public transportation, or affordable and healthy food venues within walking distance, have limited access to foods which support healthy eating patterns (Ploeg et al., 2009). For example, some research has identified that those living in areas with more grocery stores, access to fresh produce, and full-service restaurants are at lower risk of diabetes and obesity, relative to areas with less access to fresh produce, more convenience stores, and more fast food restaurants (Babey, 2008). However, some research did not identify physical distance as linked to diet quality, instead identifying important roles played by income, education, and shopping at a high-cost grocery store in predicting diet quality (Aggarwal et al., 2014).

Moreover, prior research has identified that members of racial and ethnic minority communities and residents of low–income communities are inequitably burdened by poor access to healthy and affordable food, consequently contributing to health disparities (Beaulac et al., 2009).

While additional research is needed to identify what strategies are effective in expanding access, there is moderate evidence that altering food environments increases communities' opportunity to healthy eating patterns (Larson et al., 2009). For example, one study identified that offering a small financial incentive increased the use of SNAP (Supplemental Nutrition Assistance Program) benefits at participating farmer's markets (Baronberg et al., 2013).

Therefore, accessibility, availability, and affordability of healthy food are important factors which influence healthy eating patterns and consequently impact health.

ACCESS TO EMERGENCY SERVICES AND EVACUATION ROUTES

Emergency evacuation is the organized immediate withdrawal of people from an area with an imminent or ongoing threat or hazard. The City of Seattle, through its Comprehensive Emergency Management Plan, has an emergency management system which is organized to "prepare for, mitigate against, respond to, and recover from any emergency that could adversely affect the health and safety of Seattle's residents, visitors, and the environment" (Comprehensive Emergency Management Plan, 2017). When thinking about emergency evacuation, cities need to see it with a social justice lens in order to provide equitable (Jerolleman, 2019) resources and services during both the planning and implementation process. Building equity into the structure of emergency plan creation will allow for a more fair and impartial treatment of people and situations. In both Federal Emergency and Management Agency's 2019 Planning Considerations (FEMA, 2019) as well as City of Seattle's 2015 Comprehensive Emergency Management Plan (CEMP 2015) they have identified the importance of planning and addressing the needs of High-Risk Populations. High-risk populations are those individuals with disabilities, those with medical needs, the elderly and children. A recent study addressed the need for social fairness when creating evacuation routes, its premise is that the emergency evacuation team's objective is to minimize total evacuation losses leading to the people at highest risk's priorities to possibly be sacrificed (Yan, 2018). The study developed a model that took into consideration efficiency and social fairness to create more fair and equitable traffic assignments during emergency evacuation.

Emergency services are made up of primarily four services: police department, fire department, ambulance services and coast guard. Access to emergency services is essential to survival rates studies have shown that increased time and distance to hospitals is associated with increased mortality (PEW 2020, Nicholl 2007).

EXISTING CONDITIONS

PUBLIC TRANSPORTATION AND BIKE ACCESSIBILITY

According to the Seattle Department of Transportation's Transit Master Plan (2016), the city has been working to identify potential new ridership markets to accommodate the growing population for jobs and residence, enhance public transit infrastructure, and coordinate with King County Metro and Sound Transit to establish a seamless and fully integrated user-friendly networks of transit services.

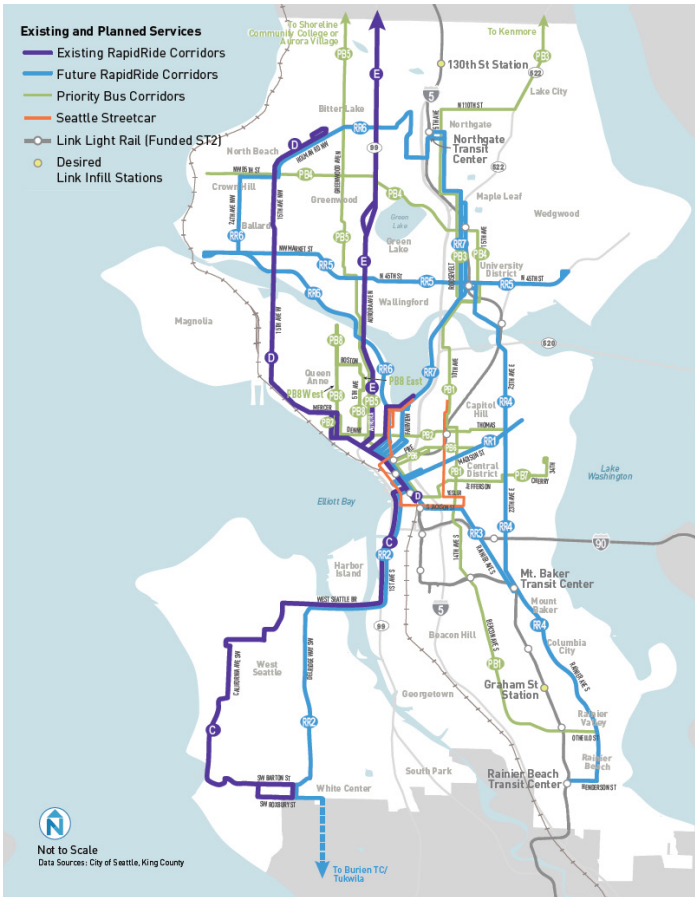


Figure 4.1 *Map of Transit Corridors (Transit Master Plan, 2016)*

TRANSIT SYSTEM

To the east of the Armory site is an arterial road, 15th Avenue West / Elliott Avenue West, along which RapidRide (the D Line) operated by Metro runs from Ballard to Downtown (Figure 4.1) with high-frequency service every 15 minutes. Other express services (Routes 15, 17, 18, and 32) also use these lanes for frequent transit. Metro express and local connections (Routes 19, 24, and 33) also run along Magnolia Bridge / Garfield Avenue. In addition to the Metro services, Commuter Rail operates on the BNSF railway to the west of the Armory site to provide means of commute during peak hours between Seattle and Everett, though there are no stations located near the Interbay site. The Washington State Department of Transportation is also currently looking at the possibility for future ultra-high-speed ground transportation from Vancouver, BC to Seattle, WA, and Portland, OR, as a fast, reliable, and environmentally responsible means of transportation stretching across several regions (Washington State Department of Commerce, Appendix M, 2019)

Figure 4.2 *Link Light Rail Alignment Options (Sound Transit)*

LIGHT RAIL ALIGNMENTS

There is currently no light rail in service near the Interbay neighborhood. However, one of the largest up and coming projects by Sound Transit is the development of light rail running from Ballard to West Seattle, and it will run through Interbay. Sound Transit has developed two major alignment alternatives along with several other potential options (Figure 4.2), in which one of them will be chosen to be further developed. The project delivery process includes completing planning by 2022, completing design by 2026, and completing construction by 2035 to be in full service. The two alignment alternatives would impact the Interbay neighborhood very differently (Washington State Department of Commerce, Appendix CC, 2019; (Washington State Department of Commerce, Appendix M, 2019):

- **The Brown Alignment**
  This option (preferred by Sound Transit) is more intrusive to the Armory site with a 60' wide track running at grade along the west edge of the site. With this alignment Smith Cove station would be located north of the Expedia development and would have to accommodate for layover space for transit. The brown alignment would have a greater impact on the land use of the Interbay property as it takes up a larger amount of space than the other potential alignment. However, this alignment could be developed with a trail in proximity to promote access to the proposed station through the underside of the Magnolia Bridge.

- **The Blue Alignment**
  While the Brown alignment runs at grade along the Armory site, this option is elevated along 15th Avenue West as it travels north. With this alignment, Smith Cove station would be located further south, closer to the Expedia development and close to the Helix Bridge. With the elevated tracks along 15th Avenue West, this alignment leverages less impact to the site. However, the elevated structure would require coordination with a potential West Armory bridge that extends over the BSNF Balmer Yard to the west of the Armory site.

BICYCLE SYSTEM

The Bicycle Master Plan (2019) created by the Seattle Department of Transportation outlines city-wide improvements of bicycle networks that include approximately 100 miles of protected bicycle lanes and almost 250 miles of neighborhood greenways. It also identifies various programs such as facility maintenance, bicycle parking, and educational events to promote and encourage bicycle commutes. The existing bicycle networks stretch along 15th Avenue West and its adjacent streets with on-road bike designations, and a separate Elliott Avenue West and around the Terminal 91 area. It is however indicated in the Master Plan map (Figure 4.3) that there is no future development of bicycle network planned near the Interbay site.

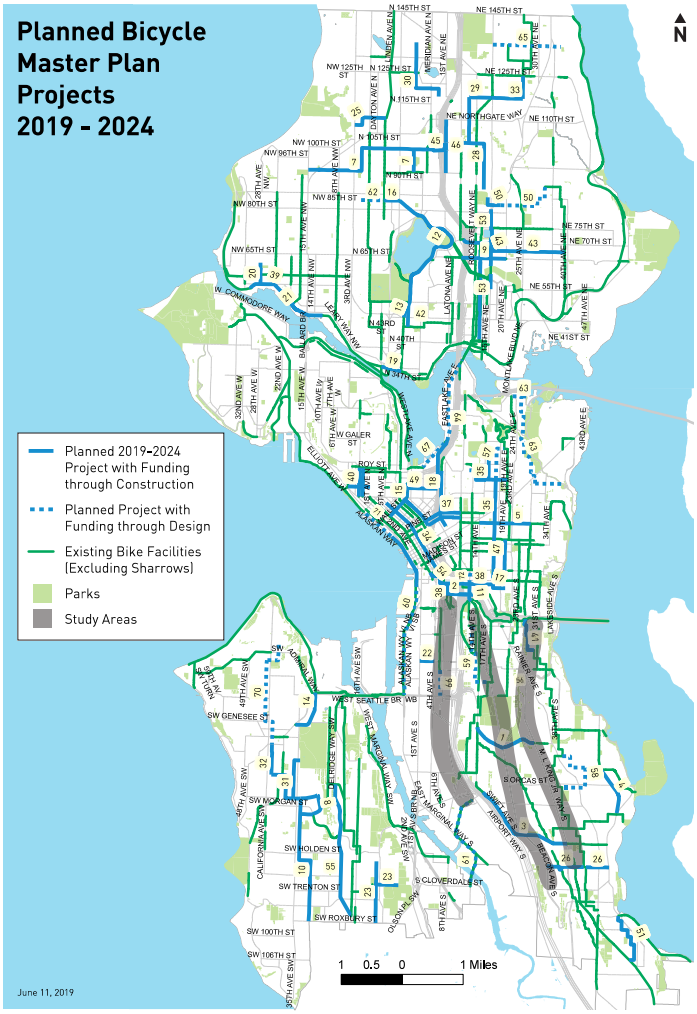


Figure 4.3 *Bicycle Master Plan, 2019 – 2024 (Bicycle Master Plan, 2019)*

PUBLIC TRANSIT FOR ALL

Access to public transportation provides opportunity for everyone to travel to their destination. Figure 4.4 illustrates the general ratio of population to private vehicles, indicating vehicle ownership throughout Seattle. The map represents those who are unable to own a vehicle, those who chose to live without a car, and households with a single vehicle. This conveys the scale in which people rely on transit for different reasons in various neighborhoods. Interbay indicates low vehicle ownership, which reflects that residents in the neighborhood have high transit reliance (Transit Master Plan, 2016).

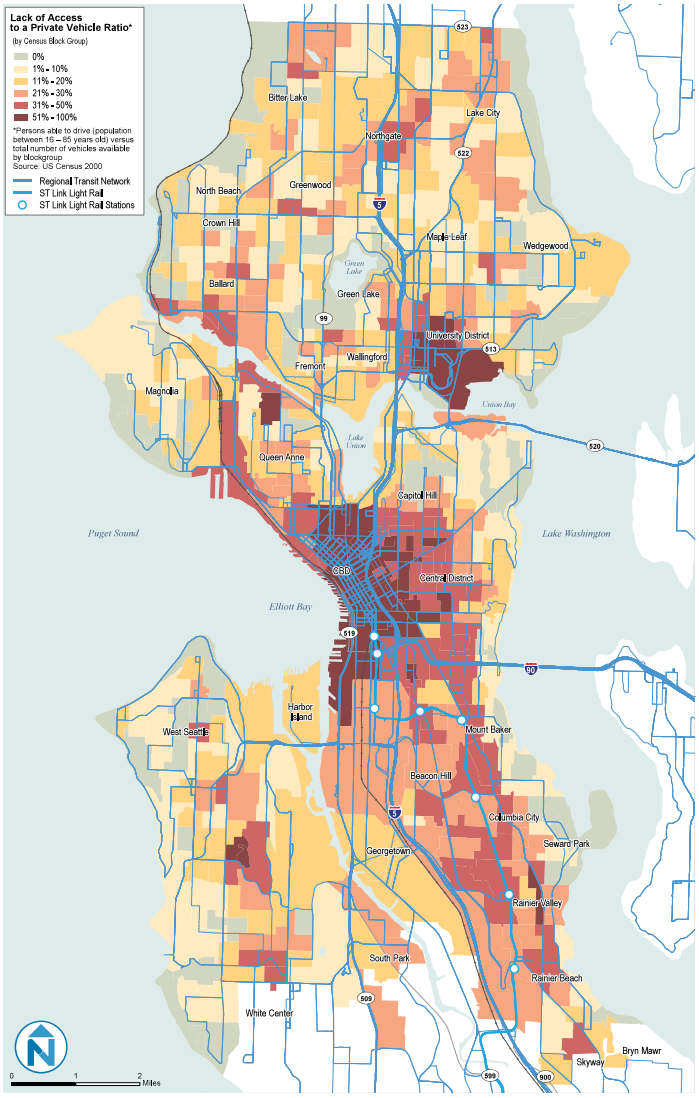


Figure 4.4 *Transit Reliance Index (Transit Master Plan, 2016)*

PEDESTRIAN ACCESSIBILITY AND SAFETY

The Interbay Armory site is bounded to the north by West Armory Way, to the east by 15th Avenue West, to the south by the Magnolia bridge and West Garfield Street, and to the west by the BNSF railyard. It is also within the City of Seattle's Priority Investment Network or PIN, which guides the City to direct investment to those areas that serve "as key pedestrian routes" (City of Seattle Pedestrian Master Plan, 2017). The composition of the surrounding street types and pedestrian infrastructure are as follows:

Street	Classification & Mode Designation	Speed Limit	Average Daily Vehicle Trips	Peak Pedestrian Counts
15th Avenue West / Elliott Avenue West	Principal Arterial Major Truck Street RapidRide Network (D Line)	30 MPH North of Ballard Bridge and 35 MPH South of Ballard Bridge	59,200 Bridge 46,600 north of Magnolia Bridge 52,000 south of Magnolia Bridge	Unknown
Magnolia Bridge / West Garfield Street	Principal Arterial First and Last Mile Freight Connector	30 MPH Elliott Avenue West to Smith Cove 35 MPH west of Smith Cove	10,000 west of 15th Avenue West 20,000 west of Terminal 91	Unknown
Gilman Drive West	Minor Arterial	30 MPH	9,600	Unknown
West Armory Way	Local Street Minor Industrial Access	20 MPH	Unknown	65 per hour
West Dravus Street	Principal Arterial Minor Truck Street Corridor	30 MPH	21,100 west of 15th Avenue West	Unknown
Galer Street Flyover	Local Street First and Last Mile Freight	30 MPH	Unknown	117 per hour

(City of Seattle Comprehensive Plan, 2018; City of Seattle Freight Master Plan, 2016; City of Seattle Pedestrian Master Plan, 2017; City of Seattle Transit Master Plan, 2016)

- 15th Avenue West is a principal arterial with two full signal intersections and six crosswalks from the northerly point of the Interbay Armory site at West Armory Way and to the southerly point at West Garfield Street. There are concrete sidewalks, measuring 6 feet in width, on either side of the street. These are graded sidewalks with no visible irregularities, cracks or vegetation. Both sidewalks are bisected by multiple driveways for commercial retail locations and intersecting minor industrial access streets (on the western side). While there are six marked, signalized crosswalks that cross 15th Avenue West, there are no crosswalks at any of the three intersecting minor industrial access streets. Gilman Drive West is a minor arterial that feeds into 15th Avenue West, from the west, approximately one third of a mile north of West Armory Way. It is a major truck street which provides through trips and connections to the Interbay Manufacturing and Industrial Center (MIC). West Dravus Street is a principal arterial that feeds into 15th Avenue West from the north, approximately ¾ of a mile north of West Armory Way. It is a minor truck street corridor that handles freight traffic to and from the Interbay MIC.

- At the southern tip of the Interbay Armory site there is the bridge on/off ramp for the Magnolia bridge and West Garfield Street. At the intersection of 15th Avenue West and the Magnolia bridge on/off ramp,

there are four marked crosswalks, three of which are signalized. The off ramp for Magnolia bridge merges with 15th Avenue West at the mouth of West Garfield Street, a one-way minor industrial access street. Here there is an unsignalized marked crosswalk with a pedestrian refuge. There are five-foot in width sidewalks on either side of the Magnolia bridge on/off ramp, which have multiple irregularities, such as cracking, changes in slope, and extensive vegetation. The southerly sidewalk extends across the length of the bridge, whereas the northerly sidewalk terminates after approximately 480 feet with no crosswalk or other means of egress. Figure 4.5

- West Armory Way is classified as a minor industrial access street that terminates at the BNSF railyard. There are concrete sidewalks, measuring 6 feet in width, on either side of this single lane, two-way street, with traction strips along the sidewalk adjacent to the Interbay Armory site. The sidewalks begin at the intersection with 15th Avenue West, with the sidewalk adjacent to the armory site extending until the entrance of the site and the opposite sidewalk extending to the railyard. The sidewalk adjacent to the Interbay Armory site does not extend the full length of the street and requires pedestrians to descend from the sidewalk and travel in the roadway or cross the street without a marked or signalized crosswalk. There are multiple driveways bisecting each sidewalk, with commercial operations and attendant parking adjoining both. Figure 4.6.

According to the Seattle Pedestrian Master Plan, 6 out of 10 people surveyed in Seattle think that pedestrian safety "is a problem" (City of Seattle Pedestrian Master Plan, 2017). This opinion may be supported by what the report showed as an annual increase of the pedestrian crash rate from 2013 to 2015 (City of Seattle Pedestrian Master Plan, 2017). Pedestrian and automobile interactions can occur at numerous points around the Interbay Armory site, with multiple driveways intersecting sidewalks, several streets without marked crosswalks and areas where sidewalks end without a point of safe egress. Moreover, speeds in the area range from 20 to 35 MPH, and vehicular speed is a major threat to pedestrian safety. Research has shown that the odds of a pedestrian surviving after being struck by a vehicle traveling at 20 MPH, is 95%. Whereas, when a vehicle is traveling at 30 MPH, the odds shrink to 55% (Limpert, 1994). With pedestrian crossings located on all freight connector streets with 30 to 35 MPH speed limits, the risks to pedestrians are evident.

Figure 4.5 *Sidewalks along the Magnolia bridge on/off ramp (Image taken from Google Maps. 2020)*

Figure 4.6 *Sidewalks along West Armory Way (Image taken from Google Maps. 2020)*

PARKING AND TRAFFIC

The analysis conducted by the Interbay public development advisory committee's recommendation and implementation plan provided a detailed look at the current traffic situation in the Interbay area. The project site is close to transportation networks such as Magnolia bridge and 15th Ave W and Elliott Ave W transportation intersection. According to the Interbay project report, this intersection serves roughly 46,600 trips recorded in the north of the Magnolia bridge and 52,000 in the south at peak hour. For Magnolia bridge, it serves 20,000 west of the terminal 91.

15th Ave W and Elliott Ave W are both the essential road network for freight, connecting industrial, commercial or urban centers within the Seattle metropolitan area (Department of Commerce, 2019).

For the transit systems, Metro provides RapidRide from Ballard to Downtown, other routes such as 15,17,18, 19, 24, 32, 33 serving this region. For Parking, the interbay project doesn't cover the parking analysis within its report, the

only confidential evidence suggests there are over 1,971 parking spaces provided in the region (USCG, 2004). Current parkopedia data shows that 1,100 parking spaces are provided near terminal 91. Additional parking spaces are provided by Wholefoods, with hundreds of spaces.

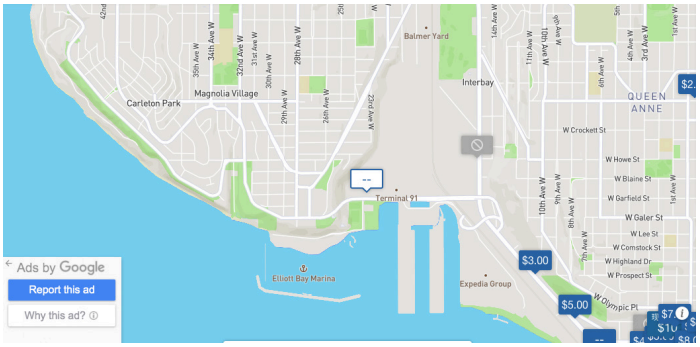


Figure 4.7 *Parking Lot Map (Parkopedia map, 2020)*

Figure 4.8 *Freight Roadway Classification (City of Seattle)*

DISABILITY ACCESSIBILITY

Nearly 1 in 4 King County adults has reported having a physical, mental, or emotional impairment or condition that limits their function or ability to perform major abilities of life (King County Hospitals for a Healthier Community, 2019). Disability prevalence increases with age; 40% of adults aged 65+ in King County live with a disability. Disability is also associated with low incomes: adults with the lowest incomes were at least twice as likely as those with the highest incomes to live with a disability or a diagnosis of diabetes or asthma. Disability prevalence in King County is likely to rise with the aging population of King County; by 2040, almost 1 in 4 King County residents is projected to be 50 years or older, up from 1 in 7 in 2000. Figure 4.9 is taken from the most recent King County Community Needs Assessment.

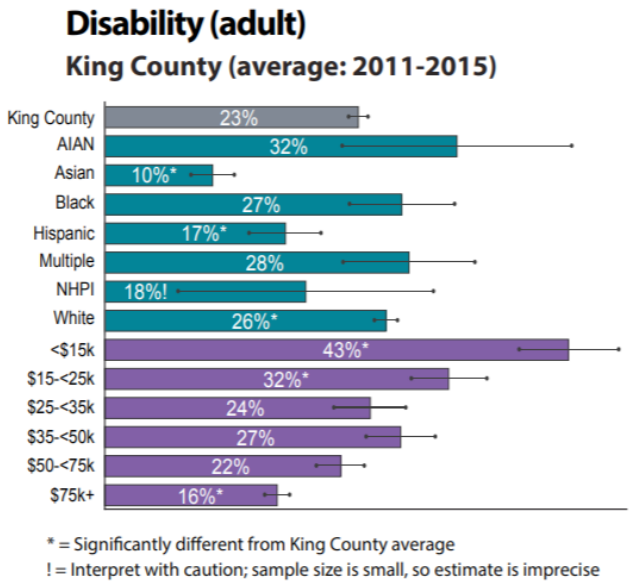


Figure 4.9 *Disability among Various Groups of Adults(Behavioral Risk Factor Surveillance System)*

Rates of disability among people living in Interbay and surrounding areas currently are difficult to accurately determine. According to the Race and Social Equity Index Map from the Bureau of Land Management, the area where the Interbay property is housed (Figure 4.10) contains 6,954 people, 8% of whom have a disability. Surrounding areas of the Index Map show similar rates of disability in this region. However, data from Communities Count and the Behavioral Risk Factor Surveillance System estimates that 20% of adults living in Queen Anne and Magnolia are living with a disability, and 19% of adults in Ballard live with a disability (Communities Count, 2019).

The Interbay site is reasonably accessible for people with disabilities. Current accessible streets surrounding the site (15th Avenue West and Armory Way) are reasonably flat and have sidewalks on both sides of the street. There are crosswalks at intersections of 15th Ave and Armory Way, 15th Ave and Howe Street, and 15th Ave and Garfield Street. Walk scores for houses in the surrounding area range from 45 in Magnolia near the BNSF tracks to 79 for houses close to 15th Avenue intersections (Walk Score,

2020). Unfortunately, the site is only accessible from a single point at the northern end of Interbay property at West Armory Way (Department of Commerce, 2019c). Public transportation is also an important consideration for people with disabilities. King County reports a higher percentage of residents 65 and older use public transportation compared with US residents of the same age. Older adults in King County also outlive their ability to drive safely by an average of 7-10 years (Lester et al., 2015). Current public transportation options near the Interbay site are bus stops centered on 15th Avenue West that travel from Ballard to Downtown (D-Line) and from Interbay to University of Washington (Route 32).

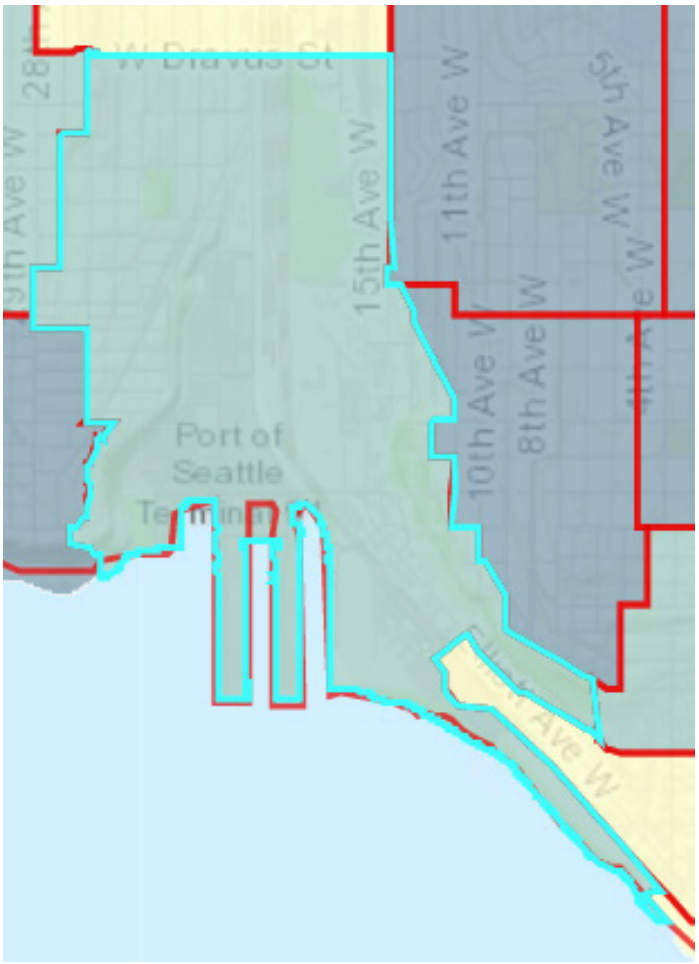


Figure 4.10 *Race and Social Equity Index Map (Bureau of Land Management*

Economic and affordable housing are significant stressors for people living with disabilities. According to the Bureau of Labor Statistics, only 19% of people with a disability are employed, whether part-time or full time (U.S. Bureau of Labor Statistics, 2020). Most people with a disability are not in the labor force, but those who do work usually cite financial need as the main reason for staying in or seeking employment. 32% of workers with a disability are employed part time, compared with 17% of those without a disability. People with disabilities are more likely to work in service occupations, production, transportation, and material moving occupations. Additionally, the need for affordable housing in King County greatly surpasses the supply; it's estimated that an additional 936 subsidized housing units need to be created each year until 2025 just to maintain the current ratio of affordable housing to less-affluent adults (Lester et al., 2015). Priority considerations for the City of Seattle in supporting people with disabilities should address the need for attainable employment and affordable housing for these populations.

HEALTHY AND AFFORDABLE FOOD ACCESS

In 2019, Seattle's Healthy Food Availability & Food Bank Network Report identified that across the city, families with young children, people of color, people with lower incomes, less education, and those who identified as lesbian, gay, or bisexual were more likely to face food insecurity (Bolt et al., 2019). In the Magnolia and Queen Anne neighborhoods (which includes Interbay), an estimated 13% of households "ran out of food" in 2011-2013, which is not a deviation from the King County average (13%). Obesity was at 16% in Magnolia/Queen Anne from 2013-2017, which is considerably lower than the King County average (22%). County-wide, obesity was significantly higher among those with lower incomes, black and Hispanic residents, and 45-64 year olds (Data for King County Communities, 2019).

Magnolia/Queen Anne was not classified as a low-income or healthy food priority area by the 2019 food availability report on food insecurity (Bolt et al., 2019). However, some areas near the Armory property were identified as poverty threshold areas, meaning that 25% of people lived under 200% of the Federal Poverty Level. Moreover, the report acknowledges that in examining food insecurity, it is important to not only focus on areas that are largely low income, but also on those who are low-income living in high income areas. Low income individuals living in high income areas may still face food insecurity, particularly where higher income people may access food by driving and lower income people rely on public transportation or walking insecurity (Bolt et al., 2019).

In 2012, a study of food availability in King County identified some areas near the Armory where the travel time to the nearest 4 grocery store locations is greater than 10 minutes (by any mode of walking, biking, transit, or driving), on average (Jiao et al., 2012). Additionally, a 2014 study of obesity in Seattle found that one-third of respondents bought most food for their household at the supermarket closest to home (Aggarwal et al., 2012).

GROCERY STORE LOCATIONS NEAR INTERBAY, MAGNOLIA, AND QUEEN ANNE

In the Interbay area, Whole Foods is the most proximal grocery store to the Interbay property, located right across from the Armory site along 15th Ave. More affordable grocery store options are located more than a 20 minute walk from the Armory site. There are many grocery store options located within a 5 or 10 minute drive or 15 minute bike ride. By bus, a QFC and Safeway are located within 10 minutes, with many other options requiring transfers and longer rides. Distances to nearby grocery stores by walking, biking, driving, and busing were identified in Google Maps (Google Maps, 2020).

FARMERS MARKETS AND COMMUNITY GARDENS NEAR INTERBAY, MAGNOLIA, AND QUEEN ANNE

Magnolia and Queen Anne both host seasonal Farmers Markets; Ballard hosts a year-round Farmers market. The Interbay p-patch, a community garden, is located just up the street from the Armory site, or about a 9 minute walk. There is also one p-patch in Magnolia and two in Queen Anne. Distances to nearby farmers markets and community gardens by walking, biking, driving, and busing were identified in Google Maps (Google Maps, 2020).

Figure 4.11 *Grocery Store, Farmers Market, and Community Garden Locations near the Interbay Site*

LOCATION	WALK	BIKE	DRIVE	BUS
Larger Chain Grocery Stores				
Whole Foods 2001 15th Ave W	1 min	1 min	-	-
Ken's Market 2400 6th Ave W	21 min	9 min	5 min	28 min (2 buses)
QFC 1600 W Dravus St	20 min	10 min	5 min	10 min
Trader Joe's 1916 Queen Anne	32 min	21 min	8 min	30 min (2 buses)
Safeway 2100 Queen Anne Ave N	32 min	21 min	9 min	33 min (2 buses)
Albertsons 2550 32nd Ave W	41 min	12 min	6 min	20 min (2 buses)
Safeway 516 1st Ave W	32 min	11 min	6 min	11 min
Smaller Chain & Independent Grocery Stores				
Metropolitan Market 100 Mercer St	34 min	14 min	6 min	10 min
Metropolitan Market 3830 34th Ave W	55 min	18 min	8 min	29 min (2 buses)
Tenth West 1903 10th Ave W	13 min	12 min	4 min	-
Fisherman's Green Market & Deli 1900 W Nickerson St	35 min	11 min	6 min	19 min
Midnite Mart 4217 Gilman Ave W	39 min	13 min	7 min	26-37 min (several routes, 1-2 buses)
76 Food Mart 2237 33rd Ave W	38 min	11 min	5 min	24 min (2 buses)
ChefShop.Com 1425 Elliott Ave W	10 min	3 min	2 min	5 min
Farmers Markets				
Magnolia West McGraw Street & 33rd Ave W	38 min	11 min	5 min	25 min (1-2 buses)
Queen Anne Queen Anne Ave N & W Crockett St	30 min	20 min	8 min	40 min (several routes, 2 buses)
Ballard 5345 Ballard Ave NW	50 min	15 min	8 min	18-27 min (several routes, 1-2 buses)
Community Gardens				
Interbay P-Patch 2451 15th Ave W	10 min	5 min	5 min	8 min
Magnolia Manor Park P-Patch 3480 27th Ave W	40 min	17 min	7 min	19-23 min (several routes, 1-2 buses)
Queen Anne P-Patch 301 Lynn St	37 min	22 min	9 min	27-46 min (several routes, 1-2 buses)
UpGarden P-Patch	38 min	13 min	7 min	15 min

ACCESS TO EMERGENCY SERVICES AND EVACUATION ROUTES

Currently the Interbay Project has one access point making it unprepared for evacuation situations. With only one access point the potential for bottleneck issues is a concern. The Interbay Project report in Appendix G: Military Relocation Report stated that the most recent assessment for The Seattle Readiness Center in its current location scored poorly on both Geographic Location, Access to Transportation, and Flexibility (Department of Commerce, 2019). Part of the reason for this rating was due to site access, orientation, neighborhood context and traffic.

Access to and by emergency services is a problem at the moment since there is only one main entry point which could limit or slow down response time. The single point access connects to West Armory Way which leads to 15th Avenue West and according to the report during peak travel time there is roughly 1,800 trips north and 1,000 trips south which the intersection can support the traffic volume well (Department of Commerce, 2019). The closest hospital to Interbay is 2.7 miles which requires going across Ballard Bridge which has high traffic flow and is a functioning drawbridge which would increase travel time and cause unexpected delays. The second closests is 3.5 miles located in the center of downtown Seattle which has high traffic volume. Interbay has access to several hospitals under 5.0 miles yet due to traffic and a drawbridge, travel time is higher plus the existence of only one point makes it more challenging. The West Precinct is the nearest Seattle Police Department which is 3.0 miles away located in the Belltown neighborhood. Seattle Fire Station 20 is the nearest station with a distance of 0.5 miles located on 15th Avenue west.

ANALYSIS AND HEALTH IMPACT ASSESSMENT

PUBLIC TRANSPORTATION AND BIKE ACCESSIBILITY

The redevelopment concepts proposed by the Interbay Public Development Advisory Committee maintain the existing public transportation infrastructure, while providing an identical (across the proposals) bike/pedestrian trail along the western edge of the Interbay Armory site. As the proposals do not include any further development in terms of public transportation, this section mainly discusses the health implications of the proposed trail on site.

One major health impact of the proposed trail arises from its proximity to the railyard as well as freight access in some proposals that incorporate industrial uses on site. The trail's adjacency to the railyard may increase, for those using the trail, exposure to particulates, noise, and other pollutants generated from the trains. Also, several proposals that implement heavy to light industrial uses on site locate freight access next to the proposed trail. This may increase not only the vehicle accident rate, but also the disconnection between the trail users and its adjacent community.

PEDESTRIAN ACCESSIBILITY AND SAFETY

INDUSTRIAL ONLY

In the event the Interbay Armory site is developed in accordance with the current industrial zoning, draft plans from the Washington State Chamber of Commerce predict up to six industrial facilities and over nine separate parking areas. The site would maintain its existing single point of vehicular entry off of West Armory Way and would include a shared pedestrian/bike path running along the western boundary of the site. Such a development concept would increase existing traffic volumes on West Armory Way, 15th Avenue West, and conceivably along the other principal arterials (Washington State Department of Commerce, Appendix W, 2019).

MIXED-USE: COMMERCIAL & RESIDENTIAL

In the event that the Interbay Armory site is developed for mixed use commercial/residential with mixed-income housing, the Washington State Chamber of Commerce projects the construction of approximately 2,846 housing units, on-street and underground parking, and a shared pedestrian/bike path. The site would maintain its existing single point of vehicular entry off of West Armory Way, with two interior north/south streets (17th Avenue West and 16th Avenue West) connected laterally by multiple smaller interior roads. As aforementioned, as the density of employment increases in an area, so does the rate of pedestrian traffic fatalities (Mansfield et al., 2018).

MIXED-USE: LIGHT INDUSTRIAL, COMMERCIAL, RESIDENTIAL

In the event that the Interbay Armory site is developed for mixed use light industrial/residential with mixed-income housing, the Washington State Chamber of Commerce projects the potential construction of up to 1,198 housing units, 22,00 ft2 of commercial space and 153,200 ft2 of industrial space. The site would maintain its existing single point of vehicular entry off of West Armory Way, with two interior north/south streets (17th Avenue West and 16th Avenue West) connected laterally by multiple smaller interior roads.

PARKING AND TRAFFIC

Three options have been proposed, namely industrial only, mixed-use commercial and residential, and mixed-use light industrial and residential options.

INDUSTRIAL ONLY

In the industrial only redevelopment concept, there are many off-street parking spaces provided between 18th Avenue West and 16th Avenue West. For the traffic volume, it is expected to increase especially in the peak hour for the interaction of W Armory Way and 15th Avenue West.

MIXED-USE COMMERCIAL & RESIDENTIAL

In the high-rise redevelopment concept, there would be private open parking spaces in the west of 17th Avenue West. The plan increased the density of population in the area, meaning more traffic created in the regions. Retail service within the area also increases the traffic volume in non-peak hours. The interaction of W Armory Way and 15th Avenue West would be under heavy pressure due to the growing employment within the regions.

MIXED-USE: LIGHT INDUSTRIAL, COMMERCIAL, RESIDENTIAL

In the mixed-use light industrial and residential plan, there would be off-street parking spaces created near 17th Avenue West. For the traffic volume, the interaction of W Armory Way and 15th Avenue West would rise due to increased density of population in the region.

Overall, no matter which option finally chosen, the parking spaces and traffic volume in the regions would be increased expectedly. If the services of the public transportation system would not be changed in the short term, more population or employment in the regions would push up private-auto traffic as a result, causing more air pollution problems once the project would be completed.

DISABILITY ACCESSIBILITY

Most concepts under consideration would increase vehicle trips during PM peak hours, which would affect accessibility of crosswalks along 15th Ave West. In all concepts except for industrial only, additional access to the Interbay site would need to rely on secondary access via 15th Avenue and Howe Street in addition to the current access to the site on 15th Ave W and Armory Way (Department of Commerce, 2019a). Howe Street currently does not have a sidewalk. The Department of Commerce report mentions the need for a sidewalk on Howe Street, but also mentions that consideration of Housing Above industrial concepts could preclude the need for added access to 15th Avenue and Howe Street. However, the Sound Transit Light Rail is planning for a Smith Cove station to be placed to the south of Magnolia bridge, south of where the Interbay site is located (Department of Commerce, 2019a). Currently, there is no access to the Interbay site from the south, and without the addition of access to the Interbay site from the south, pedestrians with disabilities may be forced to travel 0.5 miles across busy intersections along 15th Ave to access the Interbay site from the Armory Way access point, potentially leading to pedestrian collisions and reduced access to needed public transportation.

Different options for the Interbay site provide different opportunities for people with disabilities. People with disabilities are unlikely to work in heavy industrial jobs that require physical and mental fitness, but they may be able to work in light industrial settings that produce more consumer focused products, or in service positions, transportation, and material moving. Industrial only zoned land is projected to create 720 to 920 industrial jobs, but it's unclear what kinds of jobs these would be and if they would be accessible to people with disabilities (Department of Commerce, 2019b). Mixed use commercial/residential would not provide industrial jobs but could provide commercial and retail jobs to people with disabilities. Mixed use light industrial/residential is projected to create anywhere from 540 to 660 industrial jobs, many of which may be accessible to people with disabilities. In the housing above industrial option, 260-340 jobs could be created which could be accessible to people with disabilities.

Different options under consideration may or may not provide affordable housing, a significant need for people with disabilities in Seattle. The industrial only option would not provide any affordable housing. The mixed use commercial/residential option could provide 556 to 978 units of affordable housing, depending on whether or not it's mid or high rise housing. The mixed use light industrial/residential could provide 176 to 360 units of affordable housing, depending on whether it's mid-rise housing, high-rise housing, or housing above industrial. None of these

HEALTHY AND AFFORDABLE FOOD ACCESS

The different redevelopment concepts offer different impacts for community members at and around the Interbay site. Regardless of industrial only, mixed-use commercial and residential, and mixed-use light industrial and residential development plans, all members stand to benefit from healthy and affordable food access. For example, individuals employed by industries, either industrial or commercial, at the Interbay property may consider grocery shopping nearby work if it is convenient and affordable.

However, for those living in or nearby the site, healthy and affordable food access is even more critical. The demographics of the area are subject to change, in part dependent on whether housing is built on the Armory site and the proportion and number of units of housing at affordable and/or market rate. Given that many affordable grocery store options are located more than a 20-minute walk or 10-minute bus ride from the Armory site, low-income individuals living in affordable housing units may face inequitable access to healthy and affordable foods, traveling further to shop or spending a larger proportion of their income on the convenience of Whole Foods. The chronic health effects of these inequities may not be immediate, but may emerge over time, particularly for communities that traditionally face increased food insecurity, including members of racial and ethnic minority communities, people with lower incomes or less education, and those who identify as lesbian, gay, or bisexual.

ACCESS TO EMERGENCY SERVICES AND EVACUATION ROUTES

INDUSTRIAL ONLY

In the event that it becomes industrial there will be an increase in the number of people that are in the area more consistently. Currently, the National Guard has training twice twice a year with a small number of people working year round. With an industrial zoning designation there could be a potential increase in occupational injuries, commercial related emergencies due to fires or other hazards therefore access to emergency services and hospitals will be required. Emergency evacuation planning will need to take into consideration the increased daily population in Interbay.

MIXED-USE COMMERCIAL & RESIDENTIAL

With a mixed and commercial residential designating there will be an increase in permanent population living in the area due to residential space and an increase in people traffic due to commercial spaces. This increase will possibly increase the need for emergency services. Emergency evacuation planning will need to take into account the increased population with the possibility of increasing high-risk people living or visiting Interbay

MIXED-USE: LIGHT INDUSTRIAL, COMMERCIAL, RESIDENTIAL

In the event that Interbay is designated a mixed-use light industrial and residential there will be an increase in permanent populating living in the area. Due to light industrial use there will be an increase in population spending time in the area that are connected to the light industrial spaces. With a light industrial use designation there could be a potential increase in occupational injuries and emergencies due to fires or other work hazards therefore access to emergency services and hospitals will be required. Emergency evacuation planning will need to take into consideration the increased permanent and

RECOMMENDATIONS

PRIORITY RECOMMENDATIONS

RECOMMENDATION 1: IMPLEMENT UNIVERSAL DESIGN PRINCIPLES

Implement Universal Design principles on the development of the Interbay site and surrounding streets to facilitate access to the site. The concept of Universal Design means designing a space for use by all people, not just those who we believe are most likely to use the space (Snider & Takeda, 2008). ADA requirements for urban design are often not sufficient to meet the needs of all people with disabilities. Universal design offers more innovative and inclusive solutions not just for those with disabilities, but also for people with temporary injuries that prevent mobility, children, and those who speak limited English. Seattle Department of Transportation and the City of Seattle have the unique opportunity to be inclusive in the design of their future city spaces through implementation of universal design concepts in a space that has been largely untouched by urban design. Such concepts include Leading Pedestrian Intervals, which give pedestrians an opportunity to enter an intersection 3-7 seconds before vehicles are given a green light. LPIs result in safety benefits of 60% reduction in pedestrian vehicle crashes at intersections. SDOT should also consider slower crosswalk speeds at intersections; SDOT currently times crosswalks for 3.5 feet per second, but older drivers and pedestrians may need a speed of 2.8 ft/s per the guidance of the Federal Highway Administration Guidelines. Other considerations include even surfaces with minimal inclines and declines, accessible street furniture, visual and informative signage, and adequate lighting along all walkways. Sidewalks should have a minimum clearance of 5 feet, with a planning strip (buffer between on-street vehicles and pedestrians) for people who are blind or people with wheelchairs. Curb cuts should be installed at all intersections, with two curb cuts at each corner for easy access. SDOT should consider using the findings from implementation of Pedestrian Wayfinding Program pilots in Westlake and Jackson Hubs to inform design plans for the Interbay site. The City of Seattle should also consider mandating that future site developers incorporate UD principles in the development of their buildings and infrastructure.

RECOMMENDATION 2: INCREASE ACCESS POINTS THROUGHOUT THE SITE

Provide increased emergency vehicle, pedestrian and bicycle access to the Interbay Armory site. Existing conditions and Washington State Chamber of Commerce plans feature only one point of access to the Interbay Armory site. This presents accessibility challenges for emergency and service vehicle access to the site. Moreover, it potentially creates increased risk of contact between pedestrians, bicyclists and vehicular traffic.

One option would be to provide access via an extension of West Howe street. Deployable bollards would restrict vehicular access to only emergency vehicles. The West Howe Street extension could double as a pedestrian pathway if agreed to by adjoining the property owner.

OTHER RECOMMENDATIONS FOR CONSIDERATION

PUBLIC TRANSPORTATION AND BIKE ACCESSIBILITY

Based on (1) the health implications of public transit and bike accessibility, (2) current conditions of the Interbay property and its surroundings, and (3) the redevelopment concepts provided in the report by the Interbay Public Development Advisory Committee, it is important to consider how the current conditions are affecting the community, and how the redevelopment concepts can bring positive/negative impacts to the community alongside the future development in the transportation infrastructure. The following list includes various recommendations made with regards to the redevelopment concepts and their compatibility with the upcoming transportation infrastructure development in the area.

- When industrial uses are implemented on site, provide a sufficient amount of green buffer (e.g., trees, landscaping, etc) between the proposed bike trail and freight routes to reduce exposure to particulates and accidents for those using the trail

- Provide easy and frequent access to bus stops along 15th Avenue West with clear wayfinding strategies, such as visible signs and small block dimensions, to incentivize and promote future residents with taking public transit as a means of commute

- When implementing commercial/neighborhood commercial uses on site, the development should locate commercial amenities in proximity to the new Smith Cove station and nearby bus stops to provide easily accessible necessities not only for residents, but also for workers and travelers coming to the site via transit

- New development should implement appropriate means of travel in East-West directions (via walking, cycling, and/or taking transit) to its adjacent neighborhoods, Magnolia and Queen Anne, in order to provide adequate access to essential amenities for the neighboring communities.

PEDESTRIAN ACCESSIBILITY AND SAFETY

Industrial Only

To mitigate the potential increased safety risk to pedestrians, the following could be implemented:

- a marked crosswalk with rectangular rapid flash beacon (RRFB) where the shared pedestrian/bike path bisects West Armory Way,
- install lighting along the shared pedestrian/bike path,
- a protected bike lane or trail extension, from the shared pedestrian/bike path, that runs behind West Garfield street and along the BNSF rail line until it can connect with the West Galer Street Flyover pedestrian/bike path,
- a marked crosswalk that connects the south sidewalk of West Armory Way with the north sidewalk, facilitating foot traffic to the commercial complex to the north of the development site,
- plant trees as illustrated in the draft plan to help mitigate ground level air pollution and implement a no-idling directive for vehicles in the development site to keep vehicular exhaust to a minimum,
- In the event that Sound Transit builds the Smith Cove station at the southern portion of the site:
  - pedestrian plaza with lighting, that would direct foot traffic towards the shared pedestrian/bike path, and would include an additional lit path connecting to 15th Avenue West.

Mixed-use commercial/residential with mixed-income housing

To create a safe pedestrian network within the site and to mitigate potential safety impacts around the site, the following could be implemented:

- interior posted speed limits of 15 MPH or below,
- make all interior streets Complete Streets
  - widened sidewalks
  - dedicated bike lanes
  - one-way traffic flow for both 17th and 16th Avenue West
  - multiple marked crosswalks with curb-bulbs to increase pedestrian visibility and shorten crossings
  - speed humps placed upon 17th and 16th Avenue West,
- a marked crosswalk with rectangular rapid flash beacon (RRFB) where the shared pedestrian/bike path bisects West Armory Way,

- install lighting along the shared pedestrian/bike path,
- a protected bike lane or trail extension, from the shared pedestrian/bike path, that runs behind West Garfield street and along the BNSF rail line until it can connect with the West Galer Street Flyover pedestrian/bike path,
- a marked crosswalk that connect the south sidewalk of West Armory Way with the north sidewalk, facilitating foot traffic to the commercial complex to the north of the development site,
- plant trees as illustrated in the draft plan to help mitigate ground level pollution,
- In the event that Sound Transit builds the Smith Cove station at the southern portion of the site:
  - pedestrian plaza with lighting, that would direct foot traffic towards the shared pedestrian/bike path, and would include an additional, lit, path connecting to 15th Avenue West.

Mixed-use light industrial/residential with mixed-income housing

To create a safe pedestrian network within the site and to mitigate potential safety impacts around the site, the following could be implemented:

- interior posted speed limits of 15 MPH or below,
- make all interior streets, apart from the private industrial access street, Complete Streets;
  - widened sidewalks
  - dedicated bike lanes
  - resident only traffic for both 16th & 17th Avenue West, thus requiring shoppers to arrive by foot or bicycle,
  - multiple marked crosswalks with curb-bulbs to increase pedestrian visibility and shorten crossings
  - speed humps placed upon 16th Avenue West and the private industrial access street,
- a marked crosswalk with rectangular rapid flash beacon (RRFB) where the shared pedestrian/bike path bisects West Armory Way,
- install lighting along the shared pedestrian/bike path,
- a protected bike lane or trail extension, from the shared pedestrian/bike path, that runs behind West Garfield street and along the BNSF rail line until it can connect with the West Galer Street Flyover pedestrian/bike path,
- a marked crosswalk that connect the south sidewalk of West Armory Way with the north sidewalk, facilitating foot traffic to the commercial complex to the north of the development site,
- create a pedestrian pathway that links the site with 15th Avenue West via the rear of the existing Interbay retail, located at the opposite end of the Whole Foods parking lot,
- plant trees as illustrated in the draft plan to help mitigate ground level pollution,
- In the event that Sound Transit builds the Smith Cove station at the southern portion of the site:
  - pedestrian plaza with lighting, that would direct foot traffic towards the shared pedestrian/bike path, and would include an additional, lit, path connecting to 15th Avenue West.

PARKING AND TRAFFIC

- *Discourage auto cars entry in the Interbay Neighborhood.* Due to the increased traffic volume expected in light of the redevelopment of Interbay site, the private auto car use in the region would be simultaneously increased. The air quality, noise or traffic safety may be threatened. The strategies that the government could do include the road congestion pricing, optimizing the traffic operation (traffic lighting management) in the regions or improving cycling structure.

- *Propose an alternative route for the north-south arterial in the west of the city*. 15th Ave W and Elliott Ave W would be an arterial road in the Seattle roadway network. Setting up the alternative routes may reduce the negative impact of immediate surge of traffic demand once the redevelopment is completed and be a buffer for any other nearby particular events.

- *Stick with the transit plan in the region.* In light of the delayed transit infrastructure having a negative impact on traffic in the local community, the city government should oversee their timeline, projected annual investment and other administrative processes to avoid delayed opening date, increased public funding for infrastructure and traffic congestion within the regions.

- *Set up different strategies for different development plans.* For reduced private cars volume, the city government should take a detailed look at the parking capacity to reduce the private car volume within the car capacity in the region. For different redevelopment plans, the public sectors should set up different approaches to properly manage the capacity of different car type parking spaces and nearby roadway capacity.
  - *Industrial only* It would be majorly used by employees or staff nearby, and there would be long-term daily parking. If there are grocery stores or barber shops set up in short distance, it would be much more effective to use those parking spaces due to high demand in the evening or night.

- *Mixed-use Commercial & Residential* It would be beneficial if it uses TOD (transit-oriented development) strategies to reduce the parking lots nearby. That is, joined with ST3 light rail station plan, investment more on accessibility and walkability for transit stations, making people less dependent on private car uses.(Cole ,2015)
- *Mixed-use Light Industrial and Residential* Set up paid parking zoning systems in the regions, and give parking permits to industrial companies' employees and residents within the regions.

DISABILITY ACCESSIBILITY

- *Create access to the Interbay site through Howe Street. Add a sidewalk on Howe Street that meets ADA requirements and has Leading Pedestrian Intervals at all lights.* The Transportation Impacts Appendix to the Department of Commerce report mentions that Howe Street may be considered as a future access point to the Interbay site (Department of Commerce, 2019a). Though they mention that additional access may not be needed if the site is zoned for industrial only or if the construction of housing is timed with the development of the future light rail, we believe that the City should be proactive in their implementation of accessible walkways for people with disabilities. Regardless of how the site is built, pedestrian access to the site will naturally increase throughout its development. Being proactive on accessibility will be crucial, particularly as people with disabilities will continue to rely on public transit centered on 15th Avenue West.

- *Create an ADA accessible pedestrian bridge at the south end of the Interbay site.* Creating more points of access to the Interbay site will be crucial for people with disabilities, particularly if residential options are considered. Several community members indicated support for the building of a pedestrian bridge to the south of the Interbay site (Department of Commerce, 2019c). Their proposed bridge would feature ADA compliant access ramps with a single ramp on the Interbay site and 2 traversing ramps on the waterfront side, which would join Elliott Bay Trail and connect the waterfront. Careful planning of this pedestrian bridge could also incorporate the development of the Smith Cove light rail station for easy access from the light rail station to the Interbay site, without having to cross multiple intersections on 15th Avenue West.

HEALTHY AND AFFORDABLE FOOD ACCESS

Based on the important role that healthy and affordable food plays in health and the redevelopment concepts put forth by the Interbay Public Development Advisory Committee, the HIA team makes the following recommendations to support healthy and affordable food access for those affected by the development of the Armory site and those in the surrounding area:

- *Consider adding an additional, more affordable, grocery store as an alternative to Whole Foods,* if commercial redevelopment is included at the Interbay property. This could benefit future residents, employees of the property looking to grocery shop near work, and/or neighboring communities.

- *Examine opportunities to include community gardens* in the Interbay property, particularly if housing is included in the redevelopment and if environmentally feasible. P-patches traditionally have long wait times to access and the opportunity to participate in a community garden may be attractive for potential tenants.

- *Explore the potential of including a small farmers market* on the Interbay property, dependent on availability of parking spaces and/or open space within the sites. This could benefit a variety of different stakeholders, dependent on the final development of the site. The day, time, and seasonality of farmers markets should also depend on final development plans. Potential residents could benefit from convenient healthy food access as could neighboring communities, while future employees might appreciate a weekday farmers market.
  - If a farmers market is developed, explore opportunities to offer small financial incentives to SNAP users or otherwise expand affordable access.

ACCESS TO EMERGENCY SERVICES AND EVACUATION ROUTES

The HIA team recommends the following based in the Interbay Public Development Advisory Committee redevelopment proposals:

- *Create additional access to the Interbay site under all land use designations.* One additional access point could be through Howe street as The Transportation Impacts Appendix to the Department of Commerce report mentions that Howe Street may be considered as a future access point to the Interbay site (Department of Commerce, 2019a). If the designation involves housing, in order to accommodate the increase in population living

in the area we recommend the addition of a third access point which is making a second 15th Avenue West connector. The creation of additional access points will require collaboration and negotiation with parcels east of Interbay where Whole Food and Work Loft businesses are located. (The area to build additional access points is in green on the Adjacent Land Use Map)

- *Depending on land use designation there needs to be a reevaluation of the emergency management systems* in order to consider and take into account the change in population that will be living in Interbay to meet access needs.
- *With the expected increase in populations there needs to be a reevaluation of the police department and fire department staff serving the area* in order for them to meet the needs of the future increase in population.

EQUITY EVALUATION

Design of transportation and accessibility for the future Interbay site should consider the historical and existing inequities in death, disease, access to transportation, pedestrian safety, and emergency preparation and work to mitigate the disproportionate health impacts experienced by people of color and low-income populations in the Greater Seattle Area.

Expansion of public transportation and other forms of transportation such as walking and biking as the potential to reduce air pollution and greenhouse gases, which can cause air pollution and greenhouse gases. Air pollution can cause health conditions such as respiratory illness and asthma, which disproportionately affect people of color (Communities Count, 2019). Greater access to public transportation can also support low-income households with access to the city. The cost of owning a car can be prohibitive for low-income families, the ORCA LIFT program allows individuals with limited household incomes to ride public transportation for free.

The substantial decrease of traffic-related pollution has a positive impact on human health. Some researches point that it is not evidential or confidential to prove the correlation between low socio-economic condition and health concerns (Sabrina H. Severine D.et al, 2009), while other researches provide evidence to prove that population at the lower end of socio-economic spectrum is disproportionately higher exposed to the traffic-related pollution due to spatial demographic differences in metropolitan area (Gregory C. et al, 2015). Nevertheless, the decrease of auto-traffic improves the health of the local community.

Barriers to pedestrian activity can be greater still for people of color. A study by Coughenour et al. in 2016 demonstrated an association between a driver yielding to a pedestrian at a crosswalk and the pedestrian's perceived race. The research showed that at high income crosswalks (crosswalks located in neighborhoods categorized as "high income"), drivers were less likely to yield to black pedestrians waiting on the sidewalk than for white pedestrians waiting, and were more likely to drive through a crosswalk when a black pedestrian was in the roadway (Coughenour et al., 2017). These data are concerning and call for comprehensive measures to improve pedestrian safety. The current land use for the Interbay Armory site is industrial, however, there are multiple retail operations located around this site. Each of these businesses are potentially staffed by workers that may need to commute to work by using the King County Metro Rapid Ride D line on 15th Avenue West, and in turn walk to their place of employment. While there are multiple marked crosswalks along the streets in this area, there are some that run directly in front of streets with challenging sight lines, such as the on/off ramp of Magnolia bridge. There is one multi-modal trail, the Elliott Bay Trail, that begins at 20th Avenue West and runs roughly parallel to the west of the BNSF railyard and continues south, providing access to Pier 91.

Members of racial and ethnic minority communities and residents of low-income communities are inequitably burdened by poor access to healthy and affordable food (Beaulac et al 2009). People of color also have the highest prevalence of diabetes and obesity in the region and have the higher death rates due to diabetes and hypertension than their white counterparts (Communities Count, 2019). Providing access to healthy, affordable foods near the Interbay site helps make it easier for communities in Interbay and the surrounding Queen Anne and Magnolia neighborhoods to make healthy choices in their diets.

Equity must be considered in the creation of emergency evacuation routes to ensure fair treatment of people in disaster situations. High risk populations in disaster situations and for access to emergency situations include individuals with disabilities, those with medical needs, elderly, and children. When creating evacuation plans that attempt to minimize total loss, it could lead to sacrifice of the priorities of those at highest risk. Historically, emergency evacuation has not always served the most marginalized communities (e.g. Hurricane Katrina and Flint, Michigan). Design of the new site and its plans for access to emergency services and evacuation routes should design their plans with consideration of the highest risk populations at the forefront.

Even within the vast landscape of inequity that faces people living with disabilities, we must also consider the compounded disparities of people with disabilities

who are of different incomes and health statuses. As mentioned in earlier sections, lower income is associated with higher disability rates. "Just as disability may limit employment opportunities (and thus income), the limited and sometimes dangerous circumstances of poverty may increase the risk for disability" (King County Hospitals for a Healthier Community, 2019). Additionally, according to HUD data, about 20% of households that receive HUD assistance are disabled (Brucker, Helms, & Souza, 2018). Those living in assisted housing with disabilities also have higher rates of self-reported fair or poor health, asthma, diabetes, hypertension, obesity, and cigarette smoking.

Safe living spaces with adequate access to social services centralized in downtown Seattle are sorely needed. However, any consideration of this space as residential must consider the difficulties and cost of making this space friendly to residents through removal of pollutants, creation of safe walking spaces, and access to green spaces. We should consider the compounding of health disparities on already marginalized people and make every effort to create safe, accessible spaces that provide people with disabilities with access to social services, healthcare, walking space, and community.

SUMMARY

LIMITATIONS AND ASSUMPTIONS

Transportation and accessibility in the Interbay neighborhood, is a complex topic requiring a multifaceted analysis of its connections to health, of the existing conditions for both the Interbay Armory site and the neighborhood, and the ways that existing and potential impacts to health and safety can be mitigated. Public transportation and pedestrian and bicycling networks are parts of an active transportation strategy that can lead to increases in physical activity, and when paired with lower traffic volumes, improved health outcomes. These networks must employ the principles of Universal Design and the Americans with Disabilities Act, to ensure that the Interbay Site and neighborhood are healthful and connected. Those connections must include increased affordable healthy food options and fast and reliable access by emergency services.

These analyses all come from a place of basic assumptions and limitations. Some broad limitations to this work was the lack of consistent access to the site and the team of fellow researchers, due to the shelter in place directive in Washington State and King County. Moreover, the team conducted its research and analysis within a highly condensed time frame of approximately 4 weeks. More specific limitations and assumptions for each of the chapter's sections are detailed below.

LIMITATIONS FOR PUBLIC TRANSPORTATION AND BIKE ACCESSIBILITY

- The uncertainty of the future development plans and its impact on the Interbay property

ASSUMPTIONS FOR PUBLIC TRANSPORTATION AND BIKE ACCESSIBILITY

- Health and equity implications of public transportation and bike accessibility were largely based on the existing literature and the existing conditions of the site.

- Recommendations should provide a healthy and inclusive lifestyle for residents and workers of the future development on the Interbay property
  - should be appropriate to consider implementing as part of the redevelopment.

LIMITATIONS FOR PEDESTRIAN ACCESSIBILITY AND SAFETY

- The potential construction of the Sound Transit Smith Cove stop could dramatically alter the scope and type of pedestrian infrastructure needed for the area.
  - Needs hinge upon whether the stop is constructed at the southern tip of the site or if it is constructed on the western side of the BNSF railyard. (Seattle South Center Lake Union, 2020)

- In 2017, the Seattle Department of Transportation began a planning study to replace the existing Magnolia bridge. The four proposals range from enhancements that would increase traffic flow north of the site, to replacing the current bridge, where it is located, but with significant improvements. Any one of the four plans could have impacts on pedestrian safety and health. (Magnolia Bridge Planning Study - Transportation | Seattle.Gov, n.d.)

ASSUMPTIONS FOR PEDESTRIAN ACCESSIBILITY AND SAFETY

- Had to perform health impact assessments based upon the assumption of existing conditions projected forward without secure knowledge on these two major capital outlays.
  - That the Smith Cove station would be located at the southern tip of the property
  - That the Magnolia bridge would be replaced in its current location and carrying capacity.

LIMITATIONS FOR TRAFFIC AND PARKING

- Unclear about the car type of traffic volume and air quality modelling for the futuristic different plans.

LIMITATIONS FOR DISABILITY ACCESSIBILITY

- Unclear how many people with disabilities currently live in the region and how many will live in the region in the future
- Limited community input from people with disabilities in regards to the development of the site

ASSUMPTIONS FOR DISABILITY ACCESSIBILITY

- The proportion of the population with disabilities will continue to rise through 2040
- Smith Cove light rail station will be built to the south of Magnolia bridge in alignment with the preferred option for light rail (next to BNSF railyard)
- The major issues that people with disabilities are concerned about with regards to this space are pedestrian access, and availability of jobs and housing
- Access to affordable housing will continue to be an issue in Seattle
- All three options for development are under equal consideration
- The Pedestrian Walkways Program is still underway

LIMITATIONS FOR HEALTHY AND AFFORDABLE FOOD ACCESS

- There is limited research on food insecurity and subsequent health impacts for the Interbay area specifically
  - most data is drawn from Magnolia/Queen Anne or Seattle at large.
- While there is strong evidence connecting eating patterns to health, strategies to increase food access and mitigate health consequences relating to diet have varied evidence for their effectiveness

ASSUMPTIONS FOR HEALTHY AND AFFORDABLE FOOD ACCESS

- The varied evidence is likely due to the diverse contextual elements related to food and health that affect the implementation and effectiveness of food related interventions
- Data found for Magnolia/Queen Anne also reflect Interbay
- Interventions/recommendations to expand access would actually result in people using them and in turn having improved health related to food/eating patterns

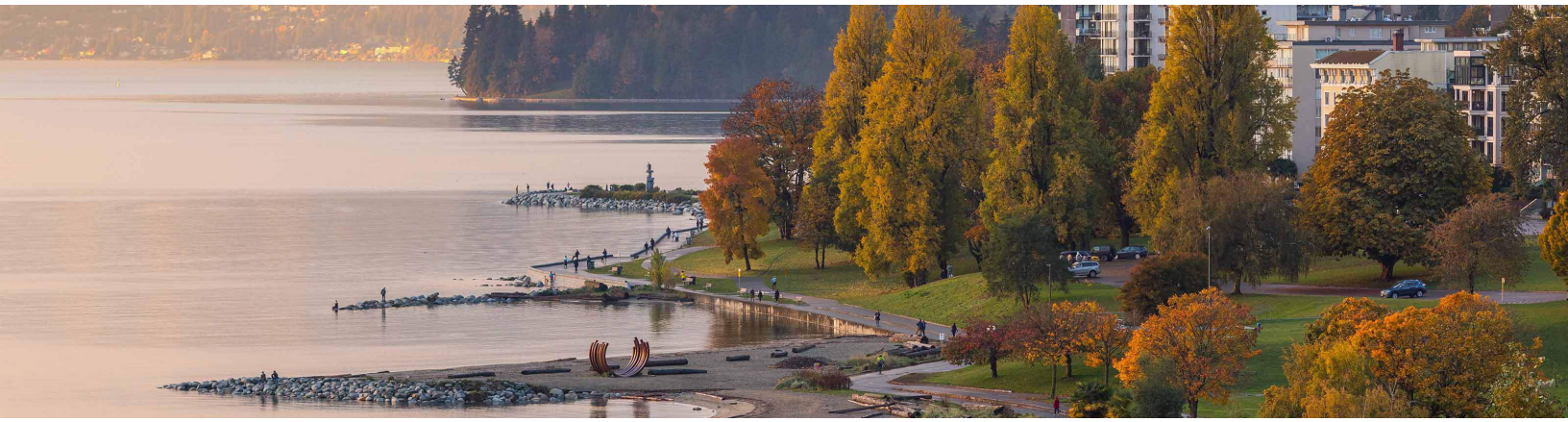
LIMITATIONS FOR EMERGENCY SERVICES AND ACCESS TO EMERGENCY SERVICES

- The greatest limitation is the existence of a single access point regardless of the land use assigned to Interbay there needs to be increased access.
- A challenge could be negotiating with surrounding parcels to create access to 15th St. Avenue since the creation of roads would through the middle of owners properties and change the structure of their commercial space.
- Access to the nearest hospital is only 2.7 miles but the emergency vehicles would need to cope with the high traffic volume on the Ballard bridge. The other challenge in getting to the hospital is the Ballard bridge which is a functioning drawbridge.
- Since the area is under maritime law enforcement, search and rescue branch and not for public use, it makes it difficult to understand the need for emergency services in the area.

ASSUMPTIONS FOR EMERGENCY SERVICES AND ACCESS TO EMERGENCY SERVICES

- There will be population growth in the Interbay area regardless of which land-use designations are settled upon.
- Recommendations for increased access points are based on the assumption that connecting parcels will collaborate and allow for the creation of access points.

LAND USE



INTRODUCTION

LAND USE AND PUBLIC HEALTH

Planning and land use decisions play a critical role in the enhancement or hindrance of healthy community creation and maintenance (Dannenberg et al., 2003). Development patterns and zoning policies can directly impact health determinants, such as transportation and transit access (Van Wee, 2002), housing affordability (Nelson et al, 2002), crime levels (Anderson et al, 2013), and access to education, health services, employment opportunities, and other critical and essential goods and services (PEW, 2016). By incorporating health in the decision-making process through close collaboration with multidisciplinary teams, planners can help ensure that health is a priority in land use policy planning. Careful consideration and analysis of land use projects will guide how people live, work, and play in a manner that "reduces air pollution, encourages physical activity, provides essential services, and preserves green space, all of which are important to health" (PEW, 2016). Land use decisions are particularly important because of their ties with environmental justice concerns, as marginalized groups such as people of color and those with low socioeconomic status often suffer disproportionately from the adverse consequences of decisions made for their communities (Dannenberg et al, 2003).

HISTORY AND INTRODUCTION

Prior to colonization of the land we refer to as the Interbay Armory, the Duwamish, Suquamish and Muckleshoot Tribes used the site, which was mostly underwater (Ruby et al., 2010; Suttles & Lane, 1990; Waterman, 2001). This area was then filled in to become a storage space for the US Navy, finally becoming the Interbay Armory in the 1980's (NETR, 2019; Ross and Williams, 2019). As mentioned earlier, the Interbay Armory property is part of the larger BINMIC.

According to the Seattle Comprehensive Plan, the BINMIC is one of the smallest MICs in the city, covering 932 acres, respectively. Within the MIC there are seven zoning designations, which include four core industrial designations and three industrial-commercial designations. Buffer zones are utilized along the edges of the MIC to separate retail and residential uses from the adjacent industrial land. The Interbay site sits within the BINMIC and comprises two parcels and a substantial portion of unvacated right-of-way (King County Parcel Viewer, n.d.). The 26-acre Interbay property is currently zoned Industrial General 2 (IG2 U/45), which indicates a 45-foot maximum height for any structure that contains commercial uses. With the exception of a BNSF freight rail yard to the west, the Interbay property is not bordered by active or planned industrial use properties. The site is surrounded by vacant Port of Seattle property and private retail development to the east, a self-storage facility and retail development to the north, the City of Seattle-owned Magnolia bridge and Port of Seattle marine terminals to the south, and the Puget Sound to the west. A Sound Transit light rail expansion is proposed south of the Interbay property, which would connect the site to the greater Seattle area. The following uses are currently prohibited on the Interbay site: residential housing, landfills, agricultural, cemeteries, commercial, and institutions such as adult care centers, community centers, libraries, museums, schools, and jails.

This chapter will address the proposed Interbay land uses and zoning options (industrial, mixed use commercial/residential, and mixed use light industrial/residential) as related to their impact on the following land use topics:

- Ancestral Land & Culture
- Climate Change
- Open Space and Parks
- Liquefaction

CONNECTION TO HEALTH

ANCESTRAL LAND AND CULTURE

The Tribes native to Washington State have relied on and protected the natural resources of the land and their personal, cultural and spiritual survival depended upon their ability to use the natural resources available to them. After colonization, American Indian and Alaska Native (AIAN) people experienced great health inequities compared to other Americans, and this continues today. This includes shortened life expectancy due to a disproportionate disease burden, which ultimately stems from systemic discrimination. AIAN populations suffer from inadequate education and healthcare, and high rates of poverty. Many of the roots of these health inequities among AIAN populations are social and cultural in nature (Indian Health Service, 2019). This project has the potential to honor fundamental aspects of the spiritual, cultural, and traditional practices of the Duwamish, Suquamish and Muckleshoot Tribes which are fundamental to Tribal health and wellbeing (Daniell et al., 2013).

CLIMATE CHANGE

Climate change is related to health largely through increased risk of heat and issues related to rising sea levels and increased precipitation. Land use decisions can mitigate or worsen these risks. This chapter will be addressing three factors that are related to potential impacts of land use or zoning amendments on climate change: heat, flooding, and tree canopy cover.

HEAT

Rising local temperatures and more frequent, extreme heat waves will increase global morbidity and mortality rates; rising temperatures in Seattle will impact the lives of future residents and workers of the Interbay site. Heat waves cause increases in acute heat-related illness, such as dehydration, heat stroke, and heat exhaustion, as well as exacerbation of underlying health conditions (Peng et al., 2011; Semenza, McCullough, Flanders, McGeehin, & Lumpkin, 1999). A meta-analysis of heat-related mortality found that existing cardiovascular, pulmonary and psychiatric illness are strongly associated with risk of mortality during heat waves (ORs: 2.48, 1.61 and 3.61, respectively) (Bouchama et al., 2007). Mortality risk is associated with higher age, female gender, being confined to bed, being socially isolated, and being unable to care for oneself—i.e., vulnerable older adults--while air conditioning is a protective factor (Borrell et al., 2006; Bouchama et al., 2007). In addition to tripled odds of mortality for those with psychiatric illness, use of emergency mental health services and psychiatric hospitalization increases during heat waves; suicide rates are associated with higher temperatures and summer season (Bouchama et al., 2007; Trombley, Chalupka, & Anderko, 2017). A Finnish study found that 10% of variance in violent crime rate was related to ambient temperature, and that a 2°C increase in average temperature would increase violent crime by 3% (Tiihonen et al., 2017).

Heat-related inequalities exist and are related to socioeconomic status, ethnicity, and occupational status. People living in neighborhoods with more intense UHI effects due to high density, sparse vegetation, and limited open space tend to be ethnic minority groups and have lower socioeconomic status (Harlan, Brazel, Prashad, Stefanov, & Larsen, 2006). Low education levels have been associated with increased mortality during heat waves (Borrell et al., 2006). Individuals and groups with fewer material and social resources needed to cope with extreme heat, particularly those in poverty, are most vulnerable to the health effects of heat stress (Harlan et al., 2006; Heaviside et al., 2017). Decreased ozone associated with climate change and subsequently increased UV radiation, as well as heat, places outdoor workers—who are already vulnerable due to their socioeconomic status—at risk of eye damage, skin cancer, and heat stress (Gubernot, Anderson, & Hunting, 2014). Land use decisions, particularly the strategic use of green infrastructure, can protect against these effects.

FLOODING

Flooding resulting from extremely high tides or from poor stormwater management may result in negative health effects, including direct injuries. Land use and development decisions can mitigate exposure to flooding-related health impacts, or it can place humans in proximity to standing water or within vulnerable structures and therefore at risk. Flooding may result in increased rates of vector borne diseases due to standing water (Sanford, Cleetus, & Perera, 2001). Overwhelmed water infrastructure and sewage backup may result in exposure to bacterial and other contaminants (Sanford et al., 2001). Finally, water intrusion in buildings may cause dangerous mold growth (Sanford et al., 2001).

GREEN CANOPY AND GREENSPACE

Green spaces and tree canopy cover are associated with myriad health benefits and human flourishing.

Green spaces and tree canopy cover are associated with myriad health benefits and human flourishing.

Tree canopy cover, as well as other types of urban green infrastructure, are important tools for mitigating the effects of climate change (see Figure 1) (Norton et al., 2015). Tree canopy provides shading as well as evapotranspirative cooling; it lowers ambient outdoor temperatures and reduces energy use to cool buildings (Norton et al., 2015). Broadleaf trees and dense canopies provide the most shade but they can trap heat at night; therefore, there is benefit to using a mixture of broadleaf and needleleaf trees (Norton et al., 2015). Daytime air temperature decreases nonlinearly with increasing canopy cover, with the greatest cooling occurring at canopy cover over 40% (Ziter et al., 2019). Open green spaces, like the golf course north of the Interbay site, can provide cooling in urban environments, particularly downwind of such spaces. Green façades (climbing plants grown on trellises which can be planted in the ground or in planter boxes at any height on building walls) have beneficial cooling effects; they can be especially useful where ground level space is limited and on walls with high solar exposure (Norton et al., 2015). Greening roofs can also mitigate urban heat effects and are most effective when covered in taller vegetation, when irrigated, and when placed on large, low roofs (Norton et al., 2015). Increased vegetation and accompanying decreased impervious surface cover can reduce water runoff (Livesley et al., 2016).

Neighborhood greenness and tree cover are associated with decreased morbidity and mortality throughout the lifespan. Children in neighborhoods with more street trees have significantly lower rates of asthma (Lovasi, 2008). Among children living in neighborhoods with high population density, those who live in greener neighborhoods experience less excess weight gain than those with less greenspace (Bell, 2008). Greenspace exposure, neighborhood greenness and neighborhood tree cover are related to better overall health, including better social cohesion, and increased incidence of good self-reported health, decreased stress hormone levels, heart rate, blood pressure, and cholesterol, lower prevalence of joint pain, depression, anxiety, and headaches, decreased incidence of stroke, hypertension, asthma, and cardiovascular disease, as well as lower risk of preterm birth, type II diabetes, cardiovascular mortality, and all cause mortality, controlling for socioeconomic status (Maas et al., 2009; Omid et al., 2015; Twohig-Bennett & Jones, 2018; Ulmer et al., 2016). Among Medicare beneficiaries, higher neighborhood greenness was associated with reduced heart disease risk: the highest tertile of greenness was associated with a 25% reduction in odds of myocardial infarction compared to the lowest tertile (Wang et al., 2019). Proximity of parks and the presence of tree-lined stress are associated with longer survival among elderly residents in urban environments (Takano, 2002).

Exposure to green spaces is associated with improved mental health and human effectiveness. Exposure to 20 minutes of walking through a park improves concentration in children with ADHD (Faber Taylor & Kuo, 2009). Girls with a view of nature from their home perform better on tests of concentration, impulse inhibition, and delay of gratification (Taylor, Kuo, & Sullivan, 2002). Local area greenspace is related to life satisfaction in adults (Houlden, 2018). Evidence indicates that land use decisions made my local governments play a role in determining who is exposed to greenspace: urban public housing residents assigned to buildings without nearby nature reported more procrastination, and assessed their life issues as more severe, less soluble, and more long standing compared to those assigned to buildings with nearby nature (Kuo, 2001). Levels of mental fatigue and aggression were lower in those in more barren buildings (Kuo & Sullivan, 2001). Higher levels of surrounding vegetation are connected to lower rates of reported violent and property crimes (Sullivan & Kuo, 2001).

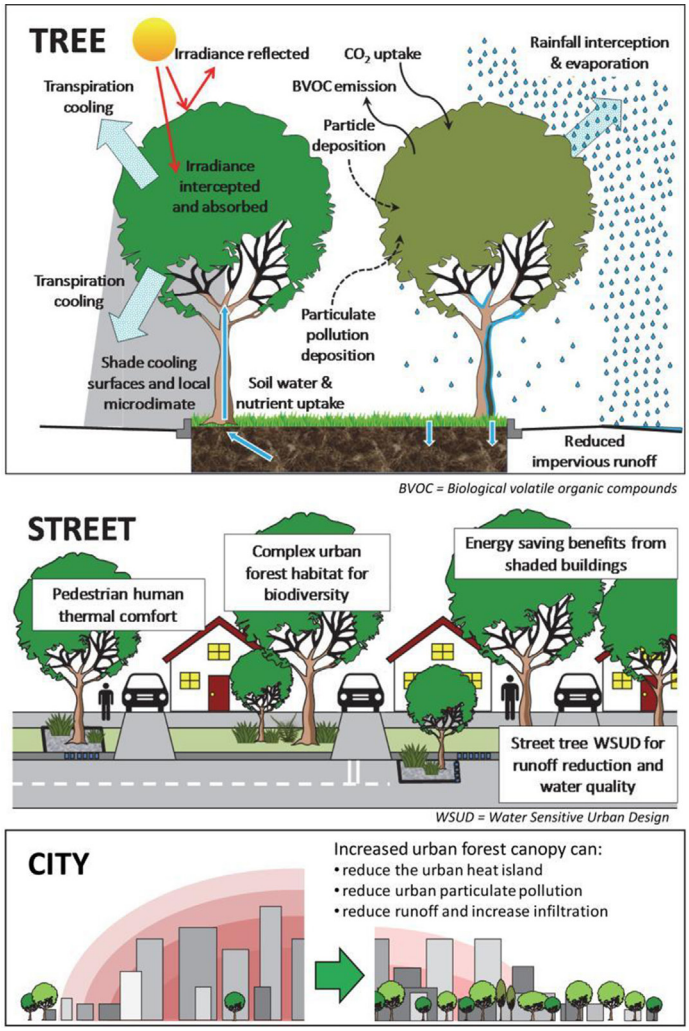


Figure 5.1 *Tree, Street City Image (Livesley et al., 2016)*

Across the globe, climate change is likely to increase the disease burden of cardiovascular disease, respiratory disease, mental illness, and vector borne diseases. The heat effects of climate change may lead to increased energy use to cool buildings, further worsening emissions and climate change.

OPEN SPACE AND PARKS

Public open spaces and parks are important in improving physical and mental health and social capital by providing a variety of open spaces close to work and home to facilitate social networking, civic engagement, physical activity, and time spent outdoors.

Both open and public spaces foster the public's exposure with nature. Studies described that there are various benefits tied to them. Contact with nature improves cognitive abilities and task performance (Berman, Jonides, & Kaplan, 2008). It is also capable of improving health through stress reduction (Wells & Evans, 2003). Studies also found that nature plays an important role in a child's psychological development (Louv, 2005).

A study conducted in 2012 indicated that lower income families utilize open spaces less than higher income residents. This case is not limited to Seattle, other studies also found that low-income residents are less likely to participate in recreational activities. One study connected this phenomenon to safety issues in low-income neighborhoods and the lack of programs and facilities to encourage physical activities (Park, Han, Cohen, & Derose, 2018).

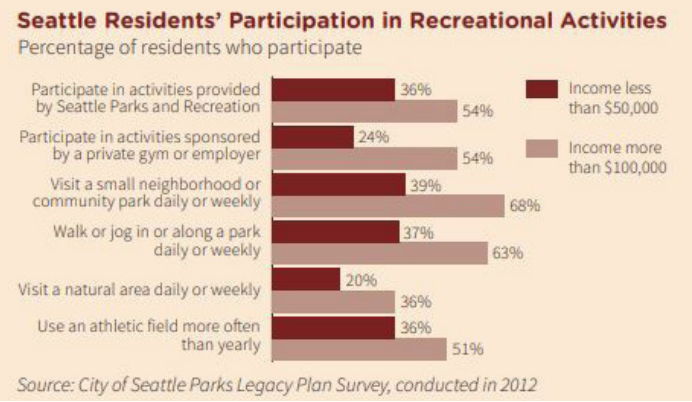


Figure 5.2 *Seattle Residents' Participation in Recreational Activities*

ACCESS TO PARKS AND RECREATION FACILITIES

Urban green spaces, such as parks, sporting fields, streams and river banks, and community gardens promote physical activity, psychological well-being, and overall public health of urban residents (Roy, Byrne, & Pickering, 2012). Many studies have confirmed that the distribution of green spaces often disproportionately benefits White and more affluent communities. Therefore, access to green spaces is usually considered an environmental and racial justice issue (Wolch et al, 2014).

Access to green spaces can be very important in protecting public health, because they may filter air, remove pollution, hinder noise disturbances, cool temperatures, replenish groundwater, and even provide opportunities for fresh, local food access (Escobedo, Kroeger, & Wagner, 2011; Groenewegen, van den Berg, de Vries, & Verheij, 2006). However, as mentioned, green spaces are usually not equitably distributed. Creating green spaces in "park-poverty" communities of color and low income neighborhoods may result in contradictory outcomes, however, because "it can improve the attractiveness and public health, making neighborhoods more desirable. In turn, housing costs can rise" (Wolch et al, 2014). Therefore, land use planning plays a major role in bridging gaps that exist between access to green space and environmental justice concerns.

An analysis of access to green spaces, particularly parks and recreation facilities, in and around the Interbay property will be conducted to address any potential environmental justice issues that may arise as a result of each of the three proposed zoning changes for the Interbay site.

LIQUEFACTION

In earthquake-prone areas, liquefaction is a common problem where the soil loses its strength due to earthquake-induced ground motion resulting in a viscous consistency. The site performance after a liquefaction event can vary significantly. In a worst-case scenario, lateral spreading may seriously compromise buildings on the surface (Bertero et al., 1994). Areas close to the proximity of a body of water such as piers are extremely prone to this risk.

Liquefaction can have devastating effects to buildings and cause injuries and fatalities. The aftermath of liquefaction may also detrimentally affect health. The liquefaction sediments and silts have the potential to spread contaminants and pathogens. Thus, it is important to assess the site for potential contaminants that could be harmful to health (Williamson, 2011).

EXISTING CONDITIONS

ANCESTRAL LANDS AND CULTURE

Prior to the U.S. Government colonizing the site we call the Interbay Armory, the peoples that used this land were primarily the Duwamish (Dkhw Duw Absh) Tribe (Ruby et al., 2010; Suttles & Lane, 1990; Waterman, 2001). The Duwamish are a southern South Coast Salish people, not

yet officially recognized by the U.S. government (Duwamish Tribal Services, 2018). The Duwamish have an organization with headquarters at the Duwamish Longhouse and Cultural Center in West Seattle (Culture Today — Duwamish Tribe, n.d.).

In their language, Southern Lushootseed, Duwamish means "People of the Inside" or "Inside [the bay] People". Members of the Suquamish and Muckleshoot Tribes also used the site. The inlet in southern Interbay is called "tselágotsid" in Lushootseed, according to Harrington (John P. Harrington Papers, 1909). Other names include "mouth of creek draining into Smith Cove," called "Silaqwotsid", translated as "talking," and "T3E'kEp," translated as "aerial net for snaring ducks," was the name for a creek that used to enter the water south of Smith Cove (Waterman, 2001).

Originally, the Interbay site consisted of tidal flats, marsh land, and the shoreline of Smith Cove. Therefore, the area was used by the Duwamish people for fishing, plant gathering, and hunting waterfowl (Washington State Department of Commerce, 2019). The main source of food for the Duwamish peoples was from the water. This included salmon, fish, shellfish, ducks and other saltwater animals. Canoeing was also an essential mode of travel, but also had a deeper meaning and represented "home on the water" (Culture Today — Duwamish Tribe, n.d.).

Between 1911 and 1916, the Navy infilled the marsh and tidal flats to build single-floor storage facilities which were completed in the 1940s (Ross and Williams, 2019). By 1950, there were 29 buildings in total that were part of the US Naval Supply Depot (Kroll, 1950). By 1980, all but three of these properties were removed and the present day Armory buildings were constructed, The final three buildings were removed in 2011 (NETR, 2019).

In the surrounding neighborhoods around the site there is a history of racial residential segregation. Banks denied mortgage loans to people of color in these neighborhoods, even though their credit was worthy of receiving the loan (redlining) and racist covenants were written into the deeds of houses and other properties that banned people of color from living on the property (Frantilla, n.d.). The effects of residential racial discrimintation are still felt today: 3.7% of the population residing in the Interbay area are Black, <1% are Hispanic/Latino. 6% of the population are Asian is 6%, 5% are mixed race, and 5% other race) (Yoon et al., 2017). This context is imperative to speak to, if this land becomes housing, and the City of Seattle must take steps to avoid perpetuating discriminatory and inequitable outcomes.

CLIMATE CHANGE

HEAT

With climate change, increased temperatures will occur, including more frequent and more extreme heat waves. By the end of the 21st century, Seattle is likely to experience more than two weeks of 90 °F weather each year (City of Seattle, Projected Climate Changes). This warm weather is likely to be exacerbated by the Urban Heat Island (UHI) effect. UHI is a phenomenon where the urban areas are warmer than surrounding rural or natural areas, due to the presence of impervious and reflective surfaces (Heaviside, 2017). Substantial local air temperature variation (approximately 3.5 °C) occurs in urban environments, depending on impervious surface cover and tree canopy (Ziter et al., 2019). The magnitude of warming associated with increased impervious cover is less than the cooling associated with increased canopy cover (Ziter et al., 2019). Another study of land cover composition found that percent building area is the most important factor in increasing local air temperature, while the percent tree cover is the most important factor in decreasing local air temperature (Yan, 2014).

TREE COVER

The City of Seattle has 28% tree canopy cover as of 2016, and aims to increase to 30% by 2037 (City of Seattle, Seattle's Canopy Cover). The majority of trees in the city are in residential areas and in right-of-way areas. Canopy cover tends to exceed targets in those areas and in developed parks and natural areas, but is below target in industrial areas. This is reflected at the Interbay site and its surroundings (see Figure 5.3). The Interbay site currently has less than 3% tree cover. Likewise, the surrounding industrial areas including the Port contain minimal tree cover. The neighboring golf course, while contributing green space, also has minimal tree cover. The SW Queen Anne Greenbelt to the southeast of the site contains a high density of canopy cover.

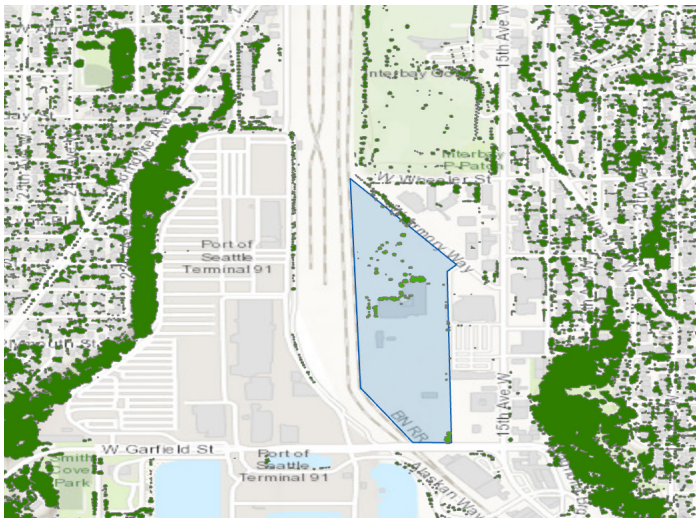
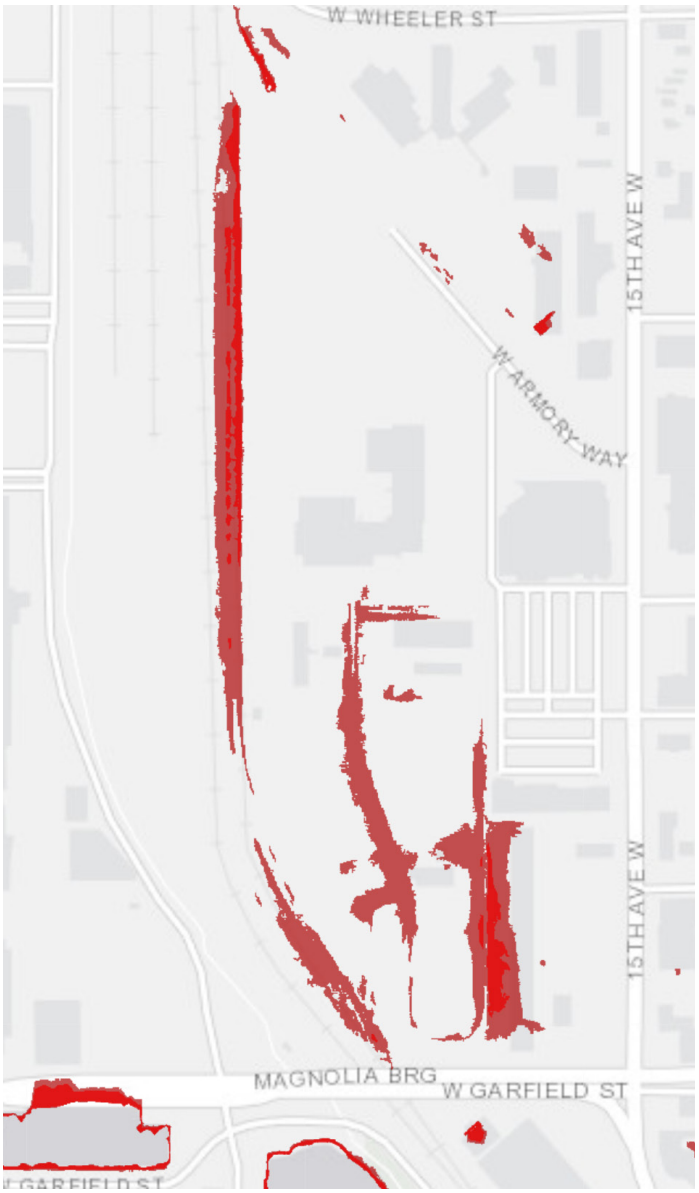


Figure 5.3 *Canopy cover surrounding Interbay*

SEA LEVEL RISE

Central projections indicate 10 inches of sea-level rise by 2050, and 28 inches by 2100, and 47 inches by 2150 (Washington Coastal Resilience Project). The Interbay Property is 14+ feet above sea level, and is not at risk of inundation from sea level rise, per the Interbay Report (Washington State Department of Commerce, 2019). However, tidal flooding events from storm surges and king tides may impact the site eventually. Where projections indicate an increase of 4 feet in Mean High High Water (MHHW, the average highest daily tide), seawater will enter the site at MHHW in the 2150s, monthly high tide and annual extreme tide in the 2090s. Later projections of 5 feet above current MHHW indicate additional water on the site, particularly along the western border of the site as well as in the southeast corner (see Figure 5.4) (City of Seattle, Sea-Level Rise Map).



Bright red is 4 feet above MHHW, dark red is 5 feet above MHHW

Figure 5.4 *Sea level rise map*

WATER

In this region, we receive approximately three feet of rainfall per year, most falling from November through March (City of Seattle, Rain Water Harvesting). Climate change is expected to cause more extreme rainfall throughout much of the world, including the Pacific Northwest (City of Seattle, Projected Climate Changes). Increased impervious surface cover increases urban stormwater runoff and the risk of flash flooding in the context of climate change (Livesley,, 2016). The soil on the Interbay property is not suitable for stormwater infiltration (Washington State Department of Commerce, 2019). Therefore, developers will have to create a stormwater management system for this site. As the climate in this area warms, our traditional water sources from snow runoff may become less reliable (City of Seattle, Projected Climate Changes). As such, land use choices which increase resilience in water supply are encouraged.

OPEN SPACE AND PARKS

The City of Seattle owns and operates park spaces which consist of roughly 11 percent of the city's total land area. A gap analysis found that open spaces at the edges of water bodies tend to be larger, while the smaller ones tend to dot residential neighborhoods of the city (Fesler, 2016). In the Interbay area, there are at least 7 public open spaces, including sports facilities, gardens and parks within one mile of the interbay's boundary (see Figure 5.5).

NAME	TYPE	APPROX. ACREAGE
Ella Bailey Park	Park	0.12
Bayview Playground	Park	4.62
Open Water Park and Smith Cove Park	Park	7.3
Soundview Terrace	Park	0.3
Queen Anne Greenbelt	Park	70
Interbay Athletic Complex and Golf Center	Athletic Facility	7.4
Interbay P-Patch	Garden	1.91

Figure 5.5 *Public spaces and parks within 1 mile of the Interbay site*

In a 2013 public engagement report, the Department of Planning and Development gathered several recommendations from community representatives regarding open space development. The suggestion calls for more open space, recreation and green space such as P-Patch gardens, sportsfields, swim centers, indoor courts, a swimming pool, small parks, tennis courts, off-leash dog areas, and street tree planting on 15th Avenue West. However, the community meeting also urges the

Magnolia Bridge to be replaced before any rezoning occurs (Early & Learning, 2011).

ACCESS TO PARKS AND RECREATION FACILITIES

One of the City of Seattle's Comprehensive Plan Citywide Planning Goals is to "guide the physical development of the city. However, in shaping how we create new spaces for people to live, work, and play, this plan also aims to give all Seattle residents better access to jobs, education, affordable housing, parks, community centers, and healthy food." Approximately 11 percent of the total city land area is the city-owned park and recreation system. These areas include gardens, community centers, pocket parks, and environmental education centers. They serve as opportunities for residents and visitors to relax, exercise, and meet with friends and other members of their community.

Parks and recreation facilities that are located within a quarter to a mile walking distance from the Interbay property include: Interbay Athletic Complex/Golf Center (3027 17th Ave W), SW Queen Anne Green Belt (12th Ave. W. Howe St.), Magnolia Green Belt, Elliott Bay Park and Bike Trail, and Smith Cove Park (23rd Ave. W.).

Using the Seattle 2017 Parks and Open Space Plan accompanying gap analysis we can address the following issues related to park and open space access in and around the Interbay property: access to the site via different transit systems (i.e. bike or car), walkability, equity and health, income and poverty, and density.

The city's walkability analysis uses the street grid system (aka walking network) to measure the distance that a person would need to walk, or bike, from home to a park or facility entrance. The national park walkability standards are a 10-minute, ½ mile walk. When analyzing these walkability standards within the Interbay site, it appears that the Interbay property is within a 10-minute walkability range of parks and recreation facilities (Figure 5.6). However, the quality of these parks should be analyzed in more detail to determine the range of passive and active recreation opportunities they offer, as well the park's LOS standards to gauge how many visitors they can maintain at a time.

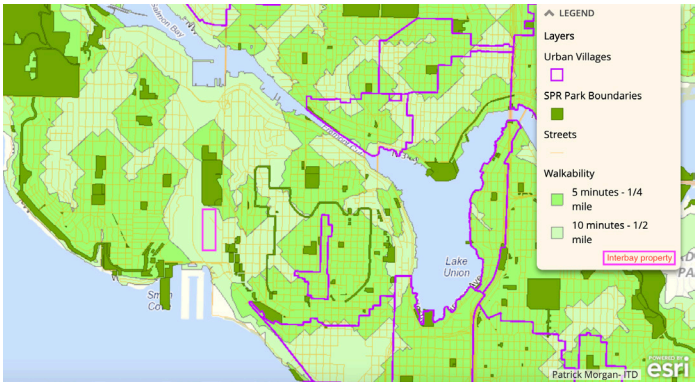


Figure 5.6 *Gap analysis report image showing walkability*

The health and equity analysis combines socioeconomic data (proportions of the population that are persons of color, english language learners, foreign born, and have less than a bachelor's degree with health-level comparisons, such as population prevalence of diagnosed diabetes, obesity, asthma, poor mental health, disability, and life expectancy (in years)). The gap analysis map in Figure 5.7 shows that the Interbay project site falls within a census tract that is identified as having the Second Lowest Disadvantage regarding the racial and social equity indices described; the surrounding tracts are at a lower disadvantage than Interbay.

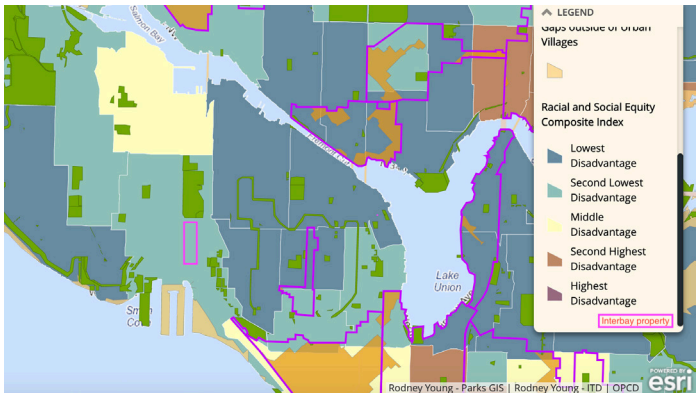


Figure 5.7 *2017 Gap Analysis Report of Racial and Social Equity*

The income and poverty analysis looks at the proportion of the population below the poverty level, which is 14% in Seattle. Using the City's income and poverty data, they were able to take into consideration priority areas for future parkland acquisition and/or facility development. Using the data, it was determined that the census tract that includes the Interbay property has approximately 7% of their population below the poverty level (see Figure 5.8). The unemployment rate for this tract is 6.6%, which is compared to a 7% unemployment rate for the city. In contrast, the census tract northeast of the Interbay census tract has 17.1% of their population below the poverty line, and a 6.8% unemployment rate. It can be concluded that the Interbay census tract is not at a high poverty level compared to neighboring tracts.

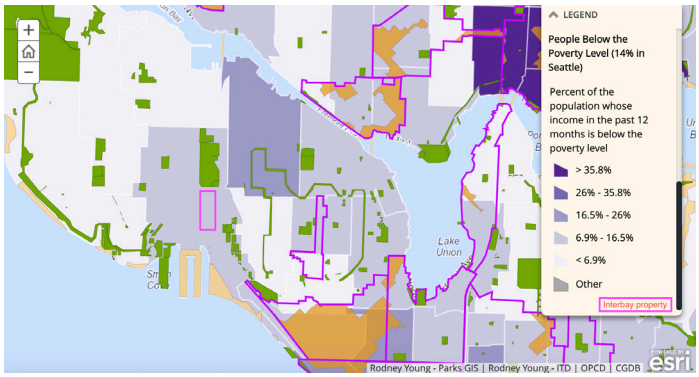


Figure 5.8 *Gap Analysis Report showing the poverty level of the Interbay site and surrounding neighborhoods.*

Finally, Figure 5.9 shows that the 2017 population density for the area is low compared to other census block groups in the area: an estimated 2,245 people on 278 acres of land. In surrounding census blocks, these densities are higher. However, it should be taken into consideration that a portion of this block, including the 23 acres ofthe Interbay site, are industrial.

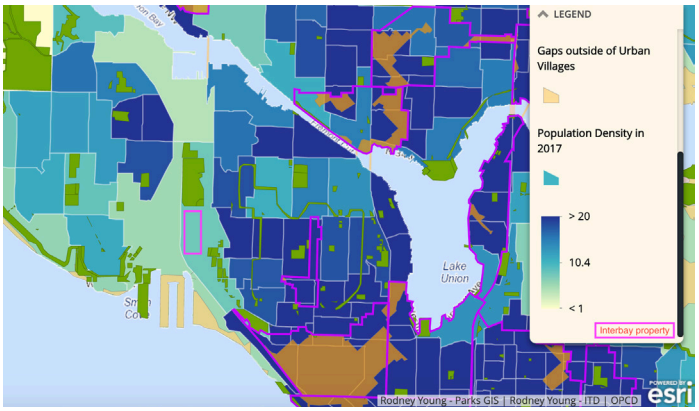


Figure 5.9 *2017 Gap Analysis Report showing the population density for the Interbay site and surrounding neighborhoods.*

Based on the information provided by the Seattle Parks and Open Space Plan gap analysis, the Interbay property does not appear to be lacking in available green spaces in or around the site. Likewise, population data indicate that the health metrics for this census tract are better than for those in the surrounding neighborhoods, particularly the Queen Anne neighborhood to the northeast and the South Lake Union and Belltown neighborhoods to the southeast.

LIQUEFACTION

The Interbay neighborhood consists of weak glacial recessional, beach, and estuary deposits underlaid by denser glacial soils at depth. It also has been infilled with various materials since the nineteenth century (Chesworth, 2008).

Even though there is no historical record of liquefaction in Interbay, a USGS report indicates that it has a high liquefaction potential. Interbay contains a substantial amount of uncontrolled fill during the 1900s. The report discovered that the area, with a typical ground surface of 3 to 6 meters from City of Seattle datum, can contain as much as 6-9 of fill soils with a variable composition. Meanwhile, the groundwater levels are typically 3 m below the ground surface. The soil tests performed by USGS showed that Interbay soils fall below the threshold criterion for liquefaction, which makes the area has a high liquefaction hazard-rating (Rogers, Walsh, Kockelman, & Priest, 1998)

This area has been subjected to several earthquakes in the past 170 years and it is prone to liquefaction due to the soil condition. A report by Seattle Department of Transportation indicated that Interbay is prone to liquefaction and lateral spreading. This would require non-standard construction procedures capable of addressing the effects of liquefaction and its subsequent surface level reaction.

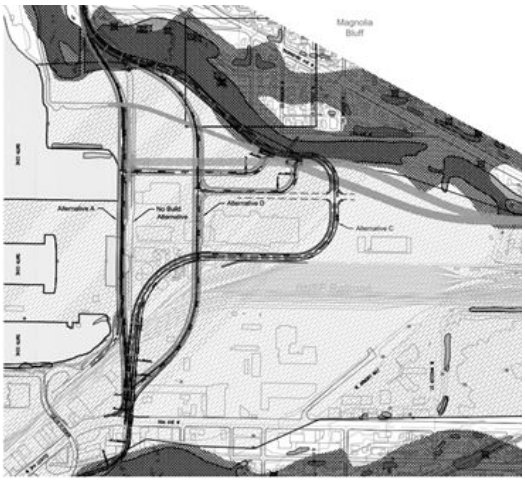


Figure 5.10 *Liquefaction in the Interbay*

According to the State of Washington Department of Ecology, the site, as a part of terminal 91, was used by several oil companies from 1926 until 1941. It was then taken into possession by the U.S. Navy. The land, combined both by the industrial practices and the U.S. Navy uses, contains the following contaminants:

- Metals: arsenic, cadmium, chromium, copper, lead, mercury, silver, and zinc
- Tributyltin
- Polycyclic aromatic hydrocarbons (PAHs)
- Phthalates
- Semi volatile organic compounds (SVOCs)
- Polychlorinated biphenyls (PCBs)

The area had been cleaned by the Army Corps of Engineers, however there are still some contaminants originating from landfills, and the neighboring railyard. There are still three areas waiting for cleanup and five currently undergoing cleanup (Figure 5.11) (Department of Ecology).

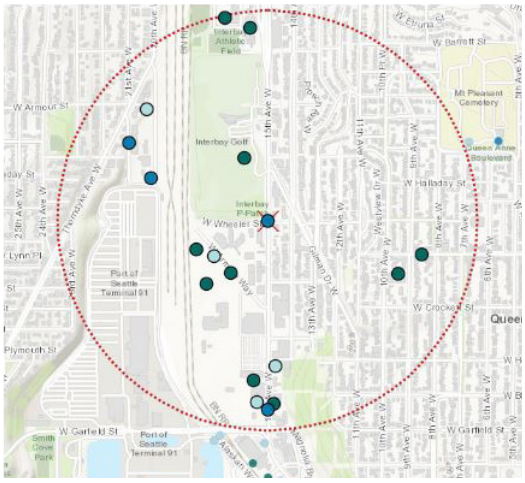


Figure 5.11 *Contamination surrounding Interbay site (Department of Ecology State of Washington, 2020)*

ANALYSIS AND HEALTH IMPACT ASSESSMENT

ANCESTRAL LANDS AND CULTURE

Potential injury and death could occur if the city builds housing or other industrial development on the coast of this land, while reinstating this to tidal flats and marsh could prevent harm. Restoring the space to its original land would greatly benefit the Duwamish, Suquamish and Muckleshoot Tribes. Emotional, psychological, social and physical well-being increases among indigenous communities when they have the ability to maintain their cultural and spiritual connection to the land. (Poon, 2019)

CLIMATE CHANGE

Planting and tending larger amounts of greenspace will positively impact the health of residents and workers at the Interbay site. Increased greenspace will reduce the burden of many diseases, including acute heat-related illness, type II diabetes, cardiovascular disease, and mental illness. The more tree canopy cover and greenspace, and the more likely exposure to this greenspace, the greater the magnitude of this positive impact will be. As non-workers (children, seniors, and chronically ill persons) are particularly sensitive to heat effects and to the benefits of greenspace, the health impact of greenspace will be greatest should residential development occur. Sensible water management will also positively impact the health of all workers and residents, through decreased exposure to pathogens, disease vectors and risk of injury. While the Interbay site is a small project in a global context, it is nevertheless important to leverage the land use decisions to minimize any contributions to climate change.

ACCESS TO PARKS, RECREATION FACILITIES, AND OPEN SPACES

Although the Interbay property is located within a quarter to one mile walking distance from five parks and trails that offer active and passive activities, it is recommended that the quality of these parks be considered. If zoning changes provide additional housing in the area, or provide more opportunities for visitors and foot traffic, the surrounding parks and recreation spaces may not be able to satisfy the growing needs of the community. If this is the case, a park or open space should be considered for the area. To monitor this need it is recommended that further attention be placed on looking at Seattle parks and open space level of service (LOS) standards, particularly for the parks and recreation facilities listed as being in close proximity to the Interbay property. Facility inventories should also be consulted for each of the surrounding green spaces to determine who can utilize these parks - are they suitable for families, for example, or are they accessible to persons with physical disabilities? In addition to these concerns, further analysis should be conducted on equity issues regarding access to green spaces. For example, the Athletic Complex/Golf Center north of the Interbay property, though within a short walking distance, may not be financially accessible to all members of the community. If the analysis shows gaps in park quality and LOS standards, it is recommended that a portion of the Interbay property be utilized as green space. The City of Seattle's Parks and Open Space Plan is helpful in supporting the development of city park land.

LIQUEFACTION

Aside from causing major injuries or even death, the aftermath of liquefaction can also be dangerous for health. The particulate matter generated from the sedimentation of silt might cause several health concerns. Certain fine silts could cause respiratory issues for both healthy people and those with existing respiratory disorders. Silt also brings pathogens which can be harmful for children and adults. Since the site was formerly an industrial area, there could be some contaminants left even after remediation by the city. The exposure to pathogens could happen when handling the soil, which children are more likely to do (Williamson, 2011).

To mitigate these hazards, it is important to develop a cleanup plan that incorporates the complete removal of any liquefaction sedimentations. An outreach from the city is also important to highlight the danger of liquefaction sedimentation on health.

RECOMMENDATIONS

PRIORITY RECOMMENDATIONS

RECOMMENDATION 1:
RETURN THE LAND, RESTORE THE SHORELINE

Our recommendation is to Washington State National Guard and the City of Seattle arrange an exchange of Interbay site land and the Interbay Golf Course land, and restore portions of the land into tidal flats and marshland, as it existed before the Interbay Armory, and return the current site to the Duwamish Tribe. This is outlined in the Interbay Project Built Environment Studio Report created by University of Washington students in 2019. This would be beneficial, as the land in this area may be difficult to build on, thus preventing potential injury if unsafe or unstable structures were built in this area. Additionally, this land could provide space for Duwamish peoples to practice traditions such as hunting, fishing, plant gathering and other activities. Access to and use of land

and traditional practices is essential to their culture, spiritual beliefs and core values including autonomy and self-determination. These are fundamental aspects to Tribal health and well-being (Daniell et al., 2013). The EcoBay design provides useful direction for developing the site with regards to sea level rise and flooding: deliberately designating low-lying, flood-prone areas (see Figure 9) as marshy wetlands will help to manage the destructive impact of water. In areas projected to eventually experience tidal flooding, native species tolerant of salt water and wetland/estuary-like conditions should be used; these areas should be prioritized for greenspace and not for building. Finally by returning the land to the Duwamish Tribal Council, the City of Seattle would be recognizing their land rights and sovereignty. Extent of the planned restoration should be monitored and communicated publicly during planning and implementation phases. Conservation and ecology experts should be involved in planning, implementation and maintenance, to monitor the status of the natural shoreline and need for conservation activities.

RECOMMENDATION 2:
PRIORITIZE GREEN SPACE & EQUITABLE ACCESS

We recommend that the Interbay site include a minimum or 30% tree canopy coverage to align with City of Seattle goals, preferably 40% to maximize cooling effects. The tree canopy extent will grow as the trees planted on this site mature, therefore these recommendations refer to canopy extent of mature growth. Older/more mature trees are preferable to younger, smaller trees at time of planting. Furthermore, a mixture of broadleaf, deciduous trees and needleleaf, coniferous trees should be used to maximize shading while preventing nighttime heat trapping, to provide green views during winter, and to encourage biodiversity. Native species should be used. To further maximize cooling and the health benefits of greenspaces, the use of green façades and green roofs should be considered. These may be especially useful on industrial buildings with large, unbroken façades and broad, low roofs. South- and west-facing walls are good candidates for green façades.The City of Seattle periodically conducts LiDaR tree canopy assessments; these should be used to track the growth of planted trees and ensure they are sufficient. Local area temperatures should be measured during heat waves to ensure that temperatures are sufficiently moderated; additional green infrastructure should be added as needed.

The need for a climate change-resilient, cool, liveable neighborhood will likely be weighed against the need to finance the National Guard's move. Dense development and green spaces are not in opposition, however; they are both important for creating an environmentally responsible neighborhood. Strategic placement of greenspaces is key. Pathways and sidewalks should be priority areas for tree canopy coverage, to facilitate safe, healthy pedestrian activity. Use of green façades and green roofs can provide greenspace exposure in spaces such as higher floors of buildings that exceed the height of trees. Likewise, the area currently dedicated to the golf course is not meeting its full potential for area cooling and equitable use; this area could be repurposed as a woodland park available for walking and other recreational activities. As noted above, shoreline areas which are ill-suited for development are ripe for rehabilitation--they could become wetlands with elevated walkways for all to enjoy. There is community support for retention and expansion of publicly accessible greenspaces, including tree-lined bike paths, green roofs, and park areas suitable for walking dogs, expressed at various community meetings and public comment periods held by the Interbay Public Development Advisory Committee (Washington State Department of Commerce, 2019).

It is recommended that an analysis of the city's park level of service (LOS) standards be considered to determine the impact of increasing housing density or pedestrian traffic flow on the city's existing park infrastructure due to the proposed zoning changes on the Interbay site. Currently, The City of Seattle's Parks and Open Space Plan citywide level of service (LOS) standards for parkland is 9.34 acres of parks per 1,000 residents. However, with a projected population increase of nearly 280,000 people by 2035, this number is expected to decrease to 8.00 acres per 1,000 residents (Seattle Parks and Open Space Plan). In order to meet this proposed standard, however, the city will need to acquire at least 40 acres of parkland, which Seattle Parks and Recreation expects to be in the form of green belts and natural areas that provide a mix of recreational opportunities and wildlife habitat. Additionally, Seattle's Parks plan states that there is no penalty for acquiring more than 40 acres of suggested parkland to fulfill future LOS standards (Seattle Parks and Open Space Plan). Although, based on the gap analysis report submitted to support the city Parks and Open Space Plan, it doesn't appear that the Interbay property area is a priority zone for acquiring land based on socioeconomic and other factors, the Interbay area would still serve as a good opportunity for future parkland. Expanding parkland through well thought-out land-use planning supports the Seattle Comprehensive Plan's environmental justice goal 5, which "seek[s] to ensure that environmental benefits are equitably distributed and environmental burdens are minimized and equitably shared by all Seattleites." And, given many of the other factors discussed in this chapter, such as the hazards of climate change and liquefaction, as well as the potential for quality of current parks to not meet the future needs of the community, an argument could be made to push for parkland to be prioritized on the Interbay property. Monitoring should address whether the acreage and park uses continue to meet the needs of a growing population.

INDUSTRIAL - RESIDENTIAL/COMMERCIAL MIXED-USE:

Ensure that the residential area is not located directly near the industrial complex as this could potentially harm the health and well-being. This design could also minimize the access to open space since only people in either the residential or industrial have direct access to open space. Thus, it is recommended to have a park as the main public space in between the two areas. By adopting this design, the industrial worker can still have unobstructed views to the park while people in the residential area are minimally impacted by the industrial activity.

RESIDENTIAL USE:

Should residential development occur, residences should be oriented in such a way that all residents have green views of some kind. Affordable units should have views that are at least as green as market rate units.

INDUSTRIAL ONLY USE:

Make sure that views towards open spaces are minimally obstructed. Employees can still be benefited from the views that could increase their resiliency against stressor elements.

OTHER RECOMMENDATIONS FOR CONSIDERATION

COLLABORATE WITH LOCAL TRIBES & INDEGNOUS ARTISTS TO HIGHLIGHT INDIGENOUS LANGUAGE AND CULTURE

A recommendation is to use the Lushootseed language to name streets and buildings that are going to be developed on this land. This could include the names for the locations listed above like "tselágotsid", "T3E'kEp", or others that hold meaning to the indigenous peoples. This would provide language revitalization which leads to a more integrated connection between land, language and identity which are essential aspects to promoting and improving health outcomes (Baloy, 2011). The selection of names should be done with approval and collaboration of Lushootseed speakers and local Tribe leadership.

An additional recommendation is to use indigenous (preferably Duwamish, Suquamish and Muckleshoot) artists to create murals or images of the activities that were done in the area such as hunting, fishing, and collecting plants on buildings and other relevant areas. This employs the peoples whose land was taken from them, thus giving a financial benefit to the Tribe. As many Native Americans experience job discrimination, employers should be cognizant of this, be aware of their own biases, and not further perpetuate discrimination, racism, and economic inequity (Brewer, 2017). The proportion of artists employed who are locally indigenous should be monitored.

The final recommendation is to continuously engage with and reach out to the local Tribes and hear what they want and need from the space. Authentic engagement is an iterative process that includes listening and learning, building trust, developing mutually beneficial outcomes or goals, and giving something to the Tribe that they value (Myers & Yeaton, 2017). This communication can and should be tracked and monitored for frequency, quality and depth.

PEDESTRIAN-ORIENTED DEVELOPMENT, RESOURCE USE AND ACCESS TO PARKS

The development of this site should contribute as little to climate change as possible, prioritizing low energy use and emissions in the construction and maintenance of these buildings. Buildings should aim for as much passive heating and cooling as possible, although air conditioning should be included, as it is an important protective factor for heat illness. We recommend that the development of the Interbay site exclusively pursue construction of green buildings, such as LEED certified buildings. There is a strong business and health case for green building. LEED buildings are associated with better respiratory health and overall health, lower air pollutant concentrations, and decreased pest allergens (Allen et al., 2015). Employees in green buildings have less absenteeism and therefore higher productivity, to the tune of 42 work hours per year (Allen et al., 2015). Operating costs of green buildings are 14% lower over five years compared with traditional buildings (Dodge Data & Analytics). Vacancy rates are lower, and rents higher ("The Business Case for Green Building," 2015). Existing LEED standards can easily be used to monitor whether these standards are met; energy use of these buildings should be monitored to identify maintenance issues that compromise energy efficiency.

Residents and workers should have access to safe, pleasant, greenery-lined pathways for non-motorized use, easy access to light rail and bus stops, as well as parking that is limited and/or expensive. Pedestrian-oriented development should encourage socializing, community building, and active transportation (pedestrian, cycling, and public transportation) and dissuade the use of personal vehicles. The residents should be able to easily access parks, gardens, or other recreational facilities. Such facilities should accommodate a range of ability, disability, and age. Community engagement and surveys may be used to track the level at which active transportation is used, and to understand and address barriers to active transportation.

LIQUEFACTION HAZARD MITIGATION STRATEGIES

As a natural hazard that could potentially occur in the future, it is important to approach this issue with hazard mitigation concepts: prevention and recovery plan.

PREVENTION

Preventing the extensive damage caused by liquefaction would minimize its aftermath and minimize harm to residents' health, as well as avoid injuries and death from such an event. Earthquake-resistant buildings are usually designed with deep foundations. This might not be much of an economical issue if Interbay is going to be developed as a commercial/industrial zone. However, the cost of earthquake-proofing will significantly make their area unaffordable for many if the area is rezoned into residential or mixed-use.

A well-engineered ground improvement may be the best solution to minimize the possibility of liquefaction; thus, lessening the impact of earthquakes. The improved soil would allow for shallow foundations to be built with minimum risk from liquefaction. It is also an economical solution if the site is found to be unfavorable for deep foundation (McManus, 2016). There have been a number of ground improvement methods developed over the years. Recent trends are geared towards more affordable sustainable solutions such as the use of biogas, low-risk agents, or tire chips. One ground improvement method involves the use of silica or bentonite. It allows for stabilization in an already developed land. Through this method, the silica grouting is injected and transported from site boundary to target area through augmented or natural groundwater flow. Silica grouting is believed to cause minimal disruption and can be applied to existing structures (Huang & Wen, 2015). Meanwhile, tire chips are generally mixed with natural soil to utilize the chips' low density and strong flexibility Tire chips improve the liquefaction resistance by rapidly dissipating the excess pore pressure (Yasuhara K, Komine H, Murakami S, Miyota S, & Hazarika H, 2010). It is known as an effective material in liquefaction mitigation. In addition to lessening the risk of liquefaction, using tire chips helps in solving the issue of recycling used tires.

RECOVERY PLAN

Liquefaction could potentially bring an increase to particulate matter and airborne pathogens. Thus, it is important to remove silt to minimize silt dust and provide adequate PPE for the industrial workers post-disaster. It is highly probable that liquefaction silts may remain undisturbed in certain areas, especially parks. It is important to remove it as soon as possible because the silt might bring disease for children who are attracted to it and adults who might use it as a garden fertilizer. Sampling should be performed to ensure dust has been adequately removed.

WATER MANAGEMENT STRATEGIES

Developers should plan for increasing stormwater runoff in future years. We recommend that water management plans include rainwater capture for irrigating green spaces and other suitable graywater uses, so as to decrease reliance on traditional snowmelt sources. We also support the EcoBay design idea to create shallow garages under buildings which would act as cisterns in the case of more extreme flooding (Built Environments Studio, 2019). Developers should work with the City of Seattle and Seattle Public Utilities to select stormwater management techniques and create a monitoring regimen under the assumption that stormwater volume will increase.

EQUITY EVALUATION

To promote health equity, it is imperative to incorporate the native Tribes who have been protecting and caring for this land long before it became the Interbay Armory into any changes that are made in the area. The City of Seattle can do this through maintaining a consistent, genuine, and meaningful line of communication with the Duwamish, Suquamish and Muckleshoot Tribes about the site, bringing their history, culture and language to the forefront of the space, and returning the land to what it was prior to colonization. Neighborhood safety and programs that encourage physical activities are important to improve access to open spaces for everyone. Studies found that areas with higher crime rates would discourage residents to utilize open spaces.

As liquefaction would result in silt deposits, these deposits would bring health concerns regarding the particulate matter that could potentially bring respiratory issues. In addition, it is possible that the silt contains harmful pathogens for children and adults. Therefore, strategies to protect these at-risk folks are imperative to implement in order to reduce harm. Climate change-related heat risks, including UHI, are especially high for outdoor workers, vulnerable older and/or disabled adults, chronically ill, which are far too often people who are also experiencing low socio-economic status. Racial minorities and low income groups also tend to have less greenspace in their neighborhoods, and therefore higher exposures to heat island effects--a result of residential segregation, racial discrimination, and nieghborhood disinvestment. Resources, including health insurance and access, to cope with heat stress are less available to low income communities. As such, it is essential to develop this area to be as resilient to the effects of climate change and heat as possible. Development of green space and tree canopy has the potential to improve health inequities and disparities (in addition to promoting health in general), including chronic disease burden, mental health and cognitive outcomes.

Climate change has effects that disproportionately affect vulnerable and poor populations across the globe (Mendelsohn, 2006; Rossati, 2017). It is important not to exacerbate this through this development.

The construction and maintenance of the site should be as minimally impactful in terms of emissions as possible. The development should minimize resource use, from heating and cooling buildings to encouraging active transport.
Greenspace is a social and health equity issue. Tree canopy is spatially correlated with household income (Greene, Robinson, & Millward, 2018). However, greening disadvantaged residential areas, including affordable housing developments, can potentially reduce inequities and disparities. In greener neighborhoods, the health disparity between wealthy and disadvantaged groups is lower (Mitchell & Popham, 2008). Another study found that having 10 more trees on a city block was associated with an increase in perceived health comparable to an increase in annual income of $10,000 and moving to a neighborhood with $10,000 higher median income or being 7 years younger (Omid et al., 2015). There are also environmental justice concerns associated with access to parks and recreation facilities. People of color and individuals from lower socioeconomic strata tend to live and work in areas that are more prone to environmental hazards and without easy or safe access to outdoor/green spaces (City of Seattle, Seattle's Tree Canopy Cover; Harlan, 2006; Mitchell, 2008; Wolch, 2014). To mitigate this, it is important that development places them on equal footing (i.e. that affordable units have equivalent or better access to escape routes, nature views.

Outdoor spaces may not be accessible to all ages and abilities. It is important that facility standards are taken into consideration when analyzing park access, because parks offer varying opportunities for active and passive activities, such as playgrounds, picnic tables, paved or unpaved running/hiking trails, etc. Cost of parks and recreation spaces can disproportionately affect lower income individuals. Therefore, park or recreation entrance fees or additional costs should be taken into consideration when looking at park access within the area. The Golf Center/Athletic Complex located north of the Interbay site, for example, may only be accessible to higher income individuals. This should be taken into consideration when gauging park access and location.

SUMMARY

LIMITATIONS AND ASSUMPTIONS

This evaluation has many limitations. Firstly, this evaluation is limited by a lack of community input from the surrounding neighborhoods and communities, indegenous people and Tribes, or other stakeholders. This is primarily due to the time constraints of this project.

Secondly, our analysis of the current conditions of this site is limited. The BINMIC is zoned industrial, therefore population data, including density and composition of this census tract at baseline, may not provide a true representation of the potential future population. Similarly, census data is from 2010, and the city of Seattle has changed substantially since then. Given the unique circumstances of the Interbay site, it is simply unknown who will move into this area, business or residential.

Thirdly, our recommendations regarding climate change are limited by the models they are based on. These are central models and a reasonable basis for recommendations, but inevitable reality will differ to some degree.

Fourthly, there is no historical data of prior liquefaction to the site. It is not possible to determine the exact severity of the liquefaction, which limits the specificity of our recommendations on this topic.

CONCLUDING REMARKS

The Interbay site, originally the hunting and fishing grounds of the Duwamish, Suquamish and Muckleshoot Tribes, has great potential to become a vibrant, health-promoting community. Many potential uses of this land are possible. To create such a community, the current and future conditions of the site--particularly its vulnerability to climate change and liquefaction--must be carefully considered and accommodated to best promote the health of those who will live and work there. The opportunities this site offers can be used for social and healthy equity--for justice.

Our foremost recommendations are as follows:

1. We recommend that the Washington State National Guard and the City of Seattle arrange an exchange of Interbay site land and the Interbay Golf Course land. Subsequently, the State may sell the current golf course land for development to finance the National Guard move. We recommend that the City return the Interbay site land to the Duwamish Tribe via the Duwamish Tribal Council. Prior to this land transfer, the City should collaborate with the Tribal Council and possibly conservation groups to develop a plan for this site and conduct any restoration of the Interbay site. We recommend restoring the site to tidal flats and marshland, as the shoreline and segments of the southern half of the site are vulnerable to future sea level rise, and are better suited to restoration than development; deliberately designating low-lying, flood-prone areas as marshy wetlands will help to manage the destructive impact of water.
2. We recommend the site strategically employ parklands, tree canopy, green façades and green roofs to enhance the health of its residents and workers and to improve resilience to climate change, especially heat and increased precipitation. Given

the threats of climate change and liquefaction, the health benefits of parks, as well as the city's need for 40 additional acres of parkland by 2035, we recommend a portion of the Interbay site should be reserved for public open space/parkland. There is community support for retention and expansion of publicly accessible greenspaces, including tree-lined bike paths, green roofs, and park areas suitable for walking dogs, expressed at community meetings and public comment periods (Washington State Department of Commerce, 2019). A mixture of native broadleaf and coniferous species should be used to develop a minimum of 30% tree canopy coverage on the site. Pedestrian walkways are priority areas for tree canopy coverage. Green façades and green roofs are recommended for buildings with large and south- or west-facing façades and broad, low roofs.

ENVIRONMENT

INTRODUCTION

Our environment plays a major role in how we, as humans, interact with our world. The environment can affect many different aspects of health, including social, physical and mental health. By improving the environmental health in the area, we would be able to lessen the poor health outcomes that might arise. The environment plays a major role in the development of the Interbay Armory site because of the current conditions of the site. Environmental issues that could arise include stormwater surge, contaminated soil, or poor air quality due to the proximity to the BNSF railway. With the potential for the site conditions to change in the future due to climate change, environmental concerns and adaptability should be a priority for future development.

In this chapter, we looked at four key environmental conditions that could have a great effect on the future development of the Interbay armory site. We considered all options of development including industrial, residential, and commercial uses that could potentially find a home on the site in the future. Each topic was analyzed through its impact on health, the existing conditions, impact on future projects, and the equity concerns that might exist. The topics are as follows:

- Water Quality and Access
- Airborne Noise, Ground-borne Vibration and Noise
- Soil Contaminants
- Impact on Surrounding Sites
- Air Pollution

CONNECTION TO HEALTH

WATER QUALITY AND ACCESS

Interbay, a unique geosocial condition surrounded on the west by Magnolia, the east by Queen Anne, and bounded by water on the north and south, is more of a passageway than a destination in its own right. These magnificent water areas create a peaceful space for individuals to enjoy and have a connection with their surrounding nature. Areas of the surrounding site create a distinct neighborhood with its own identity. Marking the convergence of Union Way, Innovation Green, and Bow-Tie Park, the Center draws community members and visitors on a local, regional and global scale to participate in physical and cultural activities, vocational education, and technological collaboration (Barber, 2019).

AIRBORNE NOISE, GROUND-BORNE VIBRATION AND NOISE

Noise not only causes hearing loss, but it also affects health in multiple ways. Studies have shown that nuisance noise is associated with high blood pressure and an increase in stress hormones. It can negatively affect sleep and cognitive performance in adults and children. (US EPA, 2015; Standfeld, 2003).

The burden of a disease is usually calculated in terms of disability adjusted life years (DALYs). In 2011 the World Health Organization reported that in the European Union, environmental noise caused a loss of 61,000 DALYs from ischemic heart disease, 45,000 DALYs from cognitive impairment in children and 903,000 DALYs from sleep disturbance (Theakston & Weltgesundheitsorganisation,

2011). To prevent hearing loss and adverse health effects in the general public, the EPA recommends an exposure limit of 70 dBA average over a 24 hour period (Understanding Noise Exposure Limits, n.d.).

For perspective, sound from normal conversation is measured at 60 dBA and sound from a freight train 100 ft away is measured at 80 dBA. Decibel unit is on a logarithmic scale and not a linear scale. For every 3dB increase, the sound intensity doubles (Understanding the 3dB Rule for Controlling Workplace Noise Levels, n.d.).

In addition to noise, vibration is also another health concern (Seidel et al., 1986). Whole body vibration has been associated with low back pain (Bovenzi et al., 1999), visual impairment (Ishitake et al., 1998), sleep disruption and heart rate acceleration (Smith et al., 2013 and 2016; Krajnak, 2018). Smith et al. found that the effects of sleep disruption and heart rate acceleration were proportionally related to the amplitude of the vibration. Loss of sleep has many implications for health. It increases risk of hypertension, dementia, obesity, and heart disease (Johns Hopkins Medicine, Based in Baltimore, Maryland, n.d.).

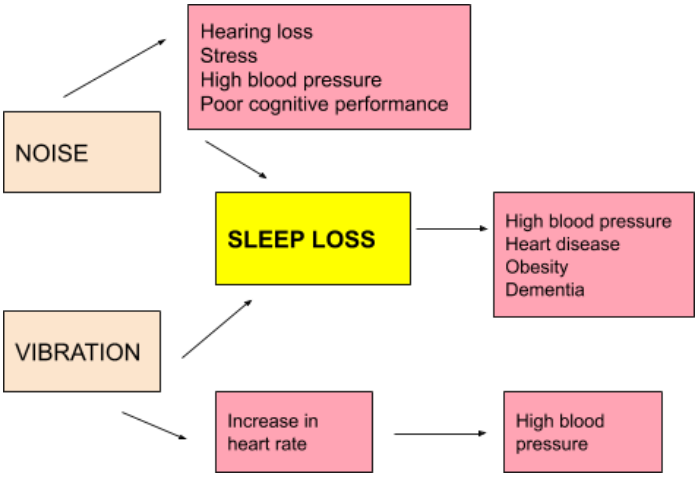


Figure 6.1 *Noise and Vibration Diagram*

SOIL CONTAMINATION

Quality of soils influence the environment and human health in numerous ways. Healthy soil can produce nutritious food and naturally filter water contaminants. But contaminated soil which contains heavy metals, chemicals, or pathogens has negative impacts on human health (Steffan et al., 2018).

Based on the environmental assessment conducted by SCS, some potential sources of contaminants that might potentially be hazardous to human health were investigated at the Interbay property:

- The wastes in hazardous waste storage areas including petroleum-hydrocarbon-based fuels, lubricants, and solvents were stored, uncovered, on pallets or on the ground nearby before the hazardous waste storage area was constructed (SCS, 1997). Concentration of confirmed diesel-range total petroleum hydrocarbon (TPH) in this area was above the Ecology Model Toxics Control Act (MTCA) Method A cleanup levels (CULs) in the analytical result in 1997 (SCS, 1997). Touching soil contaminated with TPH or exposure to TPH compounds might have impacts on nervous, immune systems, and might also affect human's lungs, skin, and eyes (ATSDR, 1999).
- Polycyclic aromatic hydrocarbons (PAH) and chlorinated pesticides resulting from Leaking Underground Storage Tanks (LUSTs) were identified during a Phase II environmental site investigation. Long-term and heavy exposure to PAHs may contribute to lung, skin, and bladder cancer (Boffetta and Jourenkova, 1997).

IMPACT ON SURROUNDING SITES

HISTORIC LANDFILL

The Interbay site is located in close proximity to a former landfill. With the potential for redevelopment on the Interbay Armory site, as well as future development in the surrounding area, the former landfill could have an impact on the health of the neighborhood. The former landfill contains methane that could be hazardous with re-development (Washington State Department of Commerce, Appendix N, 2019). However, there are proper mitigation techniques that can be used to reduce the impact on future development.

AIR POLLUTION

Air pollution is a significant part of any environment resulting in a multitude of effects if not taken into account and the Interbay property is no exception. According to the National Institute of Environmental Health Sciences (NIEHS), air pollution is divided into two categories, indoor and outdoor, both defined as "a mixture of natural and man-made substances in the air we breathe" (National Institute of Environmental Health Sciences, 2020). Everyone is impacted by air pollution, but children are especially vulnerable to the effects of air pollution. By reducing air pollution and ensuring it follows our State's guidelines, we can reduce the number of post-neonatal deaths, asthma hospitalizations, and increase our economy in terms of saving (Wong, Gohlke, Griffith, Farrow, & Faustman, 2004). Some other dangers air pollution can contribute to are cancer, respiratory issues, diabetes, and heart disease (Wong, Gohlke, Griffith, Farrow, & Faustman, 2004). When building a new infrastructure, it is extremely important to test and consider the air pollution levels to make the lives of workers and/or residents healthier.

EXISTING CONDITIONS

WATER QUALITY AND ACCESS

WATER QUALITY

Water supply to the Interbay Property is provided by the public water main located on West Garfield Street/ Magnolia Bridge. A private water main routed through the center of the property is connected to the public water main and distributes flow to all service points within the property(N). Groundwater exists at a relatively shallow depth below the existing ground surface at the Interbay Property. A shallow groundwater table beneath the site may limit the use of stormwater infiltration and pose difficulties where excavations extended below the groundwater table for below grade parking garages or basement levels. Standing rainwater on permeable and impermeable surfaces was identified during the Property walk (Washington State Department of Commerce, 2019). MFA conducted groundwater samples in identified areas of concern and found no contamination above clean up levels for unrestricted use, except for arsenic in GP04. At this time, groundwater to depths of up to fifteen feet below ground surface appears to have no potential implications for redevelopment at this time. Only one exceedance above MTCA Method A was encountered (Washington State Department of Commerce, 2019).

STORMWATER

Stormwater is collected on-site in a network of catch basins and private storm drain mains that ultimately direct all flows to outfalls to the Puget Sound (Washington State Department of Commerce, 2019). There are eight recorded utility easements on the Interbay Property. The city has an 18-foot wide easement along the western edge of the entire Interbay Property that supports two 48-inch force main sewer pipes. There is an underground utility corridor along the eastern edge of the Interbay Property that is used for stormwater, water and sewer (Washington State Department of Commerce, 2019). Stormwater infiltration at the Interbay Property is likely not feasible due to the presence of shallow groundwater and settlement-sensitive soils (Washington State Department of Commerce, 2019). A 2003 model estimates a worst-case magnitude 7.3 Seattle Fault earthquake could cause a tsunami that moves up to 40 miles per hour and inundated the Interbay Property with 2 to 5 meters (6.5 to 16.4 feet) of seawater (Washington State Department of Commerce, 2019). The Interbay Property is 14-18 feet above sea level and less than 500 feet from the Puget Sound shoreline. The model's authors note that while the modeling can be a useful tool to guide evacuation planning, it does not have implications for land-use planning. Current projections for the Washington coast show minimal or no risk of inundation by long-term sea level rise (Washington State Department of Commerce, 2019).

AIRBORNE NOISE, GROUND-BORNE VIBRATION AND NOISE

The Balmer Railyard is located on the west side of the Interbay property and the railyard will be a major source of noise and vibration. This 16 track hump yard is owned by BNSF Railway. According to Ms. Courtney Wallace, the BNSF Regional Director of Public Affairs, the yard is active and it operates 24 hours a day, 7 days a week. The Interbay Public Development Advisory Committee Report of 2018 reports that a new light rail station is planned for 2035. This light rail will either run along the west side of the property, parallel to the railyard ("brown alignment") or along the northside of Armory Way ("blue alignment"), refer to Figure 6.2. The proposed alignments for the light rails are tentative at this time and are subject to change. (Interbay Public Development Advisory Committee, n.d.)

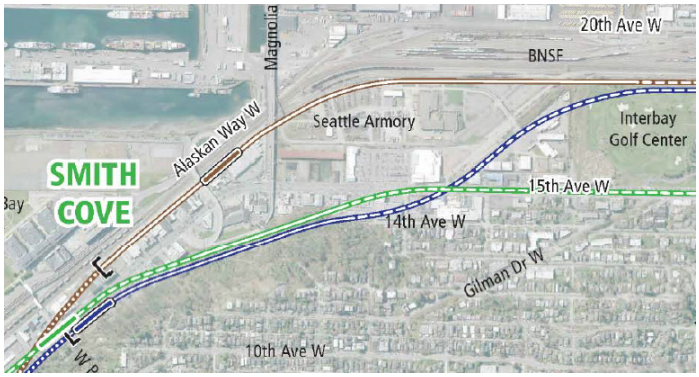


Figure 6.2 (top) *Smith Cove Station and Preferred Light Rail alignment*
Figure 6.3 (left) *Interbay Property Map with BNSF Rail Line*
Figure 6.4 (right) *BNSF 8211 Railway, EMD SD75M, Savanna, Illinois RailPictures.net by Richard Scott Marsh*

Based on the reported sound level of a freight train, it is estimated that the sound emanating from the rail yard would be approximately 80 dBA . With the addition of the proposed light rail on the western border of the Interbay property, it is anticipated that the sound intensity would exceed 80 dBA. In addition to airborne sound, vibration from the freight trains can also produce ground-borne vibration and ground-borne noise.(de Vos, 2017)
The vibration emitting from the rail tracks can reach a building's foundation. Depending on the foundation, the

soil and the structure, the building can vibrate. When a building vibrates,the frequency of the vibration may be in an audible range. This will impact the already existing noise problem (de Vos, 2017).

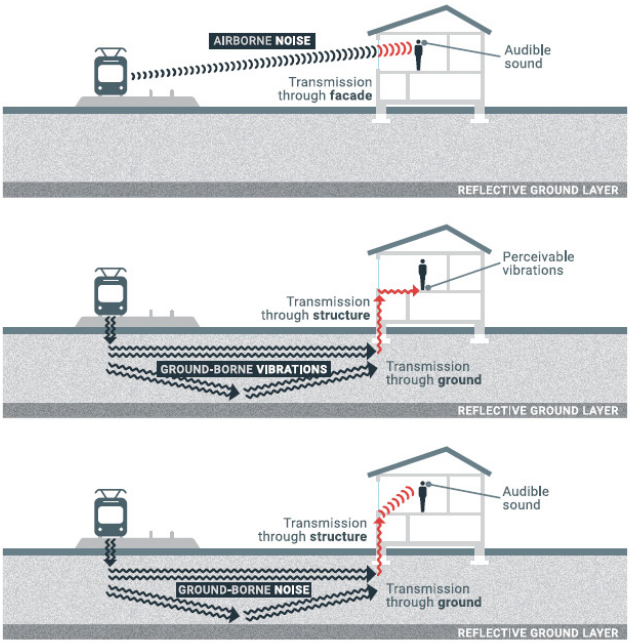


Figure 6.5 *Train Noise and Vibration Effects*

A review of the Interbay Public Development Advisory Committee Report of 2018 does not indicate that a formal noise and vibration evaluation has been completed for the site. (Interbay Public Development Advisory Committee, n.d.)

To mitigate environmental noise and vibration it is most effective to treat the source. However, in this case retrofitting the trains and tracks to lower the noise and vibration production is not an option. BNSF Railway has already voiced their concerns during the public comment period. The company would like developers, building owners, property owners and prospective tenants to be aware and to accept the around-the-clock operations of the railyard. As a result mitigating actions to reduce the railyard source of noise and vibration need to be directed at the propagation path and at the receptor site.

SOIL CONTAMINATION

Potential concerns of soil contamination:

- In 2007, the presence of gasoline-, diesel-, and oil-range TPHs, at concentrations above their respective MTCA Method A CULs, was identified in soils in the vicinity of Underground Storage Tanks (USTs) near the southwest corner of the laundry facility structure.
- Potential contaminants associated with gun cleaning include copper, lead, TCE, and PCB in hydraulic oil or lubricating oil manufactured before 1979.
- The USTs and associated fuel piping, as well as petroleum-contaminated soil (PCS) were removed by Foss Environmental Services from the site in 1995. In the soil samples collected during UST removals, the TPHs were identified in the gasoline range and the concentration of the total xylenes was above the MTCA Method A CULs for contaminants of concern (COCs).
- The Interbay Loft property, which was historically operated as a gas station contains soils confirmed to be impacted by metals, PAH, PCB, and gasoline-range TPH.
- Interbay Old Landfill which is located at West Wheeler and 15th Avenue West contains soils confirmed or suspected to be impacted by halogenated organics, metals, unspecified pesticides, and PAH to be impacted by metals, PAH, PCB, and gasoline-range TPH.

IMPACT ON SURROUNDING SITES

HISTORIC LANDFILL

About one-third of the North end of the Interbay site is located within a thousand foot radius from an abandoned landfill. Because of the landfill, this is considered to be an environmentally critical area. The Interbay landfill was established in 1911 and decommissioned in 1963. According to the Abandoned Landfill Report from the City of Seattle in 1984, the fill of the landfill was completed and the land was handed over to the Parks department and a nine-hole golf course was constructed on the site. Future development on the site will be difficult because of the uneven rate of soil settlement. According to the report, despite the age of the landfill, the methane generation on site will continue for years to come (Seattle-King County Department of Health, 1984). In order to further develop the site, special precautions must be taken during construction and development to prevent the spread of the noxious gases. The other issues with the historic landfill are the leachate issues that could arise. Due to the high groundwater levels on site, the methane levels could contaminate the groundwater and cause further issues to future development (Washington State Department of Commerce, Appendix N, 2019).

AIR POLLUTION

GENERAL INFORMATION

The HIA team has discovered that there has been no research on air quality in this area. This is a significant concern, given how detrimental to the environment and human health air pollution is. There can be many preventable long-term consequences if we ignore the importance of air pollution and its impact to the future community.

VEHICLE EMISSIONS AND BNSF RAILWAY

Having an increased level of air pollution can be detrimental to health in many ways. Since some of the possible land uses are industrial, industrial/residential mixed, or mixed commercial/residential, it's important to consider how this will impact the environment in terms of emission. Automobile and truck emissions create a large number of pollution "which is associated with increased rates of respiratory disease, heart disease and some forms of cancer [...]. Children living next to busy roadways experience greater exposure to air pollutants, increased respiratory disease symptoms, asthma hospitalizations and doctor visits, and poorer lung function than children who live further away [...]. These impacts are disproportionately concentrated in urban communities, and contribute to health disparities" (Gilhuly et al., 2011). Interestingly, a greater amount of air pollution discourages physical activity and outdoor play, which can lead to obesity (Gilhuly et al., 2011). With any industrial or commercial land use, there is bound to be more traffic, and heavy truck use, in the area and that may not bode well with the residential mixed land uses because of the increase in emissions.

Finally, the BNSF railway and the Balmer railyard play important roles in the environmental conditions and future development of the Interbay site. Currently, the railroad is open and running 24/7, arising concerns related to both air pollution and noise quality. BNSF claims that they are efficient with fuel and have low emissions; however they used 1.3 billion gallons of diesel in 2015 (Stagle, 2017). In a review of 3 California HIA's regarding air quality, it was found that, "Diesel particulate matter (PM) is identified by the California Air Resource Board (CARB) as a toxic air contaminant and represents 70% of the known potential cancer risk from air toxics in California" (Gilhuly et al., 2011). A few years ago, the Chicago Tribune covered the negative impact of a residential area near a BNSF railyard in Cicero, Illinois. The Environmental Protection Agency (EPA) had found "levels of diesel soot in residential areas near the BNSF Intermodal Facility frequently spike higher than the national average for urban areas" (Hawthorne & Richards, 2018). Being exposed to small levels of diesel pollution can affect the future community's lungs and increase asthma attacks (Hawthorne & Richards, 2018). Due to potential health impacts, it is important to take this railyard into consideration for what a community might face if this land becomes residential use.

ANALYSIS AND HEALTH IMPACT ASSESSMENT

WATER QUALITY AND ACCESS

ENVIRONMENTAL ASSESSMENT

The Interbay plan proposes that redevelopment with greater than or equal to 1,500 square feet of new or replaced hard surface or with greater than 7,000 square feet of land disturbing activity will require the project to comply with Onsite Stormwater Management (OSM) techniques outlined in the City of Seattle stormwater manual. In order to determine suitable OSM techniques, the Interbay Property is subject to evaluation of dispersion and infiltration feasibility as outlined in Chapter 3, Volume 3 of the City of Seattle stormwater manual. The feasibility evaluation result would determine the required Best Management Practices (BMPs) on-site. BMPs are categorized by priority with Category 1 comprising the first priority BMPs that must be implemented if feasible. Subsequent categories may be considered only after the priority category BMPs have all been deemed infeasible. BMP categories are summarized as:

> Category 1: Full Dispersion, Infiltration Trenches, or Dry Wells
>
> Category 2: Rain Gardens, Infiltrating Bioretention, Rainwater Harvesting, Permeable Pavement Facilities, or Permeable Pavement Surfaces
>
> Category 3: Sheet Flow Dispersion, Concentrated Flow Dispersion, Splash Block Downspout Dispersion, Trench Downspout Dispersion, Non-Infiltrating Bioretention, or Vegetated Roofs
>
> Category 4: Perforated Stub-out Connections, or Newly Planted Trees

The current water point of connection at the south end of the property is congested with multiple utility crossings. SPU and SDCI may take this into consideration during existing utility evaluation. Early discussion with SPU representative indicates that if the SPU Public Water Main serving the property is in healthy condition, SPU would not require re-evaluation. KPFF Consulting Engineers 6 point of connection between the Public and Private Water Main given no alterations are made to the private water main. However, whether the existing Private Water Main is suitable to serve the proposed development in its current condition will be evaluated by SDCI and the Seattle Fire Marshal (Washington State Department of Commerce, 2019).

IMPACT STATEMENT

Although no issues regarding the health and capacity of the existing stormwater infrastructure have been reported or discovered, an evaluation of the system will be crucial in determining necessary upgrades. The City of Seattle has a Pre-Application process that can initiate evaluation of the existing infrastructure. When a schematic site plan has been developed, a Preliminary Application Form and Pre-Application site Visit Request may be submitted. For stormwater infrastructure, this step will allow for SPU to assess whether the existing public infrastructure can accommodate the project intention and for SDCI to assess whether the existing private infrastructure can adequately meet the level of service required for the new project (Washington State Department of Commerce, 2019).

Although no issues regarding the health and capacity of the existing water infrastructure have been reported or discovered, an evaluation of the system will be crucial in determining necessary upgrades. The City of Seattle has a Pre-Application process that can initiate evaluation of the existing infrastructure. When a schematic site plan has been developed, a Preliminary Application Form and Pre-Application site Visit Request may be submitted. For water infrastructure, this step will allow for SPU to assess whether the existing public infrastructure can accommodate the project intention and for SDCI to assess whether the existing private infrastructure can adequately meet the level of service required for the new project. The Seattle Fire Marshal may require a pressure and flow test in conjunction with SDCI's utility evaluation (Washington State Department of Commerce, 2019).

SOIL CONTAMINATION

ENVIRONMENTAL ASSESSMENT

An environmental assessment was conducted on the Interbay property to assess the potential environmental issues. The assessment examined the current and historical uses in and around the Interbay property by a reconnaissance site visit, existing records review, and interviews of current and former owners or occupants of the property. Soil samples were collected at 21 locations on the Interbay property. Each sampling site was drilled to a maximum of 20 feet in depth. Generally, two soil samples were collected from each boring location. Additional soil samples were taken from locations that showed visual impacts such as black staining. Soil samples were then analyzed to determine any presence of contamination.

IMPACT STATEMENT

Of the 21 sample locations, one soil sample (GP10) from a drilling location on the northwestern portion of the Interbay site had petroleum-related contamination that exceeded cleanup levels. In this soil sample, Benzo(a)pyrene (0.111 milligram per kilogram [mg/kg]) was detected above the MTCA Method ACUL (0.1 mg/kg) and the carcinogenic PAHtotal toxic equivalent concentration (cPAH TTEC) (0.147 mg/kg) is also above its respective Method A CUL (0.1 mg/kg). Chromium (28 to 43 mg/kg) was detected in five soil samples. This result appears to be isolated and not indicative of property-wide conditions, because no adverse impacts were identified elsewhere on the Interbay site. No further investigation is recommended at this time, but additional sampling may be warranted if development activities are to occur in areas where isolated contamination was encountered (near GP10 or GP04). Washington State has a dedicated funding program for environmental cleanup that could support that work if needed.

Figure 6.6 *Subsurface Investigation Boring Locations Geotechnical Report, Source:*

IMPACT ON SURROUNDING SITES

HISTORIC LANDFILL

As development of the Interbay site occurs, it is likely that development will happen within the former landfill site. As long as proper cleanup techniques are addressed, development of the landfill site will be allowed. If proper precautions are not followed, leachate issues into the groundwater could contaminate the surrounding area and noxious gases could be released into the atmosphere. The issues should only arise during redevelopment and would no longer be an issue once construction is completed. Construction could increase the risk of exposure of these elements to construction workers, so proper worker protection is recommended.

RECOMMENDATIONS

PRIORITY RECOMMENDATIONS

RECOMMENDATION 1: AIR QUALITY STUDIES

The HIA team recommends that an air quality study be conducted along with an environmental impact assessment to understand the air conditions, risks, and hazards. In addition, the City of Seattle and the State of Washington should create a mitigation plan to reduce air pollution from the BNSF railway, taking into account occupational health and safety in industrial areas for workers and EPA guided policies for mixed use land involving residents and potential consumers.

- If residential uses are to be built, collaboration with stakeholders and future residents would be recommended to provide high quality conditions to residents. Well-ventilated buildings would be recommended on the site to reduce future health concerns.

RECOMMENDATION 2: INTEGRATED SITE DEVELOPMENT

With the proximity to the Balmer Railyards, the Western border of the Interbay property is subjected to more potential issues regarding noise and air particulates. We recommend that a buffer zone is created along the Western border to reduce noise and vibration issues as well as capture air particles. This could be implemented with a built strategy such as a wall or a natural barrier including large evergreen trees. However, tree barriers are generally not good noise barriers. Industrial buildings could also be used as a noise buffer on the Western edge of the site, many of the student proposals in the Interbay studio highlight this idea.

This development would also provide an opportunity to combine green infrastructure strategies, such as bioswales or retention ponds, to be able to mitigate rising water levels due to climate change. However, the current soil conditions and high groundwater levels creates limitations to the type of water retention development that can happen on site. Innovative built environment strategies would be recommended to retain or manage stormwater in new ways.

OTHER RECOMMENDATIONS FOR CONSIDERATION

WATER QUALITY AND ACCESS

- The Interbay project leaders should encourage natural drainage and green infrastructure to reduce stormwater. This type of infrastructure is low cost and has further positive health impacts for the community. They are also applicable in all places and locations of the Interbay neighborhood.
    - If this site were to support residential, these infrastructure projects require regular cleaning and maintenance to keep them beautiful and to manage water properly.
- Regularly sampling groundwater around the area, specifically looking at arsenic levels in the water should be enforced.

AIRBORNE NOISE, GROUND-BORNE VIBRATION AND NOISE

- If the Interbay Property remains industrial then no actions are needed.
- Noise and vibration impact health; therefore, if the Interbay property is designed for mixed use commercial /residential or mixed use light industrial/residential then the following actions are recommended:
    - Airborne Noise: Order a formal quantitative noise evaluation to evaluate if the noise level exceeds the EPA recommended noise exposure limit. The WHO Guideline Development Group recommends reducing noise levels by railway traffic below 54 dB Lden for general noise exposure and by 44 dB Lnight for night noise exposure (Environmental Noise Guidelines for the European Region 2018). Results of theevaluation will give stakeholders relevant information about the noise problem and this will dictate the design of the property.
    - Vibration: Order a formal vibration evaluation of the Interbay site. Results will inform builders what types of foundations are needed to reduce ground-borne vibration and ground-borne noise.

      Airborne noise mitigating actions:
        - Erect a sound wall along the western border of the Interbay property. Barriers can lower noise when they break the line-of-sight between the source and the receiver. Barriers located close to a train can reduce noise by 6-10 dB. If a sound absorbing material is used in the inner surface of the barrier, the level of noise can be reduced by an additional 5dB (Transit Noise and Vibration Impact Assessment Manual, n.d.)
        - Create a buffer zone on the Western border of the property. Sound attenuates with distance; therefore, residences and commercial buildings should be built as far as possible from the railyard. (Transit Noise and Vibration Impact Assessment Manual, n.d.)
        - Plant vegetation and trees along the Western border of the Interbay property. Vegetation and trees can provide some mitigation if it

blocks the line of sight between the source and the receiver, if the trees extend 15 ft or more above the line-of-sight and if at least 100 ft of trees are in between the source and the receiver (Transit Noise and Vibration Impact Assessment Manual, n.d.).

- Install sound proof windows for residences and commercial buildings

SOIL CONTAMINATION

- Regular soil sampling and testing to determine potential harmful elements might be necessary for human health if further industrial development activities are to occur in Interbay property.
- Cooperate with Environmental Protection Agency and Washington State to support the environmental cleanup if future soil contamination exceeds the cleanup levels.

IMPACT ON SURROUNDING SITES

- If development on the Interbay site occurs in conjunction with development of the existing golf course site, mitigation techniques should be implemented during construction to reduce the impact of the Methane on site. Proper cleanup provisions should be in place to protect workers safety while working with the contaminated site. Extra precautions should be taken to minimize the leachate into the surrounding groundwater.
- If the golf course stays at its current stage, no immediate action is necessary. Continual monitoring would be recommended if construction were to occur on site.

AIR POLLUTION

- Conduct an EIA on air pollution conditions, risks, and hazards for all three types of land use, due to lack of current understanding on existing conditions of air quality in the Interbay.
- Create a mitigation plan for reducing air pollution from the BNSF railway, taking into account occupational health and safety in industrial areas for workers and EPA guided policies for mixed use land involving residents and potential consumers. The University of Washington has found great evidence to support that green spaces help reduce air pollution, increasing physical activity outside and leading to a greater physical and mental health (Wolf, Krueger, & Flora, 2015). They estimated that a "total annual air pollution removal (of ozone, particulate matter, NO2, SO2, and carbon monoxide) by urban trees across 55 U.S. cities is 711,000 metric tons, representing $3.8 billion in public value" (Wolf, Krueger, & Flora, 2015). To reduce PM and increase air quality for a healthier living, evergreen trees can be used (Wolf, Krueger, &Flora, 2015). The Department of Commerce Interbay Report stated many possible ways to include sustainable and green infrastructure into the Interbay reconstruction (Washington, 2019). An example would be using vegetation to "reduce solar heat gain in buildings which will reduce air conditioning energy demands, thus reducing GHG [greenhouse gas] emissions..." (Washington, 2019).
- If affordable housing is built, to keep the community's health in mind, working with the future community as a stakeholder and consulting diverse stakeholders related to housing and air pollution risks would provide the best outcome for all. While the prior recommendation attends to outdoor pollution, having well-ventilated buildings that are regularly cleaned for apartments/houses and for industrial or mixed use buildings tackles indoor air quality issues (National Institute of Environmental Health Sciences, 2020)(Refer to Housing Quality and Safety section for more information). Throughout the State's Department of Commerce Report, we can consistently see in the Open House discussions that people are concerned about air pollution (Washington, 2019). Seattleites stated they desire high air quality indoors and that we need to find "incentives for BNSF to reduce air pollution from activities at this site" (Washington, 2019).
- Finally, create a no smoking zone to reduce air pollution for all types of land use. Tobacco smoke has been shown to decrease air quality both in outdoor and indoor environments (National Institute of Environmental Health Sciences, 2020).

EQUITY EVALUATION

WATER QUALITY AND ACCESS

Studies have shown that exposure to arsenic can cause spontaneous abortion, stillbirth, birth weight, and neonatal and infant mortality (Quansah et al., 2015). Additionally, utero and early life exposure to arsenic of high levels can increase mortality due to cancer, cardiovascular disease and respiratory disease (Farzan, Karagas, & Chen, 2013). Arsenic in the groundwater of the Interbay site should be properly controlled at all times in order to decrease exposure to the most vulnerable children.

AIRBORNE NOISE, GROUND-BORNE VIBRATION AND NOISE

Gomes, et al reported that the prevalence of auditory hypersensitivity was 15% to 100 % in autistic individuals. This indicates that autistic individuals are disproportionately affected by noise in comparison to the

general population (Gomes et al., 2008). Studies in Europe have shown that noise pollution is unevenly distributed. People of low socio-economic status are more affected by noise pollution (Hoffmann et al., 2003; WHO, 2019; Dreger et al., 2019).

SOIL CONTAMINATION

The Interbay camp has higher risk of exposure to contaminated soil, which might contain the TCE (an industrial solvent), even though the officials say the area has been capped with asphalt to prevent exposure to the solvent (Marc, 2015). The health of homeless people living in the camp might be in danger due to the presence of carcinogens (Marc, 2015). Hence, more tests are needed to ensure that vulnerable people are living in safe environments.

IMPACT ON SURROUNDING SITES

HISTORIC LANDFILL

The construction workers that have the potential to work on this project could have a higher exposure rate to the noxious gases than anyone else. If proper cleanup techniques are used, the site should be equitable for everyone inhabiting the site after the development phase is completed.

AIR POLLUTION

Environmental and social justice is a significant part of any project and especially for this project because of the sheer number of possible health inequities future communities could face. When a land is built for a certain population or demographic, it is important to be aware and integrate what the community wants. Some locals have been vocal about what the area should look like if housing is to be built such as, "self-sufficient eco-district with homes, schools, and childcare, green space, and a grocery; the kind you might see in sustainability-focused regions of Europe" (Saez, 2019).

While transit would be of convenience with the future Sound Transit plans for the light rail near the Interbay, many other citizens and housing advisors are concerned that "low-income housing next to a rail yard's compromised air quality raises social justice concerns" (Saez, 2019). Many residential communities placed next to railyards usually consist of a lower socioeconomic status and/or minorities, including the Cicero neighborhood near the BNSF railyard, which mainly consisted of Latino and African American populations (Hawthorne & Richards, 2018). There are many factors to consider creating this land for industrial uses instead of any residential use because there are so many risks factoring into the health and safety of the residents. Many housing advocates deem this area to be unsuitable for any kind of housing, stating the nuisances and safety risks of the railroad, air pollution, noise, contaminated soil, being in a tsunami inundation zone, and liquefaction risks during an earthquake (Cohen, 2019). Creating affordable housing may help many in need but it's worth considering how it may affect the future community's long-term health. Seattle has been steadily increasing and dividing via gentrification over the years, one example being South Seattle communities. "Georgetown and South Park in particular are on the highest end of the air pollution risk gradient and the lower end of the socioeconomic status (SES) and health gradient" (toxicexpertise, 2019).

SUMMARY

The Interbay Project has the potential to be a great neighborhood development project in the heart of Seattle with many different options in which the site can develop. The development could provide many new opportunities to improve the natural environment and also the way in which the site responds to upcoming environmental issues, including rising sea levels with climate change. Many of these environmental concerns have an affect on our human health and can begin to help shape the development. Some design considerations to accommodate for these health impacts include stormwater management, creating a buffer zone between the Western edge and any new development to collect particulates and reduce noise, and planting trees all along the site to help remediate the soil and cleanse the air. These environmental impacts could be lessened by preventative measures used throughout the development of the site. Overall, the site poses great opportunities for a development project and with the proper mitigation strategies; many of these environmental effects can be addressed. In addition, this site could be used as a pilot study to be able to look at the effects of climate change on sea level rise and begin to understand how a strong design for the built environment can begin to combat the effects of climate change.

LIMITATIONS AND ASSUMPTIONS

This evaluation of the environmental impacts on health has many limitations and assumptions that must be addressed. The assumptions surrounding climate change are the opinions of the group and based on current predictions and what might happen to the City of Seattle if sea levels were to rise. We can only predict the impact to the best of our abilities from the current studies; therefore, there are many limitations to creating concrete recommendations. There is also a limitation regarding how the site might be used in the future, because of the unsure future, we have created recommendations to the best of our abilities that can span multiple development opportunities and also recommendations that are broad enough to be applicable into the future. Many of the equity statements, addressed above, include assumptions regarding the future residents of the site, recognizing that these could vary greatly by the time development occurs.

CONCLUSION

This HIA was conducted to assess the connection between health outcomes and the Interbay Project redevelopment concepts and to make recommendations to promote health and mitigate adverse health impacts. These concepts include an industrial only option, a mixed-use option including areas for commercial and retail activity and housing options, and a mixed-use option including areas for light industrial and commercial activity, as well as housing.

This report was created for partners at the Seattle Department of Transportation and Office of Planning and Community Development. It is our suggestion that this report be shared with additional stakeholders and community members as future decisions are determined for the Interbay site. Redevelopment of the Interbay site presents a critical opportunity to create a new vibrant and healthy community within the BINMIC. Continuous planning, collaboration, communication, and community involvement in the development of this site will assist in creating a healthy, lively, and equitable Interbay. This HIA has not selected one proposal as the best option for moving forward, but provides recommendations for the various proposals as each has the potential to impact health outcomes for Interbay and Seattle. By building upon the existing findings of the Interbay Project Advisory Committee Report, as well as the recommendations presented in this Health Impact Assessment, there is a great opportunity to create a community that serves the historical, physical, economic, mental, social, and environmental needs of the current site and future populations in and around the Interbay neighborhood and Seattle.

FOSTERING EQUITY

A sustainable community supports individuals from a wide range of backgrounds. Vulnerable populations in this HIA include communities of color, individuals experiencing homelessness, economically exploited individuals, persons with chronic illness, renters, women, children, and individuals with disabilities. Interbay does not yet have a significant resident and employee population, so we recommend putting measures into place to protect these groups while changes remain actionable for housing, employment, transportation, and access to a range of public and private services. Equitable decision-making will ensure that future residents, employers, employees, and community stakeholders involved in this site will value diversity in its community and will help foster resilience in individuals and the community. As noted throughout this report, health equity arises from an individual's or community's relationships with the social determinants of health and through their access to basic health services. Each chapter within this HIA has utilized an equity lens to identify recommendations. As each proposal will undoubtedly provide a range of health outcomes for individuals and households, it is recommended that decision makers use the recommendations outlined in this HIA continue to monitor the phases of redevelopment to prioritize equity, inclusion and diversity to best support the health of the future community of Interbay.

LIMITATIONS

There are several limitations that are worth mentioning for this class-based HIA project. The students themselves represent a diverse range of backgrounds that extend beyond urban planning and public health, however, this is the first experience of conducting an HIA for all the students in the class. Furthermore, the time constraint--less than 10 weeks to produce this document--did not allow for primary data collection, in-depth data analysis, stakeholder interviews, or community assessments. Unlike many other HIAs done for this course in the past, no one currently lives on this site, so the HIA authors could not speak specifically to the environmental health impacts on current residents. This HIA was able to report on estimates of poor air quality, for example, but not able to certainly predict or estimate disease burdens among residents. As stakeholder and community engagement is a crucial step in the development of an HIA, the limited timeframe also did not allow for the level of professional and community feedback desired, although community engagement detailed in the Interbay Report was reviewed (Washington State Department of Commerce, 2019). Due to this limitation, SDOT and OPCD should acknowledge the importance of stakeholder and community engagement moving forward. Given that the HIA team started research during the COVID-19 pandemic, there were additional

limitations for conducting this HIA. Firstly, many students were not physically in Seattle during this timeframe. This meant that many of us were unable to visit the Interbay site on Armory Way, and have relied on photos and videos to inform us in our work. Secondly, the HIA team was unaware of how COVID-19 would impact the project at either a macro or micro level (e.g., increasing the length of time in between phases, moving forward with legislative action, changing the timeline for National Guard movement). Lastly, opportunities for additional evaluation and monitoring of this project cannot be completed by HIA authors given the time constraint of this course. Despite such limitations, this HIA offers decision makers an understanding of potential positive and negative health outcomes related to the three proposals.

MONITORING

The final steps of an HIA are monitoring and evaluation. Monitoring tracks the effectiveness of the HIA in shaping policy and helps determine the outcomes. For example, did the decision-makers follow the HIA recommendations? Was health integrated deeply into planning processes? What were the outcomes, both intentional and unintentional, of the HIA and its recommendations? Evaluation focuses on assessing the HIA process itself and on the impacts of the HIA recommendations on subsequent decisions. As mentioned in the limitations, the current HIA team is unable to assist in these steps. That being said, the HIA team recommends that continuous communication and collaboration exist between partners from OPCD, SDOT, the Washington State Legislature, the Washington State National Guard, and other partners as they become involved. Additionally, it is recommended that this HIA be disseminated to both current and future stakeholders and decision-makers within Seattle and Washington, including community members, students and faculty of academic institutions, public health officials, community developers and planners, and others that may benefit from the key findings and recommendations included here. It is also recommended that this report be distributed for the purpose of reframing the all included recommendations as more details of the site become available. Lastly, the HIA team recommends that partners continue to review and reassess the priority recommendations over the next few months as Seattle, King County, and the State of Washington attempt to return to normal operations from the impact of the COVID-19 pandemic.

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