

REVITALIZING WATERFRONT SPACE: EXPLORING A MIXED PARTNERSHIP MODEL IN URBAN WATERFRONT
DEVELOPMENT

Hanyu Wang

A thesis

submitted in partial fulfillment of the

requirements of the degrees of

Master of Landscape Architecture

University of Washington 2018

Committee:

Daniel Winterbottom

Lynne C. Manzo

Program Authorized to Offer Degree:

Landscape Architecture

©Copyright 2018

Hanyu Wang

Abstract

REVITALIZING WATERFRONT SPACE: EXPLORING A MIXED PARTNERSHIP MODEL IN URBAN WATERFRONT DEVELOPMENT

Hanyu Wang

Chair of the Supervisory Committee:

Professor, Daniel Winterbottom

Landscape Architecture

This thesis examines the challenges facing the waterfront revitalizations in the United States and proposes a new waterfront revitalization model to address them. The goal of this new model is redeveloping the vacant waterfront as a livable and thriving urban center in the future. The mixed private-public partnership is the concept for applying the theoretical guide on activating the vacant site. When considering the development partnership, the model must also meet social, ecological, and economic goals. This model would be applied in Bellingham, Washington, US.

1. INTRODUCTION.....	7
WHY THIS TOPIC?.....	8
2.PROBLEM STATEMENT	9
2.1 EXISTING WATERFRONT REVITALIZATION EFFORTS IN THE UNITED STATES	9
2.2 THE CHALLENGE FOR FUTURE WATERFRONT REVITALIZATION	14
2.3 OPPORTUNITIES FOR A MIXED PARTNERSHIP MODEL	15
3. LITERATURE REVIEW.....	17
3.1 CASE EXAMPLES.....	19
4.THE PRIVATE- PUBLIC PARTNERSHIP WATERFRONT REVITALIZATION MODEL.....	26

4.1 THE PRINCIPLE	26
4.2 THE GOALS OF THE PROPOSED PUBLIC-PRIVATE MODEL.....	27
4.3 THE CRITERION MAKING PROCESS	28
5. SITE BACKGROUND	34
5.1 SITE CONTEXT AND SITE HISTORY.....	34
5.2 EXISTING PROPOSAL.....	37
6. VISIONING AND DESIGN INTERVENTION	41
6.1 CONCEPT	41
6.2 BENEFITS OF THE CONCEPT	43

6.3 OVERALL DESIGN STRATEGIES	46
6.4 DESIGN APPROACH	48
6.5 DESIGN VISION	49
7 CONCLUSION	65
8. REFLECTION	66
9.BIBLIOGRAPHY	68

1. INTRODUCTION

When I first came to America in 2016, the beautiful communities, the well-organized urban plans, and the pleasant streetscapes surprised me. However, when I went to the waterfront area, I saw vacant land. People prefer to walk through this waterfront space quickly, if at all, rather than stay in this space and enjoy the beautiful lake view. I wondered why there is a huge contrast between the waterfront area and the rest of city. I was seeking the answer during my master degree training in landscape architecture at the University of Washington. After some study of landscape development history, urban development history and social context in the United States, I wanted to explore a new model to solve this problem in my capstone thesis. In this design thesis I will apply my model to a specific site in Washington State on the waterfront in the city of Bellingham.

In this thesis, I will not only analyze the waterfront revitalization in design view, but also think about the economic aspects of waterfront redevelopment, including the private and public benefits to building a new waterfront revitalization model. I believe the vacant waterfront could be developed as a comfortable living space and an economic engine in future development.

The model, of a mixed-private public partnership, would help me to achieve my goal.

WHY THIS TOPIC?

Thousands of heavy industries, such as manufacturing and shipping are located along the urban waterfront space in Bellingham, Washington. After World War II, deindustrialization in advanced economies had created a legacy of vacant and derelict land. Numerous sites of this heavy industry have been abandoned, leaving a large quantity of vacant land located within the urban waterfront space, leaving along with it a great deal of environmental damage (Bacot Hunter 2006). The challenges to revitalizing the brownfield land on the waterfront are complex, involving land use policy, land and development ownership, and the economics of land values. Yet, such a developmental approach to waterfront revitalization is critically important. It connects the urban economy, human wellbeing, ecology and culture. There are numerous studies about how to revitalize urban waterfront space (can you cite at least one here?). A literature review shows that there are two main waterfront revitalization/development models. One is a non-profit public investment model; the other is a private for-profit investment model. Each has advantages and disadvantages. In the late twentieth century, research on urban development proposed a new mixed partnership model to make up for the shortage in both the private investment model and the public

investment model in the urban development process (Reuschke 2001). However, the research on how to apply this mixed partnership model on specific waterfront revitalization projects is still limited. Through a review of the public-private investment model and case studies of the Copenhagen waterfront in Denmark and South Waterfront in Portland, Oregon, I will build a framework of a mixed partnership model for the Bellingham waterfront revitalization and I will apply the model through a specific design proposal for the site.

2.PROBLEM STATEMENT

2.1 EXISTING WATERFRONT REVITALIZATION EFFORTS IN THE UNITED STATES

The sheer number of brownfields in the US highlights their significance, particularly for landscape architects, as opportunities for revitalization. There are about 425,000 brownfield sites in the US covering five million acres of vacant land, accounting for \$2 trillion of undervalued real estate nationwide (National Brownfield Association, 2014). Moreover, the Government Accountability Office has estimated that many brownfield sites are located in waterfront space. Typically in the United States, waterfront revitalization focuses on urban green public space, like Gas Works Park and the Olympic Sculpture Park in Seattle (<https://www.epa.gov/>) However, the primary funding for these projects is from the federal government and national

environmental institutions like the Environmental Protection Agency (EPA). The high cost of environmental restoration, particularly when such sites are brownfields, and the lower land values of contaminated sites, obstruct the private developer from developing the waterfront.



Figure 1 A vacant waterfront in Vancouver, Washington (Photo by Ariane Kunze/The Columbian)

In the private investment model, the private developers often must build a very high-density commercial and residential area

to help them balance construction costs and profit. Also, since private developers need to build with higher density along the waterfront space to enhance profit, a large portion of the buildings are not open to the public. Importantly, in the private development model, the proposed designs usually block public access to waterfront space. Therefore, in the private development model, the developer sacrifices the public welfare to push the revitalization process to maximize profit.

In contrast, the existing waterfront development pattern is typically based on a public investment model, and relies on public funding. However, with limited federal funding for development and cleanup, enormous areas of waterfront land in the United States are not redeveloped very well. They can sit dormant, unused and often contaminated for years. It is not unusual, therefore, for the owner of the waterfront property to abandon the land until they get the funding from the public for its revitalization (Adams, De Sousa & Tiesdell, 2009).

PUBLIC DEVELOPMENT MODEL



OWNED BY PUBLIC

MAIN EMPHASIS

- Highly reliant on public funding
- Providing good quality of public infrastructure
- Providing good public accessibility
- Providing green stormwater Infrastructure
- Providing local habitat
- Providing pedestrian network
- Mostly public or commercial space
- The projects are large-scale
- Main goal is ecological restoration
- Providing cultural identity
- Providing historical identity

PRIVATE INVESTMENT MODEL



OWNED BY PRIVATE

- Highly reliant on private funding
- Good quality of private infrastructure
- Good private benefits
- Lack of public accessibility
- Green stormwater infrastructure
- Satisfy the customers
- Mainly residential or commercial space
- High density of residential area
- Recreation function
- Clear boundary between public and private
- Main goal is making profit

Figure 2 The main characteristics of the public investment model and the private investment model.

Besides, neither the private investment nor public investment model fully explores the broader benefits to the waterfront revitalization for uses other than industrial or commercial (Desfor 2011). Yet, other potential uses for vacant land include: recreation, residential, education, agriculture, and entertainment. Numerous states in the US have incentive programs and options to encourage the adaptive reuse of the waterfront to transform them from liabilities to community assets, but research is lacking on the process to realize the benefits (Adelaja et al. 2010).



Figure 3 Gas Work Park is a typically public investment in waterfront revitalization (photo by Hanyu Wang)

2.2 THE CHALLENGE FOR FUTURE WATERFRONT REVITALIZATION

As mentioned earlier, there are several challenges for private developers to invest in a waterfront revitalization project. The first is the cost of restoring/cleaning contaminated land. The developers have to spend enormous amounts of money to purify the contaminated land. For example, the Bellingham waterfront mitigation process costs \$37 million to mitigate the Bellingham Bay shoreline (Wohlfeil 2015). Before developing the site, the developer needs to prove the environment is not harmful to human health. Also, the maintenance of the vacant waterfront environment usually costs more than general project development. That's because the developer needs to keep monitoring for potential harmful substances in the soil (Adams, De Sousa and Tiesdell, 2008). The second shortcoming is that waterfront developers are unlikely to benefit from the increased land value under the existing waterfront revitalization model in United States. Barlow (Barlow 1999) claims that in the 20th century, the major brownfield builders' main business strategy was "focused on capturing inflationary gains from housing and land markets" (p. 23). Since the uncertain environment of brownfield land markets makes land banking a less attractive strategy, developers are less likely to benefit from medium-term inflationary increases in land value to the same extent as on other kinds of sites (Barlow 2003). Thus, most waterfront revitalization efforts are based on public investment, and waterfront brownfield sites are usually redeveloped as non-profit urban green spaces (Goodwin 1999) The third challenge is the

complicated ownership and fragmentary nature of such sites. Waterfront land is typically available only in smaller land parcels, and they are often scattered in more than one location, making them seem unsuitable as development sites for many developers (Tiesdell 2007). Field investigations show that many waterfront revitalization sites are not suitable for commercial activities because they are too small to be developed as commercial use, or are not well located. These sites may be appropriate for small ships, parks, and other forms of open space and housing (Miller et al.2001; Power et al.2000). In addition, it's very common that there are several owners in a single waterfront revitalization project in the United States. This fragmented ownership situation limits both the private investment and public investment. Unifying the ownership needs is time-consuming and complicated.

2.3 OPPORTUNITIES FOR A MIXED PARTNERSHIP MODEL

Based on this analysis of the challenges facing the revitalization of urban waterfront sites, it is not surprising, then, that housing and mixed-used community design strategies, the focus of this study, becomes a more seriously considered option. The first reason is that redeveloping the waterfront as a mixed-use community could help fill the need for new housing.

Population growth in metropolitan areas like Seattle has increased very quickly in recent years. Seattle's rate of population growth was 3.05% in 2016, which is almost 1.3 times greater than in 2015 (<http://worldpopulationreview.com/us-cities/seattle-population/>) and Seattle remains one of the fastest growing cities in the nation. This population growth has the potential to give the city many benefits. For instance, the government would have more tax money to build and update infrastructure. Consequently, the city could attract more people and companies, which would bring more tax revenue and potential development for the city in future. Based on current density levels and the physical layout of the city, some neighborhoods in the Seattle metropolitan area are nearly saturated for further development. Thus, redeveloping the vacant waterfront sites as a mixed-use community is an essential solution to help address future population growth.

The second advantage for redeveloping waterfront brownfield space as a mixed-partnership effort would be to attract the private developer to invest in the waterfront revitalization process, which would significantly increase the speed of the clean-up and reuse process. Individual states have adopted programs that limit environmental liability and allow for risk-based cleanup standards of brownfield sites on the waterfront, with both strategies having potential to encourage a

would-be investor or developer (Lange and McNeil 2004). Thus, there is a tremendous potential opportunity to establish a new mixed-use waterfront revitalization model in the United States.

3. LITERATURE REVIEW

Before Industrialization, fisheries and ship transportation dominated most shoreline space in the urban area. At that time, the waterfront had been regarded as the engine of the city. The advent of industrial development brought industry to the waterfront. Heavy industry, such as ship building and pulp mills, was usually located along the urban shoreline, especially in the Pacific Northwest. These industries provided thousands of job opportunities and supported urban development. In the meantime, they caused serious environmental problems such as air, water and soil pollution. After World War II, heavy industries were gradually abandoned because of shifts in the economy, the development of new technology, and the damage to the waterfront environment (Desfor 2011).

There are several approaches to revitalizing urban waterfront space. Some projects focus on the rehabilitation of the industrial

buildings and iconic elements. The developers attract people to this type of site by creating public space and market space in the existing industrial structures. For instance, Atlantic Station is a neighborhood on the northwestern edge of Midtown Atlanta, Georgia. The commercial and retail space in Atlantic Station attracts thousands of local residents to this space (Maslia 2006). Some approaches focus on human welfare and environmental justice in the revitalization. Researchers and urban planners and designers measure the factors that would affect the human welfare and environmental justice and then build a framework to guide the future waterfront development (Sairinen and Kumpulainen 2006). Other researchers are studying public and private partnerships and incorporate a diverse, yet integrated arrangement of land uses including residential, commercial, and existing water-dependent industries. This model has been described as “an essential paradigm of the post-industrial city” (Rousseau 2013). Since the 1980’s and 1990’s, policy and legislation such as amendments to the federal Coastal Zone Management Act and the formation of the Environmental Protection Agency in 1970 have provided governmental assistance for revitalization of urban waterfronts. While this support engages more urban centers and communities in the process, they have also initiated trends in waterfront regeneration that reveal an increase in privatization through the location of newly developed high-end housing with supportive infrastructure and commercial development. (G Desfor 2004). However, the research on how to combine private and public partnership in the waterfront revitalization

project is still missing. Thus, in this thesis, I will discuss mixed partnership in waterfront revitalization, drawing on case examples as sources of inspiration.

3.1 CASE EXAMPLES

Copenhagen waterfront revitalization

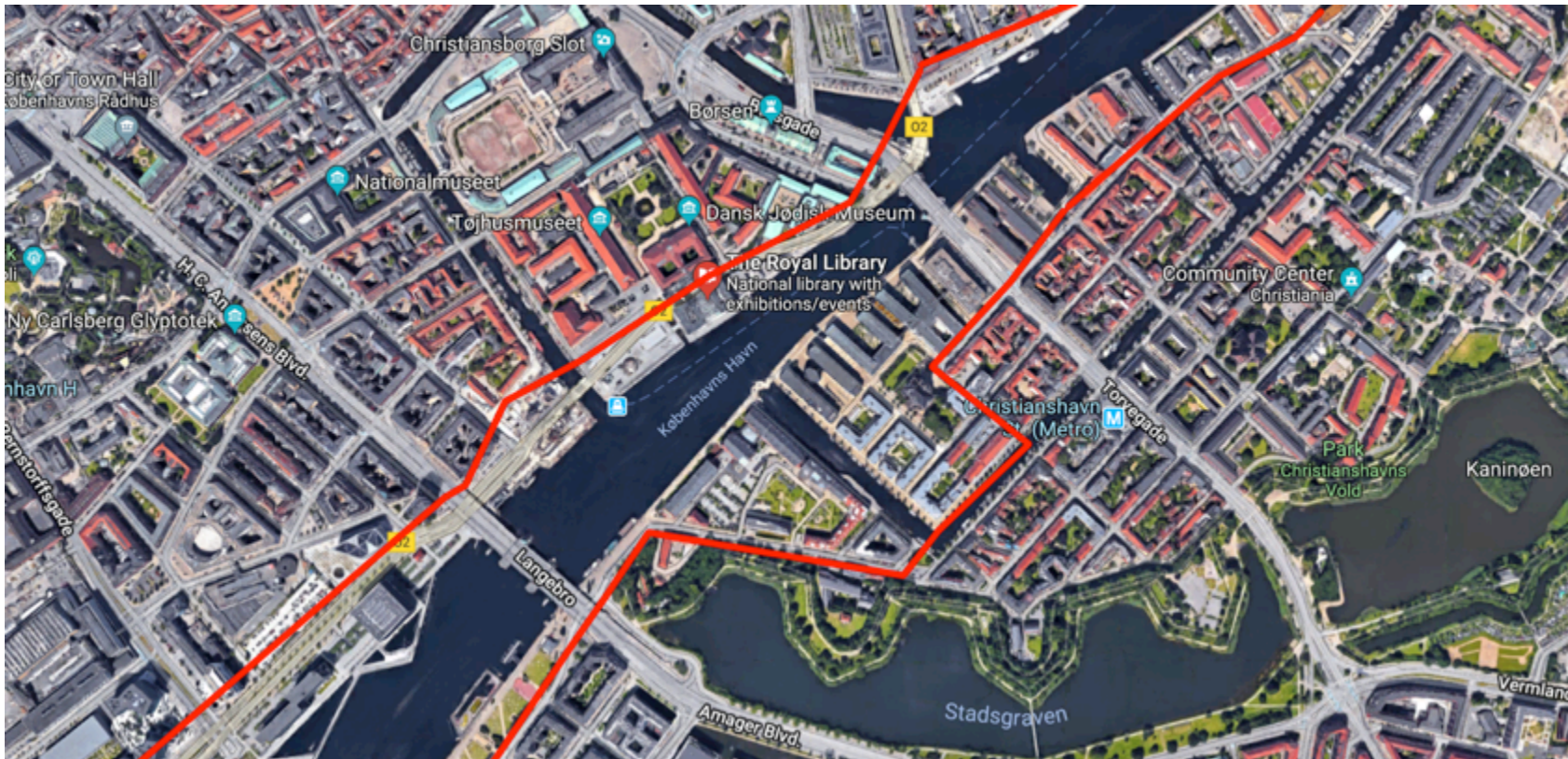


Figure 4 The plan of the current Copenhagen waterfront (image from Google map, accessed May 2018)

In the mid-to-late 1980s, due to deindustrialization and economic restructuring, Copenhagen experienced a high rate of unemployment, a growing elderly population, and serious budgetary deficits. Urban residents, especially the middle class, began to move to suburban areas to pursue a more livable environment, thus lessening the city tax base (Katz and Noring 2017a). Facing the loss of its traditional manufacturing base and a stagnating economy, the local government planned to take

radical steps to spur economic growth and to encourage people to move back to the city (Katz and Noring 2017b).

Beginning in the late 1980s, the nation, the local state and the port authority, undertook a number of planning and policy initiatives to revive the flagging city, and improve the urban environment. Transforming Copenhagen's waterfront to a livable, sustainable urban core area is a crucial point in this revival process (Katz and Noring 2017a).

In the first phase, the local government purchased the waterfront properties and rezoned the land for residential and commercial use. Then the city borrowed money from the national bank to pay the public transportation, the construction of new roads, pedestrian walkways, utilities, recreational and other amenities. The land value increased after the initial infrastructure development. In the second phase, the city sold or leased some part of the waterfront space to private developers. Restaurants, apartments, shopping malls and offices were built along the waterfront by private developers, which provided thousands of job opportunities. In the final phase, people began to move into the waterfront space. The commercial activities increased the tax revenues for the local government, which helped the local government pay back the money that they borrowed from the national bank (Katz and Noring 2017a).

In the Copenhagen mixed partnership development model, the revitalization effort increased the commercial yield of the publicly owned land and buildings without increased taxes ratio. During the waterfront development process, the local government regards the waterfront space as a future economic engine.



Figure 5 Copenhagen waterfront (photo by Hanyu Wang)

South Waterfront, Portland, Oregon

The South Waterfront in Portland, Oregon is a typical private-public waterfront revitalization project in the United States. It is a high-rise district (part of which is still under construction as of this writing) on former brownfield industrial land in the South Portland neighborhood south of downtown Portland. "The South Waterfront is part of the Portland Development Commission's North Macadam Urban Renewal District. The first phase of the South Waterfront is the \$1.9 billion "River Blocks" development. Construction began in early 2004." (https://en.wikipedia.org/wiki/South_Waterfront)The full build-out of the district envisions many residential units (primarily condominiums) and medical research towers ranging in height from 6 stories to 35+ stories (Hagerman 2007).



Figure 6 The current plan of south waterfront (image from Google map)



Figure 7 Image of South Waterfront, Portland, Oregon as currently constructed (source: <https://www.portlandoregon.gov/parks/article/618423>)

The high density of this mixed-use area improved the efficiency of land use, which allows the developers to build numerous public spaces and green infrastructure projects along the waterfront. For example, it includes a linear park called South Waterfront Greenway that runs along the west bank of the Willamette River. There is also a bicycle and pedestrian network along the shoreline space, which provide great opportunities for local residents' interaction.

The most successful design in South Waterfront is the mix of commercial, retail, office and apartments together through high density of building groups, which save a lot of space that was developed as a public green space and public waterfront. The public space attracts outside people to Portland, which stimulates commercial development and increases the tax base for the local government. In addition, the public transportation network in South Waterfront not only provides a fantastic walking experience but also activates the street-level public space in the South Waterfront.

4.THE PRIVATE- PUBLIC PARTNERSHIP WATERFRONT REVITALIZATION MODEL

4.1 THE PRINCIPLE

Globally, waterfront cities have begun to include the process of revitalization of their historical industrial waterfronts into their urban land use strategies, so that these areas may become new engines for future urban development. The revitalization process requires a forward-looking plan and effective management tactics in economic, ecological and human well-being aspects. In my mind, the contaminated derelict urban land also offers a tremendous opportunity to be developed as an urban economic engine, a livable and affordable community, an environmentally-friendly and safe open public space. In this thesis, I advocate for brownfield regeneration and redevelopment as a realistic model to repair the broken relationship between

humans and nature, to revitalize urban waterfronts, and to mitigate population boom problems in the future.

Waterfront revitalization is a complex problem. In this thesis I focus on the redevelopment of a waterfront brownfield site in Bellingham, Washington. This site offers a number of opportunities to recapture the urban waterfront, not only as an environmental clean-up project but as a way to redevelop the area to be an economic driver for the city as it grows. I believe the mixed partnership revitalization model is a tool to achieve this goal. Such a project interweaves numerous public benefits, private benefits, ecological benefits, and social benefits. It is difficult to balance all of these various benefits without a design framework. So here, I want to define what might constitute a successful waterfront revitalization project in the Bellingham waterfront, and I will use this framework to guide the proposed site design.

4.2 THE GOALS OF THE PROPOSED PUBLIC-PRIVATE MODEL

The mixed partnership model rests on four basic pillars: (1) Bellingham waterfront as an area for regional economic recovery, (2) the critical value of thoughtful environmental restoration, (3) human welfare improvement, and (4) Sustainable Bellingham waterfront community making.

4.3 THE CRITERION MAKING PROCESS

There are two main categories in the proposed model of redevelopment: the social aspect and the ecological aspect. Each of these is a necessary ingredient for a successful urban waterfront regeneration project. Each of these aspects will now be described in more detail below.

Social aspect: By this, I refer to human psychological and social benefits of accessing a revitalized urban waterfront. This includes public access to amenities and urban nature, access to goods and services through the provision of vibrant commercial space, and opportunities for social interaction.

1 Public accessibility to the waterfront

For any city on the water, the public should have access to the shoreline space as a basic public good. This, in turn enables people to have access to a variety of recreational activities, including boating, walking, sitting, gathering, having a picnic, kiting, biking, and fishing.

- Access to urban nature

In the proposed model, public accessibility also means that the general public also has greater access to vital urban green space around the Bellingham waterfront area. The urban green space should include P-patches, parks, ecological restoration

areas, and outdoor community centers.

- Access to commercial space

The proposal for this site would include commercial hubs with ground-level retail that is open to the public. In addition, the plazas and gathering spaces around the commercial area, would also be open to the public.

- Access to other people/social interaction opportunities

The design would encourage people to interact by mixing the private sector and public sector together.

- Population capacity for 20 years of urban development

Currently, the population growth in the city of Bellingham is rather rapid. Based on the United States Census Bureau's data, the Bellingham population growth rate is 2% each year. Thus, it is important to think about the community capacity for the future population growth.

2 Economic Revitalization

- Housing Affordability

Provide enough affordable housing in the Bellingham waterfront community to provide sufficiency living space for the

low-income families.

- Potential possibility of providing job opportunities

The revitalization of the urban waterfront, particularly with a mixed public-private model that includes residential and commercial space, would provide job opportunities for local residents, such as shop assistants, managers, and security guards, which could be helpful especially for low-income families as a way to balance the cost of living and income. The commercial hub and ground-level retail would provide great job opportunities.

3 Community Identity

- Human Historic awareness

The Bellingham waterfront revitalization efforts should provide a sense of social identity for the surrounding area. This could be achieved in several ways, including the recognition of the history of waterfront industry, and the history of Bellingham overall in the design process.

4 Mobility

- Public transportation infrastructure network

The proposed model would encourage public transportation for the Bellingham waterfront. Public transportation is an environmentally friendly way of getting around that mitigates traffic problems and enables diverse people to move around the city affordably. The public transportation would include light rail network and bus network.

- Bike infrastructure network

Since the proposed urban waterfront revitalization model encourages public transportation, the Bellingham waterfront revitalization efforts should provide people with a wonderful bike experience as well. Bicycle infrastructure should include bike parking, bike trails, and service stations.

- Pedestrian infrastructure network

The pedestrian experience is also important in the proposed model in general and for the Bellingham waterfront revitalization project in particular. The pedestrian network includes, walking paths, sidewalks, bicycle and pedestrian mixed trail, waterfront wooden deck and service stations. Besides, it would activate the ground space by attracting people to walk outside.

Ecological Aspect: Given that the focus of this thesis on an urban waterfront brownfield site, it is imperative to address

ecological restoration aspects of the site redevelopment. Here, consideration must be given to habitat, including that for local aquatic species, as well as cleaning contaminants from the soil through multiple means, such as phytoremediation and including green stormwater infrastructure in the redevelopment.

1 Habitat

1.1 Local aquatic species

One of the most important things about any successful waterfront revitalization project is restoring the marine environment. This is certainly true, then, for Bellingham Washington, where such a restoration would need to take into consideration the impacts on key indicator species like salmon. In 1999, Chinook salmon were listed as threatened under the Endangered Species Act in the waters throughout the Bellingham area. Thus, designers should think about how to protect the habitat of local aquatic species.

1.2 Local bird species

There are several bird species around Bellingham waterfront area, which includes cormorants, Canadian geese, great blue herons, hooded mergansers, bald eagles and mallards, to name a few. Thus, protecting the birds' habitat is also very important to balance the local ecosystem.

2 Green storm water infrastructure

Bellingham receives an average annual rainfall of 34.84 inches, and most rain arrives in November, which may cause flooding(<https://en.wikipedia.org/wiki/Bellingham>). Therefore, it is important to consider green stormwater management in the Bellingham waterfront revitalization process. Green storm water infrastructure would include a bio-swale network, rain gardens, and bio-retention ponds.

3 Soil Mitigation

Since a portion of the Bellingham waterfront has been used as an industrial area, the soil has been seriously contaminated. The site is primarily contaminated with heavy metals, petroleum compounds, and solid waste(Bower 2013a). It necessary to bring this environmentally compromised land back into productive use. And soil mitigation process should be regulated by the Washington State Model Toxics Control Act.

5. SITE BACKGROUND

5.1 SITE CONTEXT AND SITE HISTORY

Bellingham's current waterfront is made up of land forms created by filling tidal flats over the past century. Before this filling occurred, these tide flats provided food and protection to young salmon as they left nearby rivers and adjusted to salt water in preparation for a journey out to sea.

“For the last 100 years or more, Bellingham's waterfront has served the regional economy as a thriving industrial area, transportation gateway and home to many maritime activities “(Bower 2013a). In 1891, the Great Northern Railroad finished an overwater rail trestle across the mud flats on Bellingham's central waterfront allowing the distribution of goods across a new, nationwide rail network. In the early 1900's, the Whatcom Creek federal waterway was established and silt from the dredged waterway was used as fill along parts of the waterfront.



Figure 8 A photo of historical Bellingham waterfront in the 20th century. Photo by J.B.Hann

In 1926, Ossian Anderson opened Bellingham's first pulp mill on the south side of the Whatcom Waterway creating a new economic opportunity for Whatcom County's extensive timber resources (Bower, 2013a). After that, several factories such as Pacific Coast Paper Mills and Puget Sound Pulp were founded and operated as major employers in this area. More factories activity related to the pulp mill and the production of ethyl alcohol was found in Bellingham waterfront through the 1930's and 440's. (Bower 2013a). In the early 1960's, Georgia-Pacific acquired the waterfront mill site. These industrial business

continued through the following decades, discharging various waste products to adjacent waterways and upland properties (Bower 2013a). During this time, the general environmental protection awareness has not been taken, which caused a serious environmental pollution.

In 1972, the United States passed the Clean Water Act, ushering in a new era of pollution control (Bower 2013a). AS a response to the growing framework of this new environmental regulations, Georgia-Pacific built a 36-acre wastewater treatment lagoon on the north side of the Whatcom Waterway to treat the polluted water. (Bower 2013b) The GP mill adjusted to economic trends over the years, but in 2001 the pulping operation was permanently closed down. This signaled a slow decline that continued until Georgia-Pacific closed its Bellingham site permanently on December 21, 2007(Bower 2013a).

In early 2005, the Port of Bellingham acquired approximately 137 acres of waterfront property and tidelands adjacent to Bellingham Bay. This is the site where I want to apply my new waterfront revitalization model.



Figure 9 Existing Bellingham waterfront. Source: <http://www.bellinghamherald.com/news/local/article35725161.html>

5.2 EXISTING PROPOSAL

The City of Bellingham and the Port of Bellingham have joined together to transform the vacant brownfield site on the waterfront into a thriving urban neighborhood with a variety of housing, employment, institutional and recreational uses. The 2006 City of Bellingham Comprehensive Plan establishes goals and policies to guide future decision-making and coordinate

growth within the City over a 20-year planning period (Bellingham Planning & Community Development Department 2014). The existing proposal projects a demand for 1,225 infill housing units in the Central Waterfront District Urban Center, and an additional 1,321 units in the Downtown Core Urban Center by the year 2025 (Bellingham Planning & Community Development Department 2014). The public investments are intended to attract substantial private sector investment and generate long-term positive impacts for the community. The property, along with other Port, City and private properties, made up what was initially called “New Whatcom,” and later renamed the “Waterfront District.” In 2012, the sub-area boundary of Bellingham waterfront district was expanded,



Figure 10 existing plan for Bellingham waterfront source: Bellingham Waterfront

which includes a bluff along Boulevard and State Street to make the boundary contiguous with Sehome and South Hill in Bellingham. (Bellingham Planning & Community Development Department 2014).

The current Bellingham Waterfront District is a 237-acre industrial brownfield redevelopment project along the shoreline of Bellingham Bay in Bellingham, Washington. The Waterfront District will be developed into a mixed-use urban development over the next 40–50 years as city of Bellingham converts from an urban center dominated by maritime industry into one of service industry, tourism, and dense downtown residential life. In this existing proposal the Port committed to pay for most of the environmental cleanup of the waterfront, to build marine infrastructure, and to dedicate land for parks, public space and rights of way.



Figure 11 Vision of Bellingham waterfront. Source: Stephanie Bower

6.VISIONING AND DESIGN INTERVENTION

6.1 CONCEPT

A mixed partnership redevelopment model would include both private and public investment. The initial phase for redevelopment would be the transformation of land ownership of the Bellingham waterfront. To do so, Bellingham has to purchase the waterfront land and properties and rezone the land for residential and commercial use in the mix partnership model. Then, then cost of waterfront revitalization, which would include mitigation, infrastructure and commercial and residential construction could be more manageable.

The second phase is mitigating the contaminated soil and water and restoring the ecological systems. Most of the Bellingham waterfront is built on tideland, which has been dredged and filled to support 100 years of heavy industrial waterfront activity. The site is affected by soil, groundwater and sediment contamination caused by historic releases of hazardous substances. Bringing this environmentally compromised land back into productive and valuable land to serve the communities and public

is a critical part of this project.

The infrastructure build up would follow the mitigation process. Public investment would provide funding to establish the basic infrastructure, which includes green and transportation infrastructure and utility and recreation amenities. The goal of this process is to increase the waterfront land value and attract private investment while providing critical amenities and services (e.g. public transit) to local residents. Such infrastructure would not only serve the residents of the new waterfront community, but it would also serve all citizens of Bellingham. After this process, the land value of Bellingham waterfront space would increase.

The third phase of the waterfront revitalization is transforming the ownership of valuable land from public to private while guaranteeing public accessibility to the waterfront space. The Bellingham government would sell part of the land to the private developer at a good market price, because of the high land value. The private land would be developed as commercial and residential space. The remaining waterfront land would be developed as parks, plazas, playgrounds and corridors, all open to the public. Several principles should be followed in this phase. First, keep the environmentally sensitive areas, such as the

shoreline and local habitat, in low human impact, which means developing them as parks and restoration fields rather than developing them as a commercial hub and high-density residential area. To guarantee public accessibility, the private sections should not impede access to waterfront space.

The fourth phase is core area build-up. The core area would include one commercial hub, one affordable community, one public green space network, and one single-family house community. The green space and plaza would be developed by the private developer and be open to the public. As a trade-off, the commercial hub and affordable housing would have relative high building density, so that the private investors can balance the construction cost and profits. The single-family housing is relatively low density.

6.2 BENEFITS OF THE CONCEPT

There are several benefits on the mixed partnership model.

First, the development process enables a cycle. The city of Bellingham invests funds from the sale of the public land and assets under government control in a broad range of infrastructure projects. These infrastructure improvements increase the value of the remaining public land and assets, which enables the private developer to invest further.

Second, compared with the private development model, the mixed partnership model has more publicly accessible space. In the mixed partnership model, public investment shapes choices about where people live and work, and it influences the nature and location of private investment, and affects the quality of local life. Since public investment in redevelopment tends to be more focused on public welfare, the mixed partnership model has greater potential to offer better quality infrastructure and public environment.

Third, public investment can boost growth and provide the right infrastructure to promote private investment that would benefit waterfront redevelopment economically. From the Copenhagen waterfront revitalization project and South Waterfront project in Portland, we know that well-developed private sections would provide numerous job opportunities and increase tax revenues. The taxes would pay the initial public investment back and improve the financial situation of local government. It

provides a potential possibility for the waterfront to develop as an economic engine.

Fourth, in the mixed partnership model, private investment would reduce the dependence on public funding in waterfront brownfield revitalization projects. Currently, there are thousands of existing brownfields near the waterfront in the United States (<https://archive.epa.gov/pesticides/region4/landrevitalization/web/html/brownfieldsites.html>). It's hard to revitalize all the waterfront space only by the limited public resource. Thus, introducing the private funding into waterfront revitalization process is a good way to alleviate the federal funding shortage.

Fifth, the mixed partnership model also has some potential social value. A good connection between the privately-funded section and the publicly-funded areas would increase the potential interaction between people. The public gathering spaces and pedestrian networks in the waterfront area could provide great opportunities for the residents in the community to have more chances to meet and make new friends with strangers (Carr et al. 1992).

6.3 OVERALL DESIGN STRATEGIES

- Balance the public welfare and private investment benefit of using a mixed redevelopment strategy through a careful spatial distribution of private investment and public investment.
- Explore the opportunity to rehabilitate the hardened, contaminated shoreline area for improved habitat and public access.
- Consider and celebrate the local place identity of the Bellingham waterfront by representing its history.
- Guarantee the majority of the water's edge remains accessible by providing pedestrian walkways, bicycle trails and a public green space network.
- Restrict the public access to the environmentally sensitive area, protecting sensitive habitat.
- Mix the private sector with public sector on the site to provide opportunities for social interaction. Encourage sharing space in the residential area and commercial area.



Figure 12 Vision of Bellingham Bay. Drawn by author

6.4 DESIGN APPROACH

This Bellingham waterfront revitalization project focuses on three aspects:

- The economic strategy

Stimulate the regional economy through encourage the retail and commercial space in the site. Maintaining a balance between jobs, housing, retail development and public service on the Bellingham waterfront. Developing a phasing plan, which establishes a ratio between retail, services, offices or institutional uses, and residential development on the site.

- The ecological strategy

Cleanup methods would include treating, removing, or isolating contaminants in order to reduce exposure to humans and the environment. It would also include phytoremediation strategies. For each site, a range of cleanup options must be employed that meet federal environmental requirements given the current and planned uses of the property. In general, the ecology restoration would begin from the shoreline space. in the mixed-use brownfield development model, some public space would be arranged along the waterfront space, such as fishing platform and rain gardens. in addition, this area would have relatively low density of buildings.

- The social strategy

The historic industrial building would be reused as public space to maintain the place identity of the site, and some commercial and retail would be arranged in this area. Besides, the public sector should be mixed with private sector, and most green space (includes some community centers) is open to public to improve the social interaction.

6.5 DESIGN VISION

There are three sectors in the Bellingham waterfront revitalization proposal (See Figure 14). The first sector is the north industrial area. This area contains boat making facilities, aquaculture, and other light industry, which provides job opportunities for people. Green buffers, such as wetlands and parks, surround this area to protect nearby residents. There is a rectangular wooden platform extend to Bellingham Bay, which is used as boat making factories before. It is a landscape sightseeing platform, which is open to the public.

The middle sector is a commercial hub and affordable residential community, which is connected to Bellingham's downtown. Some existing industrial elements, such as industrial containers and industrial buildings, are kept in this area. These industrial elements would be transformed into offices and a shopping center. There would be public wooden platforms and public beaches along the shoreline area. The design strategy here is enhancing the beach to support public access.

The south sector would be the location of the single-family housing community and ecological restoration area. This area has a relatively low density of buildings with several private community centers. Since the south ecological restoration area has been used as a landfill, it will be necessary to replace a portion of the soil in the area with a soft bank and enhance the bank to improve habitat and public access.

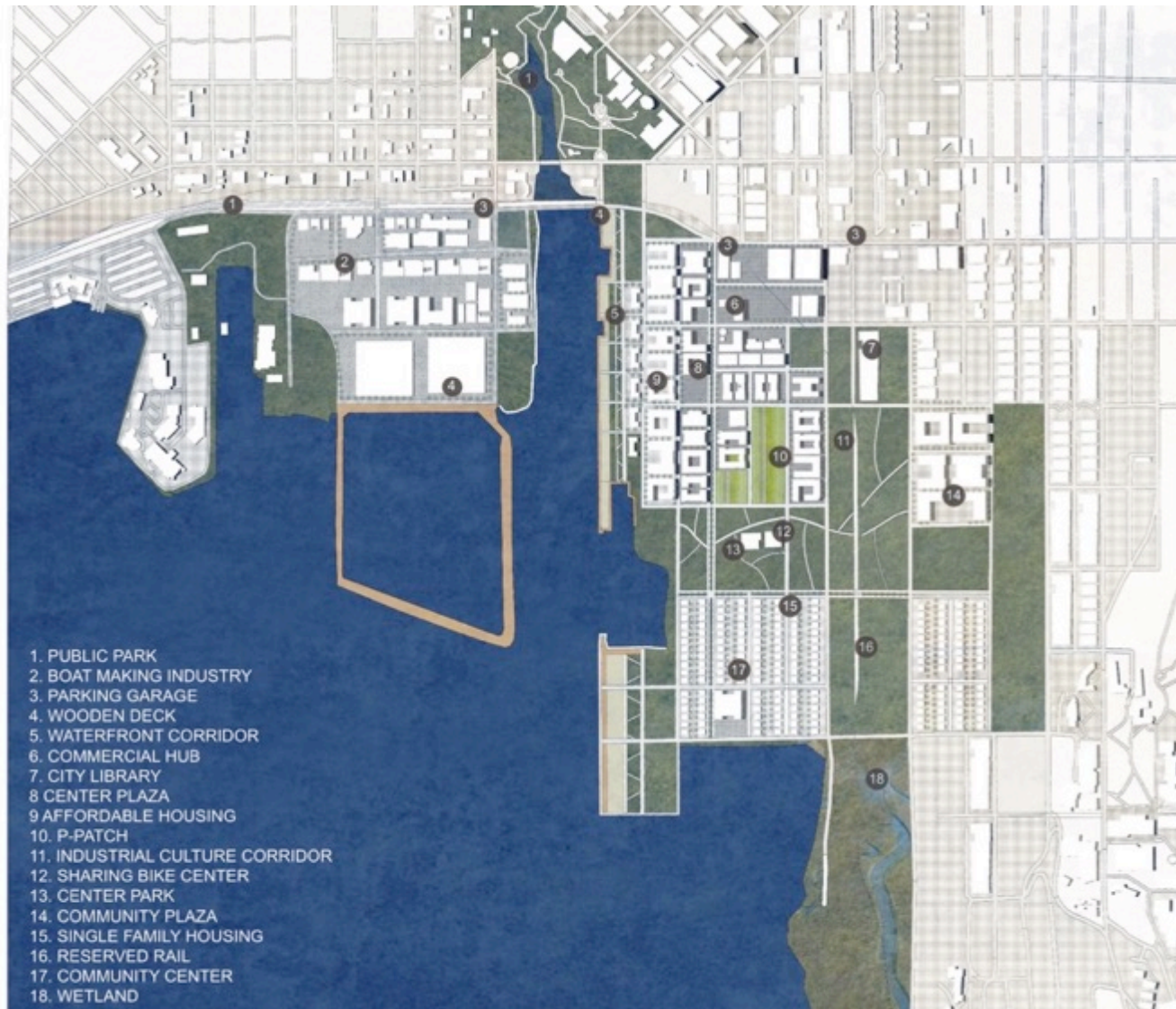


Figure 13 Bellingham waterfront master plan by author

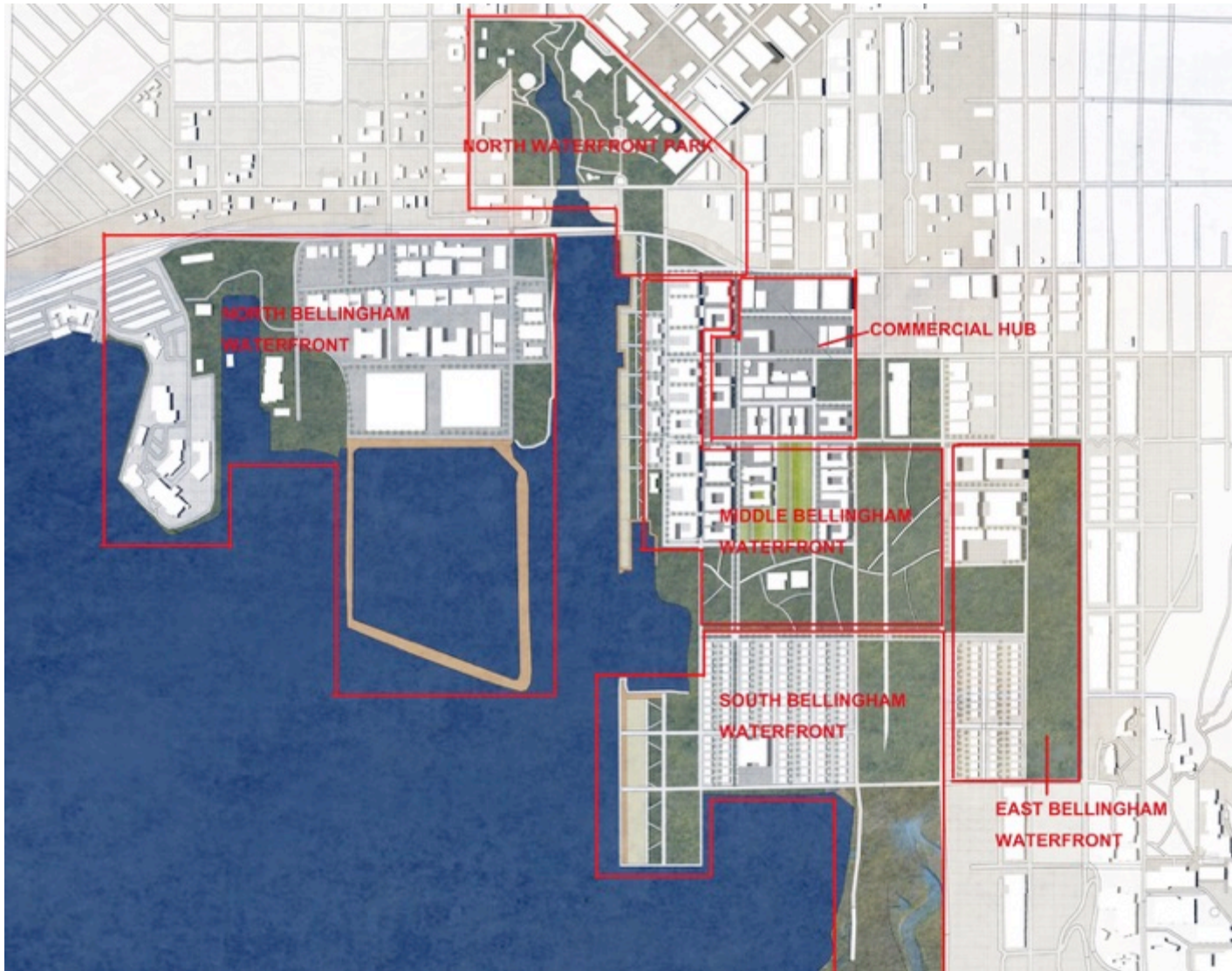


Figure 14 The Bellingham waterfront mixed model development plan arranged by Sector.

Affordable apartments

The height of affordable apartments in the proposed Bellingham waterfront revitalization project is between five stories to seven stories. They are located in the middle of the project, where is near the commercial hub and waterfront. The bio-swale network will go through this area to collect the storm water from the apartment rooftops.

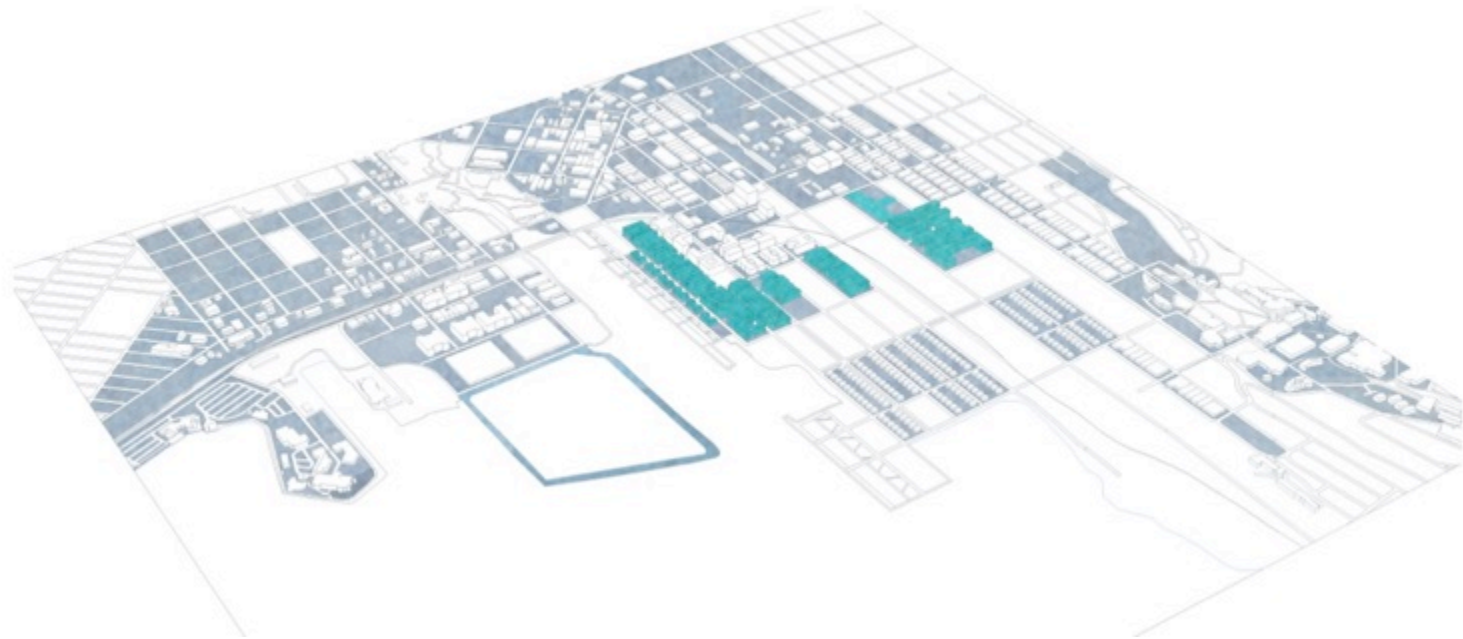


Figure 15 Diagram of affordable apartments

Boat making port

This port has been used as boat storage for more than 70 years. In the revitalization project, I would keep this port as a cultural element to record the history of the boat making industry in the Bellingham waterfront. Besides, boat making is one of the basic industries, so keeping this port is crucial to stimulate Bellingham waterfront economy in the future.

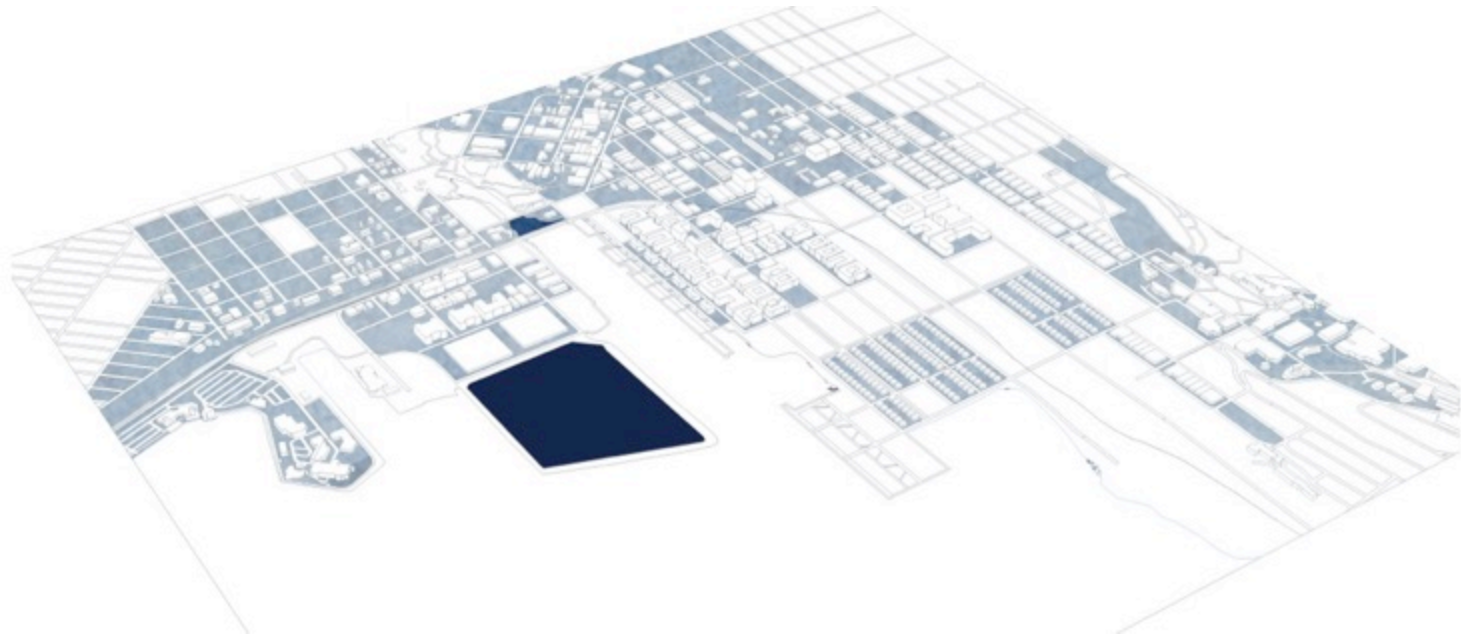


Figure 16 Diagram of boat making port

Public waterfront

The public waterfront is located on the east side of this site, near the affordable residential community and single-family housing. This public waterfront guarantees the public access to the shoreline area and provides a variety of social space for people interaction.

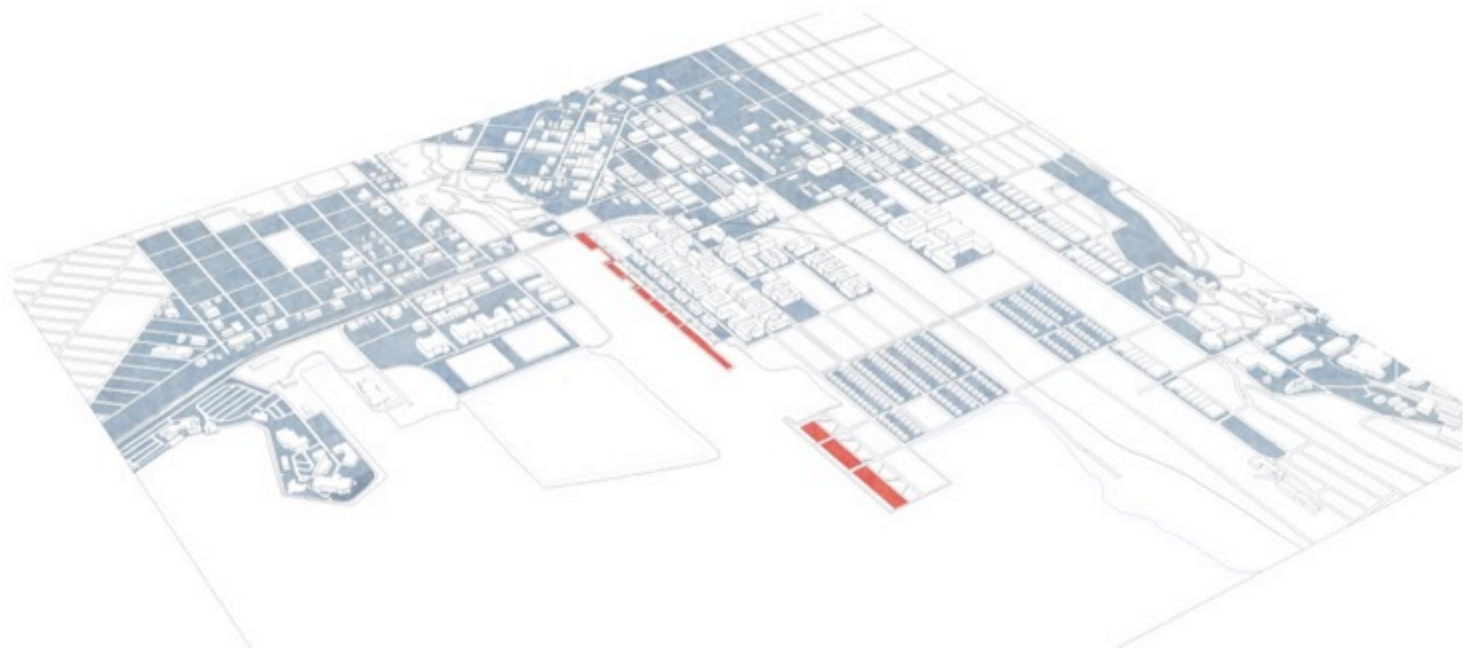


Figure 17 Diagram of public waterfront

Single-family housing

Three-story row houses are developed in south of Bellingham waterfront. There is a community center in this community and several alleys that provide parking spaces. Since this piece of land is surrounded by the good quality of landscape, the land value is relatively high. The public developer can sell this piece of land at a relatively high price to the private developer, which would help the public develop to keep a balance between initial public investment and budget.

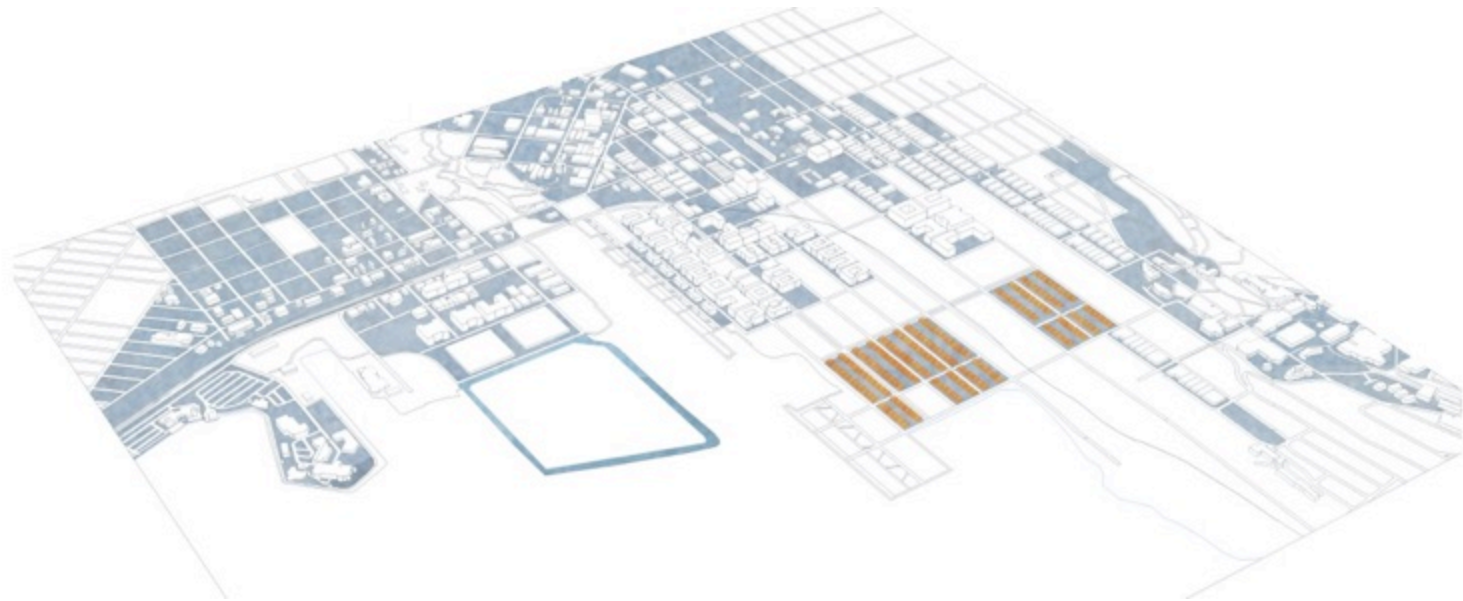


Figure 18 Diagram of single family housing

Commercial space

The Bellingham waterfront commercial center is located in the northeast portion of this project. The commercial center includes one shopping mall; five mixed-used buildings with residential and retail space; along with several offices. There is a commercial plaza to provide the public with a main gathering space. Besides, a public transit station would be sited in the commercial center to provide convenient public transportation. This space would be an economic engine for the Bellingham waterfront, and it would supply tax revenue for the local government.

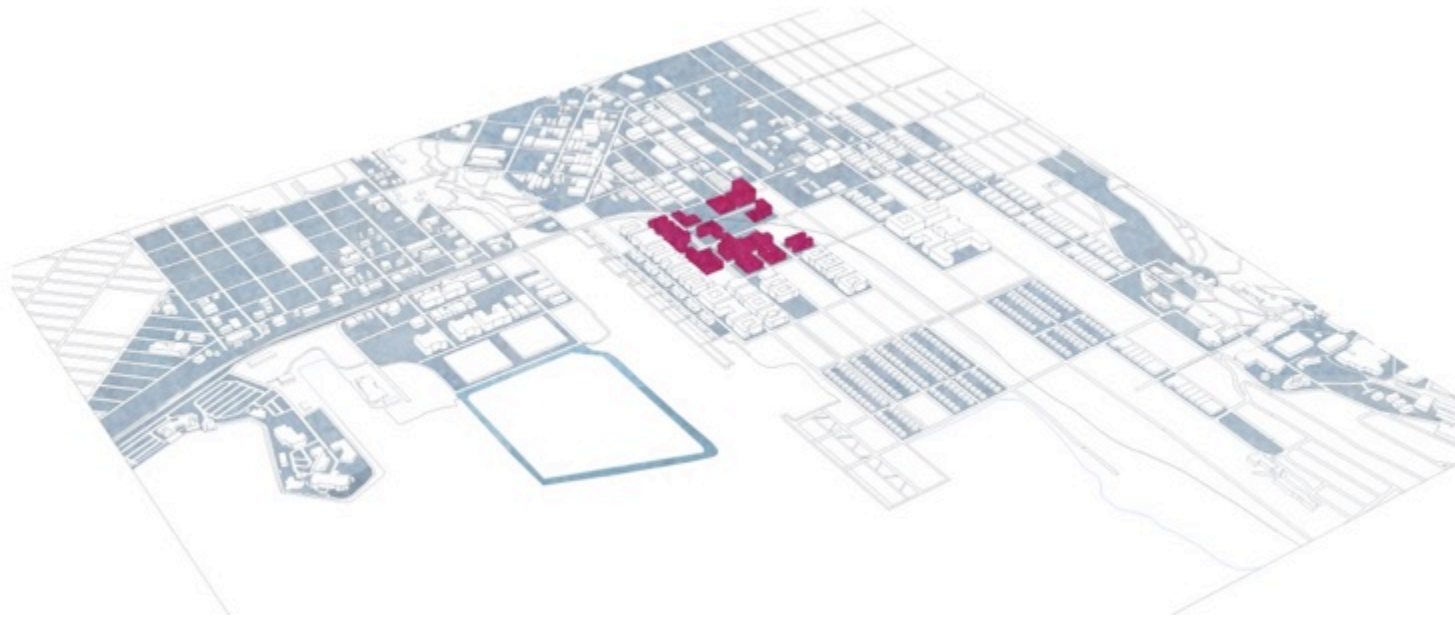


Figure 19 Diagram of commercial space

Culture corridor

The proposed culture corridor is located in the west side of this project site. There would be a themed sculpture park and other cultural elements in this area. The design goal of this area is representing the history of Bellingham history and providing place identity for residents.



Figure 20 Design vision of culture corridor

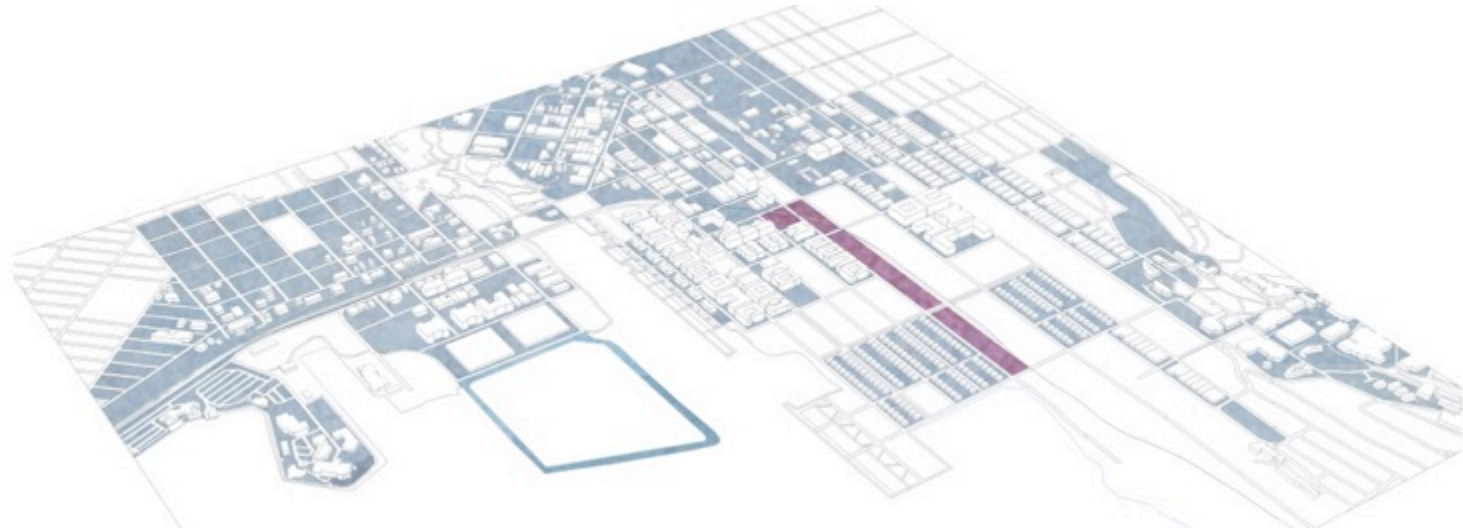


Figure 21 Diagram of culture corridor

Wetland

The wetland system would not only serve as an ecological node but also serve as a public park. The shoreline portion of the wetland will provide habitat for the local plant species through an eco-bulkhead approach. Several pedestrian and bicycle trails are going this wetland to provides the residents and tourists a place to walking, running, and have a close touch with nature.

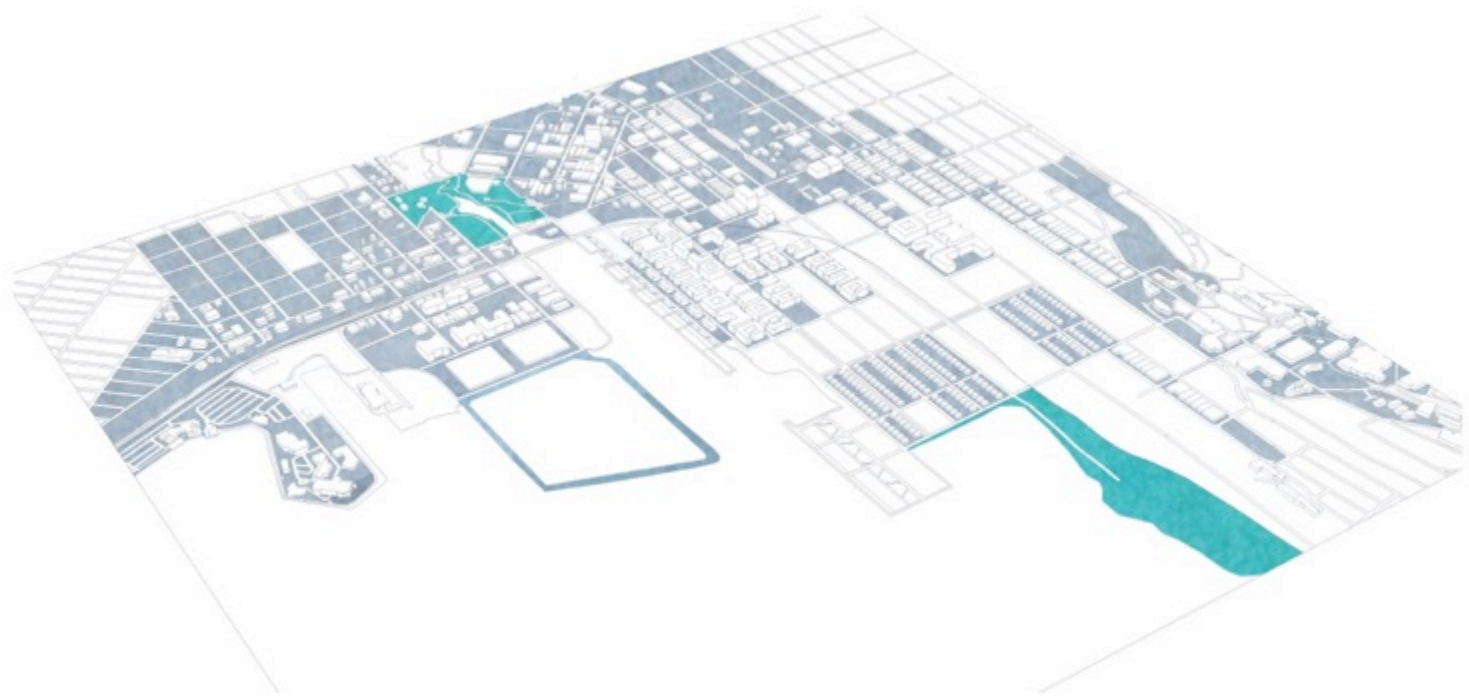


Figure 22 Diagram of wetlands



Figure 23 A sample of eco-bulkhead. Souce: Design and Photo: Marine Restoration and Construction, LLC

P-patch

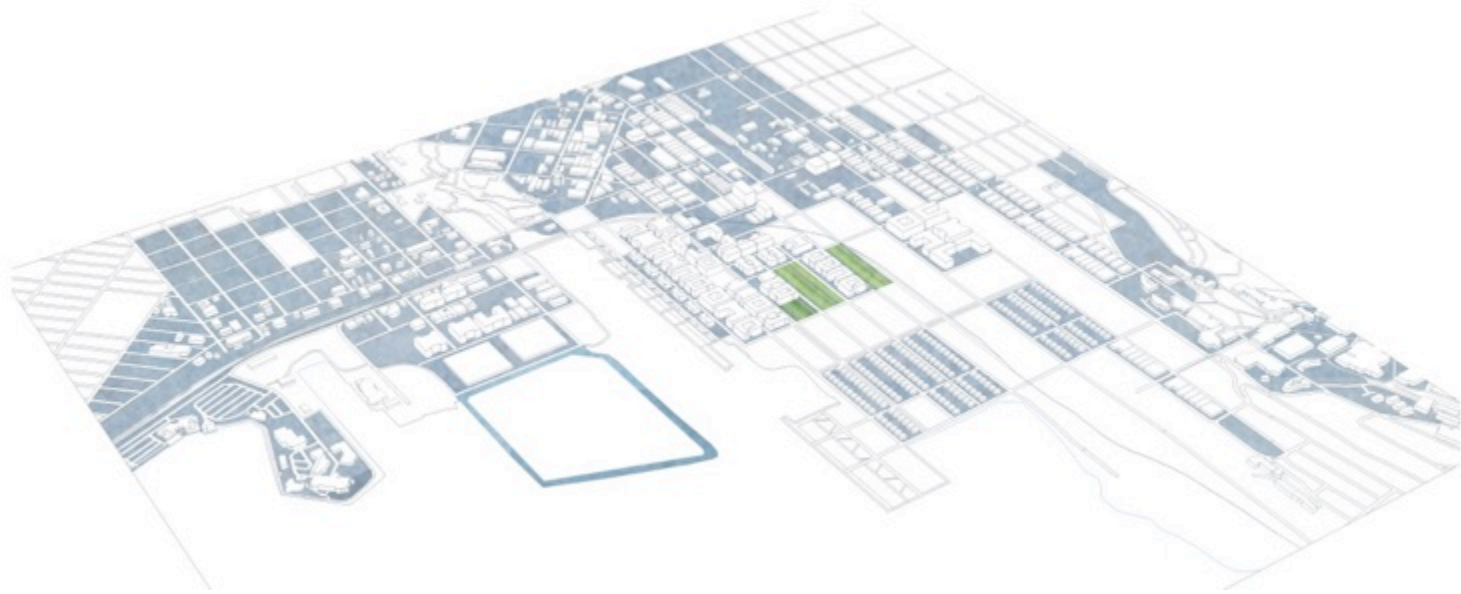
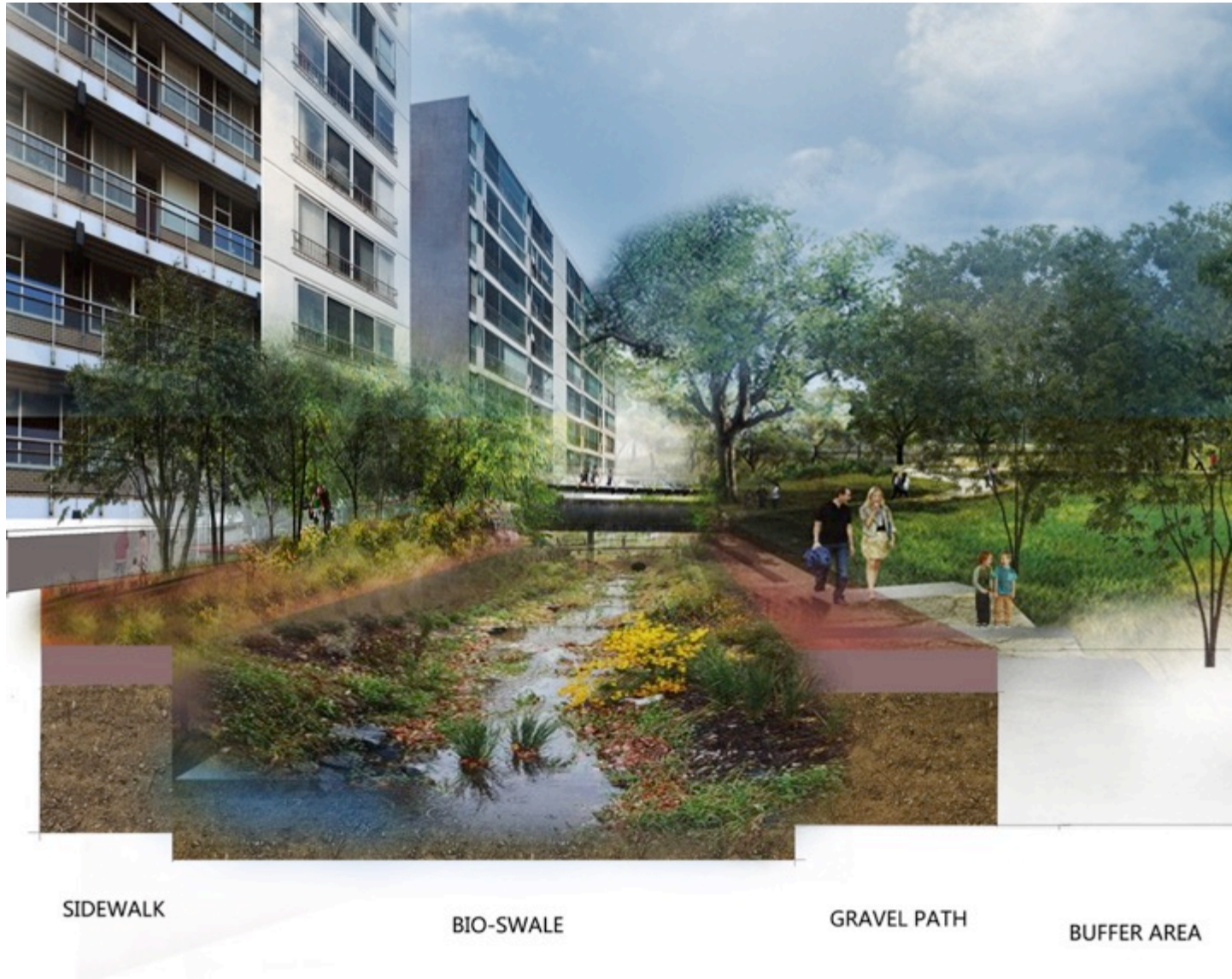


Figure 24 Diagram of affordable P-patch



SIDEWALK

BIO-SWALE

GRAVEL PATH

BUFFER AREA

Figure 25. The section of bio-swale in the proposed Bellingham waterfront revitalization

7 Conclusion

Since there are complex and interwoven benefits of waterfront revitalization, it is necessary to explore a new model to balance the public benefits and private benefits. The mixed partnership model needs a high connection and interaction between private investment and public investment, which brings numerous benefits, including public welfare, economic stimulation, and ecological benefit. In this model, public investment is the catalyst to attract and promote regional waterfront development. In the initial phase, the public developer is in charge of the reorganized land ownership and land use policy. After that, the public developer will supply basic infrastructures, which includes green infrastructure, stormwater infrastructure, utility infrastructure, public transportation and other infrastructure to serve the regional waterfront development. Private investment plays a role in facilitating the waterfront revitalization. The private sectors contain the private condominiums, private waterfront community, and some commercial and mixed-used buildings. These sectors would promote the economic development, increase the land value and increase the tax revenue in the waterfront revitalization, which will help the public investment to get the return on its initial investment.

Also, the mixed partnership model will guarantee the public welfare and access, while encourages the private development in the waterfront revitalization. Through this paper, we know that it's hard to for the public to get access to the public waterfront when the private developers are involved in the waterfront revitalization with the traditional model. This model gives the opportunities to rethink the balance between private benefits and private benefits.

8. Reflection

This thesis provides a future vision of the Bellingham waterfront revitalization. Even though the existing site condition has many constrictions, which include contaminated soil and water, and some existing industry buildings, there are opportunities to redevelop this site as the center of Bellingham in the future. The design framework proposed here is a useful tool to guide the design process. I hope there would be more research on the mixed partnership model for this waterfront revitalization project. How to facilitate the interaction between private space and public space in detailed design proposals still needs to be explored in this mixed partnership model. In the design process, I found that exploring the individual and public relationship only on the macro-planning level is not enough; designers should also explore the public- private relationship on the

micro-level spatial level as well.

9. Bibliography

- Adelaja, Soji, Judy Shaw, Wayne Beyea, and JD Charles McKeown. 2010. "Renewable energy potential on brownfield sites: A case study of Michigan." *Energy Policy* 38 (11):7021-7030.
- Bacot Hunter, Bacot Hunter. 2006. "Establishing Indicators to Evaluate Brownfield Redevelopment." 20 (2):142-161.
- Barlow, J. & Ozaki, R. 2003. "Achieving 'customer focus' in private housebuilding: current practice and lessons from other industries." *Housing Studies*:87-103.
- Barlow, James. 1999. "From craft production to mass customisation. Innovation requirements for the UK housebuilding industry." *Housing Studies* 14 (1):23-42.
- Bower, Setephanie. 2013a. "The waterfront district sub-area plan - A port of Bellingham/City of Bellingham Partnership Project."
- Bower, Stephanie. 2013b. "The waterfront district, Bellinham, Washington."
- Carr, Stephen, Mark Francis, Leanne G Rivlin, and Andrew M Stone. 1992. *Public space*: Cambridge University Press.
- Department, Bellingham Planning & Community Development. 2014. *Waterfront District Permitting Handbook*.
- Desfor, Gene. 2011. *Transforming urban waterfronts : fixity and flow, Routledge advances in geography*. New York: Routledge.
- G Desfor, J Jørgensen. 2004. "Flexible urban governance. The case of Copenhagen's recent waterfront development." *European Planning Studies* 12 (4):479-496.
- Goodwin, Robert F. 1999. "Redeveloping deteriorated urban waterfronts: The effectiveness of US coastal management programs." *Coastal management* 27 (2-3):239-269.
- Hagerman, Chris. 2007. "Shaping neighborhoods and nature: Urban political ecologies of urban waterfront transformations in Portland, Oregon." *Cities* 24 (4):285-297.
- <http://worldpopulationreview.com/us-cities/seattle-population/>.
- <https://archive.epa.gov/pesticides/region4/landrevitalization/web/html/brownfieldsites.html>.
- https://en.wikipedia.org/wiki/Bellingham,_Washington.
- <https://www.epa.gov/>.
- Katz, Bruce, and Luise Noring. 2017a. "The Copenhagen City and Port Development Corporation: A Model for

Regenerating Cities."

Katz, Bruce, and Luise Noring. 2017b. "Why Copenhagen Works."

Lange, Deborah, and Sue McNeil. 2004. "Clean it and they will come? Defining successful brownfield development." *Journal of urban planning and development* 130 (2):101-108.

Maslia, Deborah Held. 2006. " Atlantic Station shopping a retail rush for city." *Atlanta Business Chronicle* .

Reuschke, Darja. 2001. "Public-Private Partnerships in urban development in the United States." *NEURUS Program, University of California in Irvine*.

Rousseau, Max. 2013. "Post-industrial cities: towards a new approach."

Sairinen, Rauno, and Satu Kumpulainen. 2006. "Assessing social impacts in urban waterfront regeneration." *Environmental Impact Assessment Review* 26 (1):120-135.

Steven Tiesdell, David Adams. 2007. "Design matters major house builders and the design challenge of brownfield development contexts." *Journal of Urban Design*:23-45. doi: 10.1080/1357480042000187695.

Wohlfeil, Samantha. 2015. "Massive overhaul of Bellingham waterfront underway."