Edge city,
beyond edge city

Colophon

Msc thesis
Autor
Seul Lee
4518853
nova2004@gmail.com

1st mentor
dr.ir. Taneha K Bacchin

2nd mentor
Prof.dr.ir. Han Meyer

Delta interventions studio
MSc Urbanism
Faculty of Architecture
Delft University of Technology
Delft, The Netherlands

Studio coordinator: dr.ir. Taneha K Bacchin

Abstract

Historically, cities are shaped by the transport system as it was considered as the most crucial element for economic growth. However, the advance of infomation technology broke the strong relationship between the city shape, the transport system and the economic growth. Since the flow of information is no longer dependant on the physical transport system today, modern cites recently show the limits of current design methods in their urban spatial structure.

In the meantime. Landscape urbanism has been discussed as an alternative way of designing urban spatial structure. However, the actual method for design process is not developed yet. The problem of the method developing process is that Landscape urbanism does not have a quantitative part to materialize the concept of landscape as a structuring element.

For this reason, this paper attempts to combine landscape urbanism with a quantitative tool, Spacematrix. By the marriage between them, landscape urbanism have a tool to materialize the idea of re-structuring a city with nature. At the same time, a new usage of spacematrix for design process is discovered.

San Jose is a case chosen for the process of developing the method because the current situation of the city shows the struggle of the new urban transfomation. It is located in the southern part of San Francisco bay, greatly overlapped with the area of silicon valley. Since the silicon valley has shown noticeable economic performance last decades, it has been gradually expanding, and reaching the periphery of the city toward the sea.

Today the area cannot offer enough land for new development of the silicon valley because of the shortage of available land. Besides, the trend of sea level rising is also threatening the availability of land. As a result, the migration of silicon valley is getting accelarated every year. In the process of developing the method. Therefore, this paper focus on providing a solution for both the development issue and the flood problem based on landscape urbanism and spacematrix.

Contents

Introduction 1
Aim of the project 2
Theoretical framework 4
Methodology 15
Relevance 16

Analysis 17

Bay scale 23
City scale 31
Neighborhood scale 50

Synthesis 74

Problem statement 84
Research question 85

Design 86

Vison 90
Strategy 93
Tools 94
Area 95
District 98
Block 102
Neighborhood 120
Plans 127

Implementation 159
Conclusion 170

Reference 176

Alviso is a neighborhood in San jose, located in the lowest point of San Francisco Bay. Since it was built, it has been always one of the most vulnerable areas toward floods in the bay. It has not only flood risk by the peak discharge of rivers, but it also has the threat coming from gradual sea level rising by climate change. However, the natural threat is not the only one issue of the area. It is physically isolated from the city. Yet it is not a self-contained neighborhood because local industries, such as, canning industry based on agriculture in the area, fishery and salt production, died out in the process of economic transformation in the bay area.

Today, the sprawl of Silicon valley is happening in the backyard of Alviso, which does not have any relation to the physical condition of the area. The reason of having the industry is there was enough availble land and the price was cheap. As the economy of the Silicon valley has boomed from 1970's and onwards, it has become the economic core of the region. In fact, its economy is overwhelming San Jose today. The silicon valley is turning the original downtown of San Jose into an commuter town, which is not sustainable for the city in a long term.

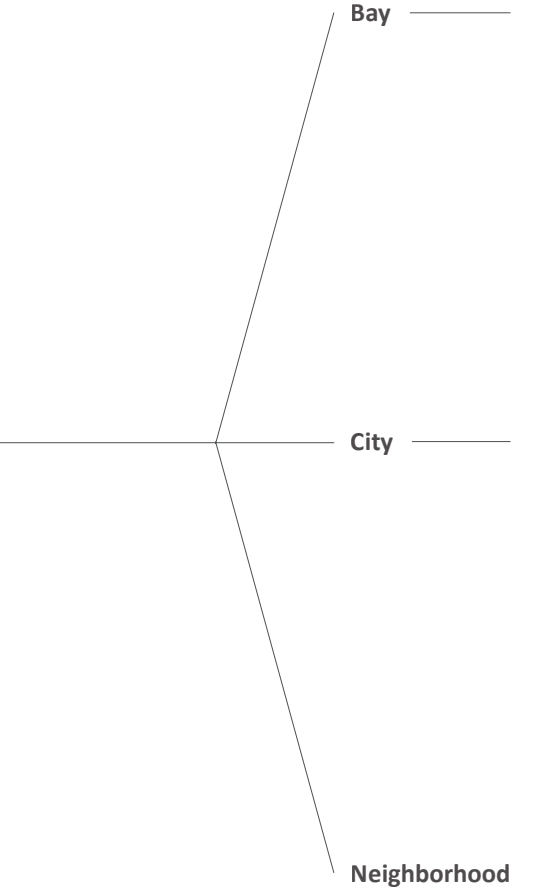
In the meantime, the value of landscpape in this area has been recently re-evaluated, and as a proof, there are marsh restoration projects on former salt pond. Yet, there is no relationship between urban area, such as Alviso, Silicon valley and San Jose, and the value of landscape in the area, although it has potential to offer new types of spatial quality and a new urban spatial structure as well as the improvement of flood protection. Therefore, this paper focuses discovering a way of intergrating those elements together for a new urban transformation.

Problem
field 1.

Urban spatial structure, responding to change of economy

Urban spatial structure

San Francisco bay has urbanized with the certain economic purposes through time. In each period, there was a spatial condition to develop a certain type of industry in a specific area. Now that integrity is lacking because of the advance of infomation technology. Nevertherless, the economy of the Silicon valley in San Jose has been thriving by agglomerative economy for decades. Today its economy is too big for San Jose as it is rather functioning as the CBD of San Francisco bay. As a consequence, San Jose is becoming an employment center of this new core. Considering the economy continuously change s with new technology, current situation is not sustainable for San Jose in a long-term. Threrefore, the aim is to find a new relationship between the original downtown of San Jose and the new core in urban design and planning



Problem field 2.

Underated value of landscape

San Franciso bay has unique landscape formed by the ecosystem of estuaries. Marsh is one of major assets of estuary, providing habitats for many different species and unique spatial quality. However, it was exploited by profitization for decades, and the value of landscape for urban spatial structure was also ignored. Recently, there are many marsh restoration projects going on while the needs of public open space is increasing in urban area. Yet, there is still no spatial connection between the urban area and landscape. For this reason, the aim is to provide urban design and planning for the area utilizing landscape as a structuring element.

Problem field 3.

Urban form after edge city

After the advent of automobile technology, high mobility of individuals created a vast polycentric region. In this process, th construction of ring roads, which is the inter-state highway, played a crucial role of building edge cities. The Silicon valley is one of them. Today the Silicon valley is still sprawling but re-densification is expected in foreseeable future because there is a physical constraint of available area. Thus, the aim for the city scale is to find a new urban form for the next phase of the edge city, which is “decentralized reconcentration”

Problem field 4.

Flood management for sea level rising

Flood has been always the issue of Alviso. Today, it is becoming more and more a pressure issue because of climate change. The precipitation is increasing and the sea level rise is expected to be up to 1.5m in 100 years. It is indeed threats of the area, but there are also opportunites in the situation because it means whole environment will be gradully transformed with higher water table. Therefore, the aim is to create new type of spatial quality with new water-related infrastructure.

Theoretical framework

part 1.

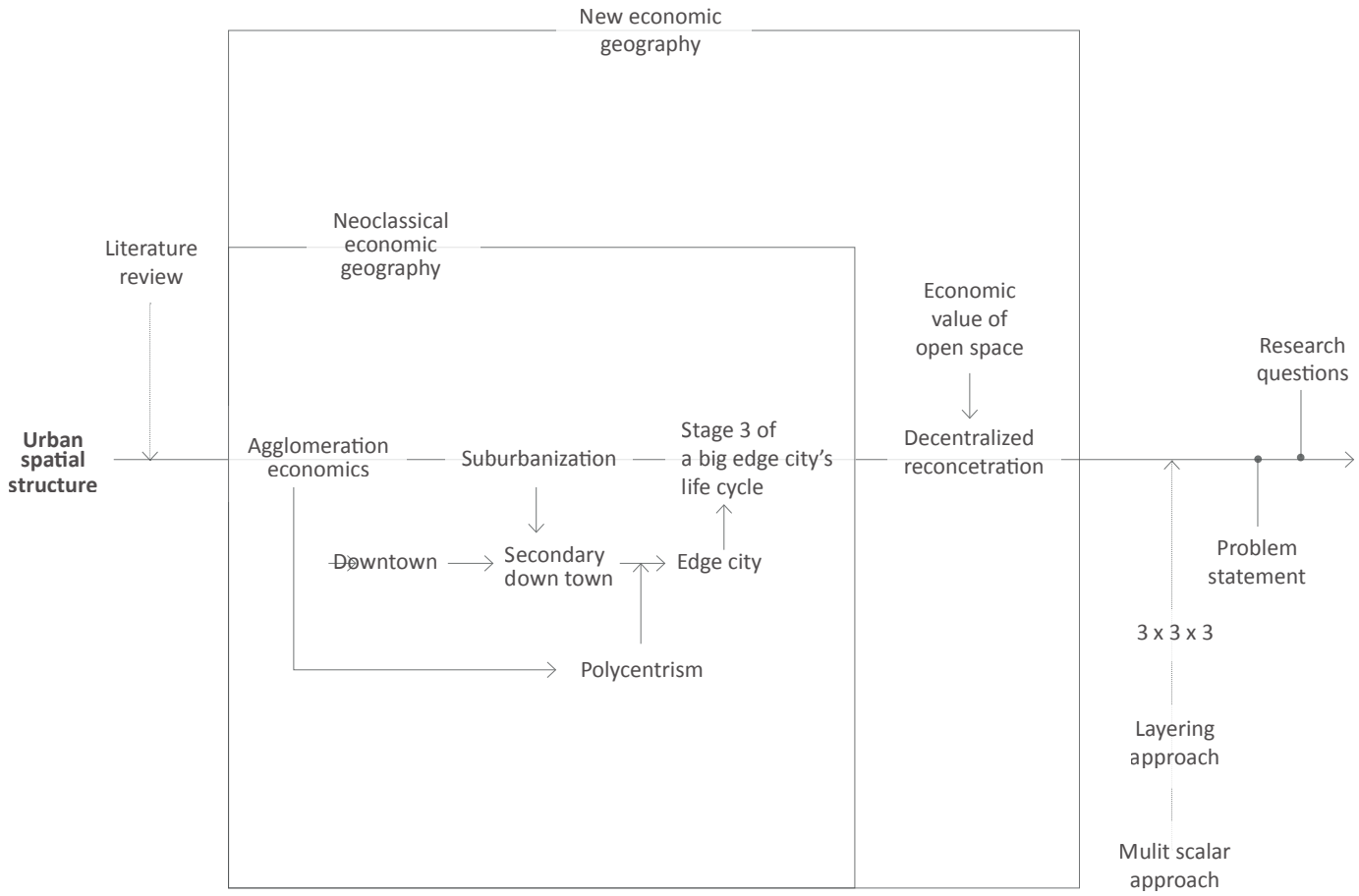


Figure 1-1.
Theoretical framework part 1.
Author(2017)

part 2.

Systematic approach

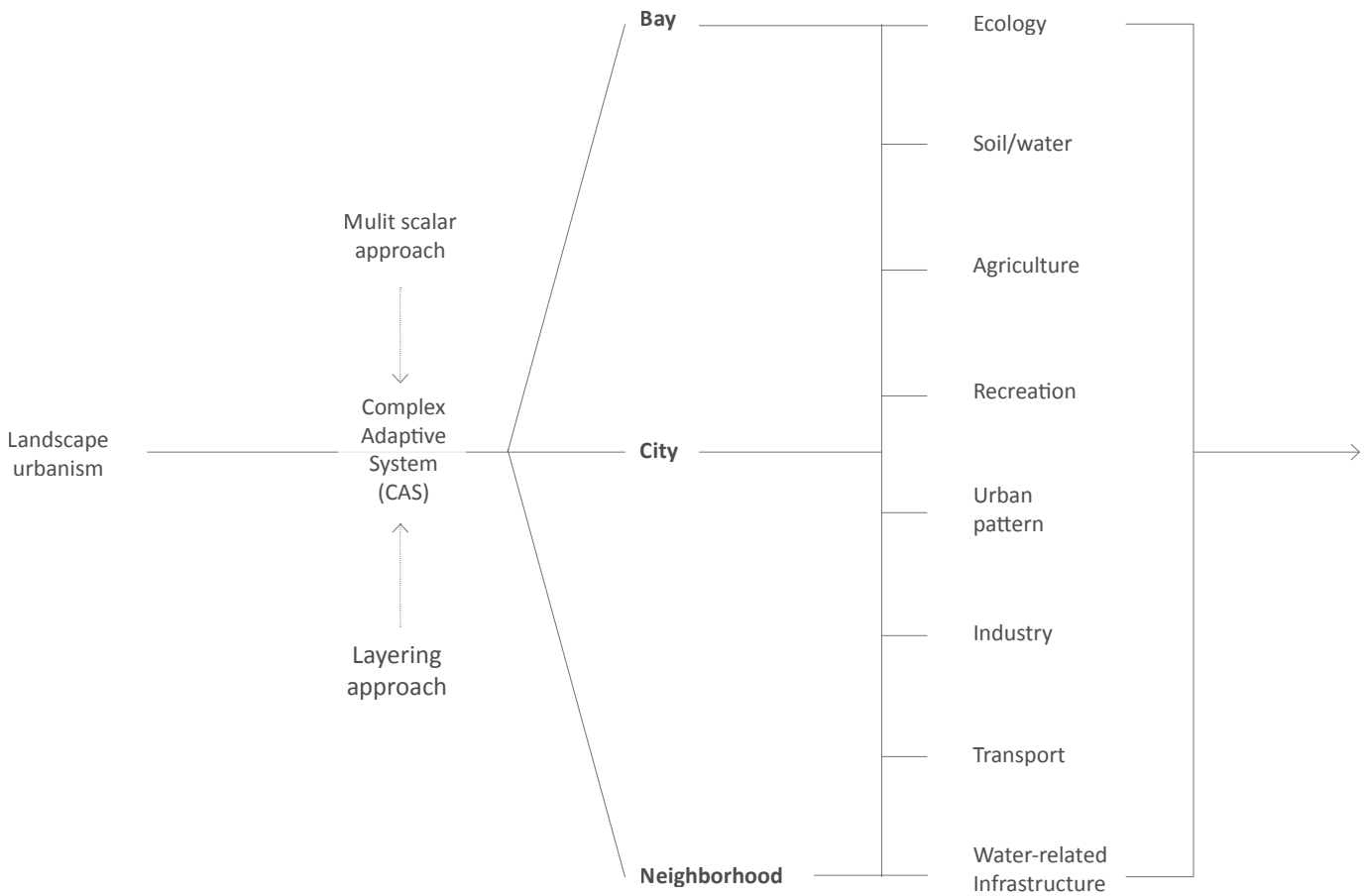


Figure 2-2.
Theoretical framework part 2: systematic approach
Author(2017)

part 2.

Synthesize

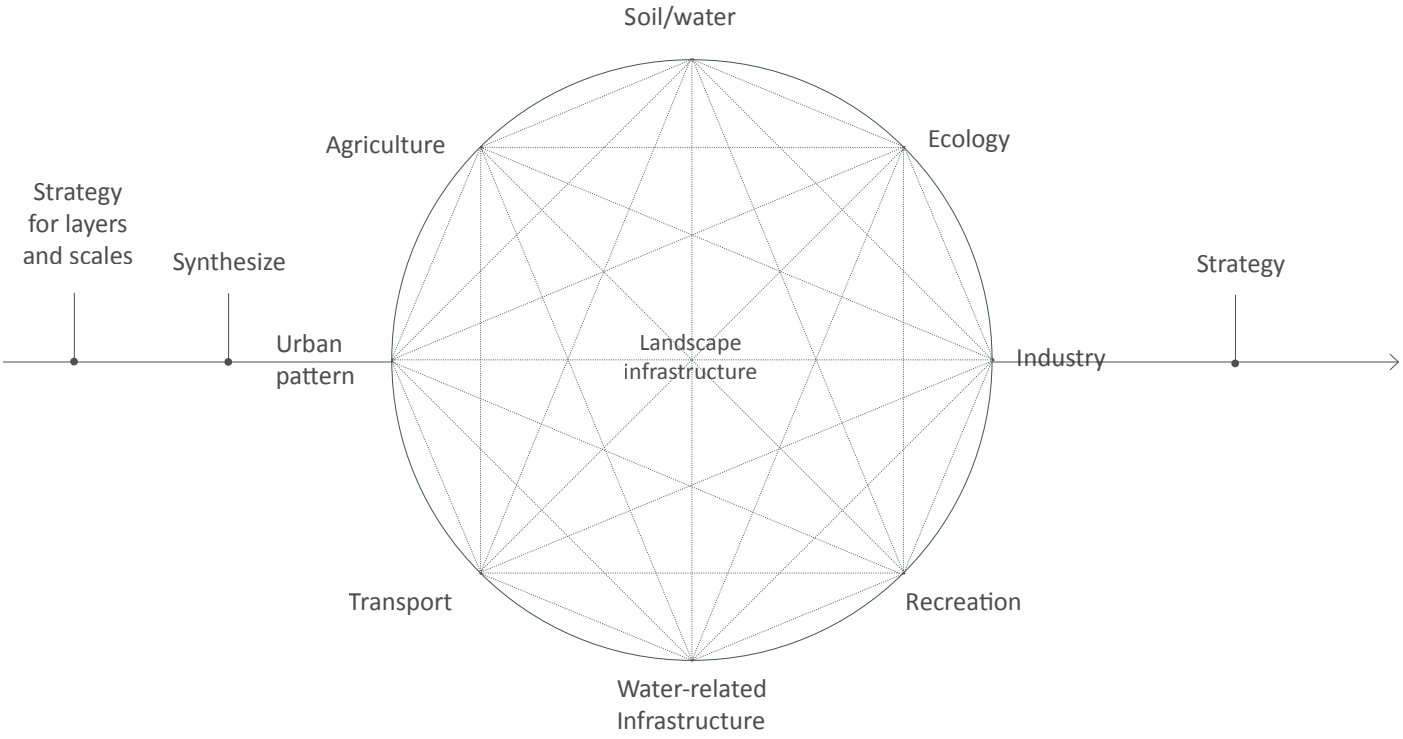


Figure 1-3.
Theoretical framework part 2: synthesis
Modified diagram of “Examples of configurations in the Southwest Delta”
Meyer, H. et al (2015)
New perspectives on urbanizing deltas:
a complex adaptive systems approach to planning and design, p129

part 2.

Spatial approach

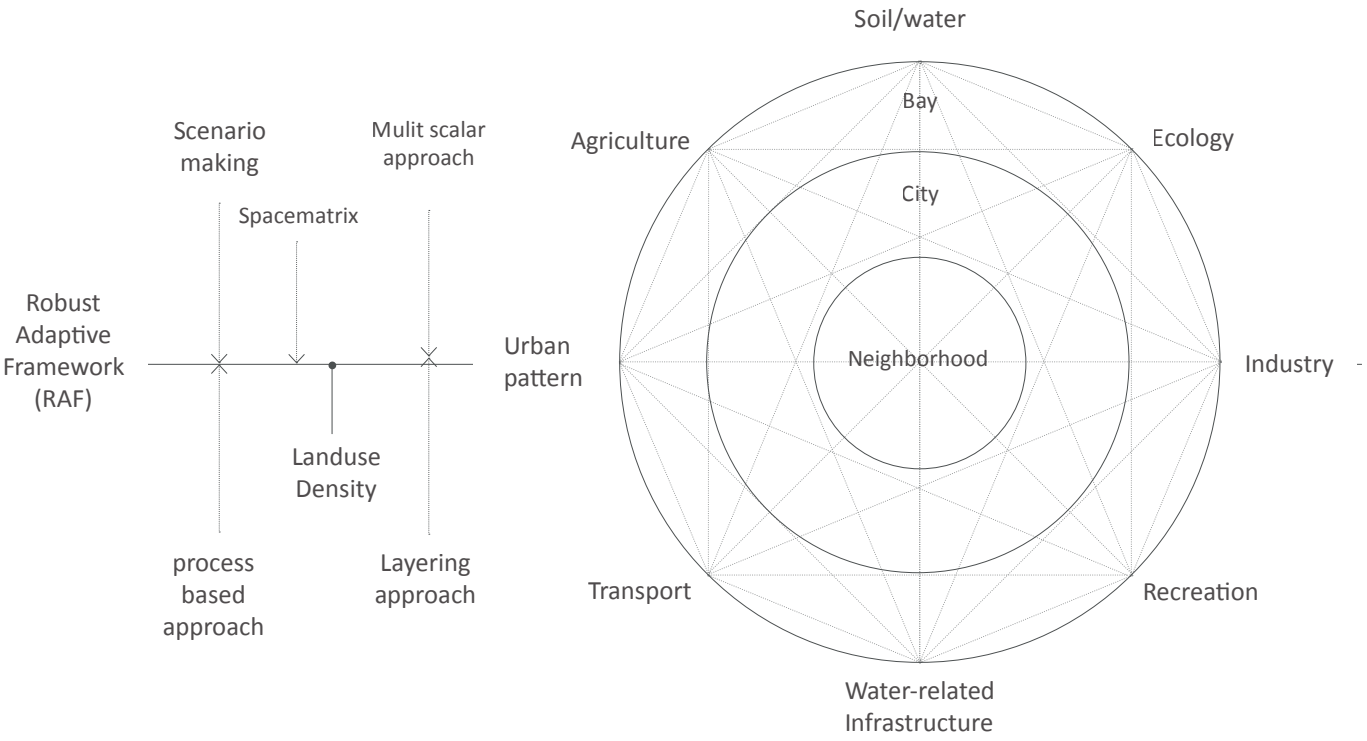


Figure 1-4.
Theoretical framework part 2: spatial approach
Author(2017)

part 3.

Implementation

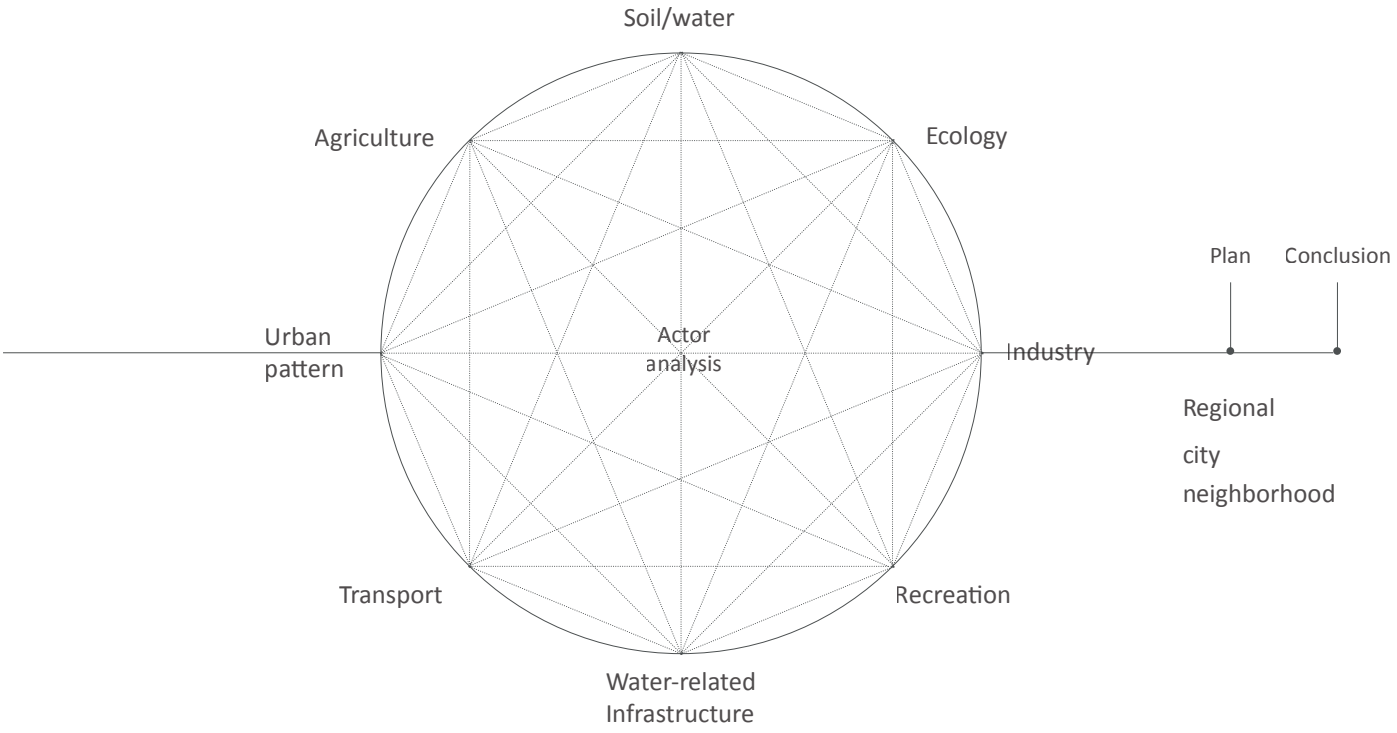


Figure 1-5.
Theoretical framework part 3: implementation,
Modified diagram of “Overview of actor analysis for the Southwest Delta”
Meyer, H. et al (2015)
New perspectives on urbanizing deltas:
a complex adaptive systems approach to planning and design, p122

Urban spatial structure, Agglomerative Economy and Landscape

Keywords:

Suburbanization
Polycentrism
Agglomeration economics
New economic geography
open space accessability
edge city

The urban spatial structure of cities has transformed by advances of transport, which is considered as the most crucial element of Neocalssical agglomeration economics. In the history of urban development in the US, the aspects of this process have been clearly testified in the shapes of cities from different time (Charles Glaab and Theodore Brown 1967).

Around 1840, most cities were designed with waterways, such as harbors and rivers. By doing so, local business could get benefit by low - cost of processing freight. It was possible by the substantial amount of products processed at certain ports, creating substantial scale economies at harbors or river junctions with access to the sea.(Anas, Alex, R. Arnott, and K. A. Small. 1998) Similarly, after the emergence of the railway network. It competed with the waterways in the 19th century.

In the meantime, horse and wagen were the most common transport for infra-urban freight, even though it is relatively slow and unreliable. This type of transport supported the growth of a single manufacturing area close to the harbor or train station, with residential area surrouding it (Leon Moses and Harold Williamson 1967). In the late 19th century, the telegraph increased the speed of infomation flow from city to city (Alexander Field 1992).

However, it was used very much within a city. For intra-city business, messengers remained as the most favored tool for communication, and it was much more costly than the telegraph. The high cost of intra-city communication influenced on the concentration of business. As a consequence, service and manufacturing industries resulted in creating the central business district.

The core was divided into many different districts. Each of them were specialized in a certain type of economic activity, such as commercial banking, pawn brokerage, manufacturing. (Anas et al 1998). According to Raymond Fales and Moses (1972), in late 19th century Chicago, four-fifths of the jobs in the city were within four miles of Madison and State streets. With this evidence, Fales and Moses showed how agglomerative forces affected to make a pattern of specialized districts in the core.

Between 1850 and 1900, electric streetcars appeared in the street. It enabled much longer distance commute to work. The new transport gave rise to “streetcar suburb” in the urban area, residential areas were developed around a station on a radial streetcar line (Sam Warner 1962). Later in the century, the advent of subway contributed even more to this pattern in cities. As a result, it formed a urban spatial structure, “19th centrury city”, consisting of a business core surrounded by residential areas concentrated along transport radials. (Anas et al 1998)

In the early 20th century, the horse and wagon were gradually replaced by the truck while the telephone was becoming more and more popular for intra-urban communication than the messenger. Moses and Williamson (1967) estimate that variable costs and travel time for the truck were less than half those for the horse and wagon. As a result, those new means contributed to the expansion of the central business district as it allowed businesses move futher out of the core while they maintain the connection with the harbor or the railhead.

When the automobile was introduced in the US, it was at first a luxury goods for high-income families. However, after the mass production of the Model T Ford in 1908, the car using population rapidly increased. The popularity of the private car was about practicality and privacy beating the public transit. It caused the areas between the streetcar suburbs to be settled and the residential area to expand.(Anas et al 1998)

In the meantime, the assembly lines for the mass production increased in the city. Manufacturing businesses started looking for bigger land with cheap price outside of the core business district. In spite of that, many manufacturing businesses outside the core relied on the location of the harbor and the railhead for shipments. However, at the end, the link was replaced by rail terminals introduced in the suburban and the inter-city truck network, facilitated by inter-state highways.

By these development, the manufacturing business enabled to move from the expensive central business district to outside the territorial boundary of the city made by inter-state highway. It is the emergence of productive the periphery that mordern landscape in the US bear.
Meanwhile, the central business districts had to face a moment of transformation that the area changed to service business oriented area from the manufacturing core. According to Lang(2003), this stage of urban development is beginning of shaping “edge city”.

Edge city towards decentralized reconcentration

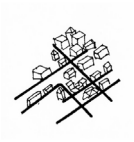
An edge city consists of large number of office and commercial buidings. It is often combined with other types of development, such as, residential area. The most noticeable characteristic of the edge city compared to downtown is the node of inter-state highway as the core. Basically, it is made by ubiquitous automobile access. Most locations of the edge city had had no development before the city was developed. In many cases, the initial construction was a single development company. (Anas et al 1998)

The most recent studies about edge city propose the concept of “edgeless city” as the current trend of urban spatial transformation after the phase of edge city. They describes that edgeless cities is a form of sprawling office development that does not have the density or cohesiveness of edge cities.(Lang, 2003).

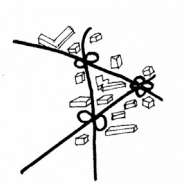
According to Gordon and Richardson (1996), This phase is “generalized dispersion” of jobs over clustering. They argue that there is no more benefit from agglomerative economy by concentration of a certain type of business because of enhanced automobile access. Economies are becoming ubiquitous throughout the entire metropolitan region. (Lee, 2006)

1.
Downtown

2.
Secondary
downtown



3.
Edge city



4.
Edgeless city

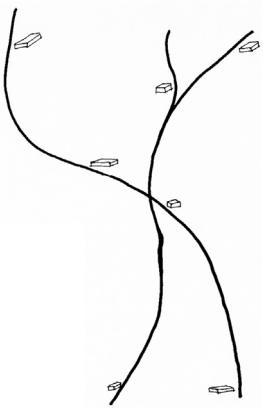


Figure 5.

Figure 1-6.
Urban transformations in the US
Lang, R. E (2003)
Edgeless Cities: Exploring the Elusive Metropolis

In the meantime, there are other studies argue that the main reason of the dispersion is from the advance of IT, which enable the high speed of information exchange. However, it is not leading the complete dispersion without any kind of centers. They propects that IT development will lead to the decentralization of production and routine functions but also a reconcentration of higher-order activities at the same time (Castells, 1989; Sassen, 1991). There are also other autors wrote that the periphery of metropolitan region are becoming the nodes of high technology cluster and information flow. (Scott, 1988; Muller, 1997; Freestone and Murphy, 1998).

Based on those prospects. the adequate spatial implication would be “decentrailized concentration” (Anas et al 1998) in a polycentric structure as the foundation that is the current condition of most metropolitan regions. However, “How” remains as a question in terms of urban design and planning. Last few decades, the US have tested urban spatial structure with high mobility by highways. Even though the malfunctions of the design continuously emerge, yet they stick to that framework.

The point of the propects for future urban spatial structure is the flow of infomation is no longer dependant on the advance of transport. The equilibrium between them has been broken since the invention of the internet. Thus, any effort of restoring the relationship between them in urban spatial structure is pointless today. It is time to discover a new tool for structuring cities. It should be another spatial element, potentially stimulating agglomeration economy.

Neglected value of public open space for agglomeration economics

In the meantime, Logan and Molotch’s growth machine hypothesis suggests that urban public space play a critical role in urban growth as they are able to stimulate financial activity. This is a new approach towards the value of public open space for urban spatial structure in comparison with the neoclassical theories of agglomeration economic, which largely ignored the presence and the role of public open space.

They claim that the spatial quality of new development area is what the local landed elite actually want to influence on. That is for both built and natural spaces with the service for maintainace of those spaces. Especially urban open space attract mobile capital as it gives a reason to visit the area aside from work purpose. Both companies and employees desire to have place where they can both play and work close to their home. in other words, “The information city implies the city of leisure” (Clark et al., 2002).

Public open space can play various functional roles in the process of urbanization. if production is the only critical part of urban growth, public open space may be seen as marginal space increasing the cost of transportation and commute time. However, in consumption terms, the open space could be beneficial to production. According to Florida(2002), the urban amenities in cities are able to attract highly educated employment to the area. At the same time, they will prompt economic productivity. Florida emphasize that urban planners should invest in developing urban settings that attract those talented employment, if they want the city to grow economically. (Smith and Floyd, 2013)

Landscape urbanism for bridging public open space with agglomeration economics

In the field of planning and design, Landscape urbanism suggests a possibility of integrating the economic benefits of public open space with urban spatial structure by utilizing landscape as a structuring element.

According to Richard Weller (2007), the landscape urbanism is foreground the landscape as the ultimate system to which all goes and from which all comes, a template for urbanism. Basically, he describes a holistic approach toward design and planning that landscape becomes a tool to integrate all kinds of elements of a city. James Corner also explains that it bridges different disciplines involved in structuring a city: landscape urbanism suggests a broad cross-discipliarity. It across the boundaries of architecture, planning and engineering, ecology, geography, anthropology, cartography, aesthetics and philosophy. For this reason, It requires the multi-scalar approach where very large scale urban and environmental issues may be integrated while focusing upon much smaller, tactile scales of engagement (Corner, 2010 p.26).

Yet, Landscape urbanism is neither a fully formed theory nor a methodology. It is about a new perspective of landscape, responding to current issues of urban spatial structure. Thus, it is still in the stage of forming a discourse, which is open to enormous possibilities to be developed. Waldheim (2010, p.21) described, while it may be true, as has been recently argued, that the urban form proposed by landscape urbanism has not fully arrived, it would be equally fair to say that landscape urbanism remains the most promising alternative to urban design's formation for the coming decades.

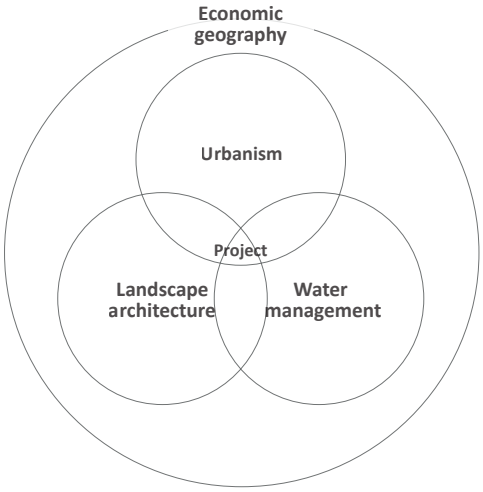


Figure 1-7. Chracteristic of the project, Author(2017)

In next chapters, this paper will focus on the design process for a case of Alviso area in multiple scales. It is based on the value of landscape as public open space, structuring a new urban form for the next phase of edge city.

Considering the complexity derived from the project, it requires multiple frameworks and methods. First, the influence of the agglomeration economics on the urban spatial structure of the target area will be proved by a multi-scalar analysis with 3x3x3. It is very much about finding evidences of transformation in the history of the urbanization. This will show where the target area is in the phases of urban transformation. That will prospect what needs to be done for next phase, followed by formulating strategies and vision.

For the design part, both systematic and spatial aspect of design will be used along with the different methods, such as, layering, multi-scalar approach, process based approach, scenario making, and spacematrix. Finally, in the last chapter, plans in three different scales will be delivered with the conclusion and the reflection of the project.

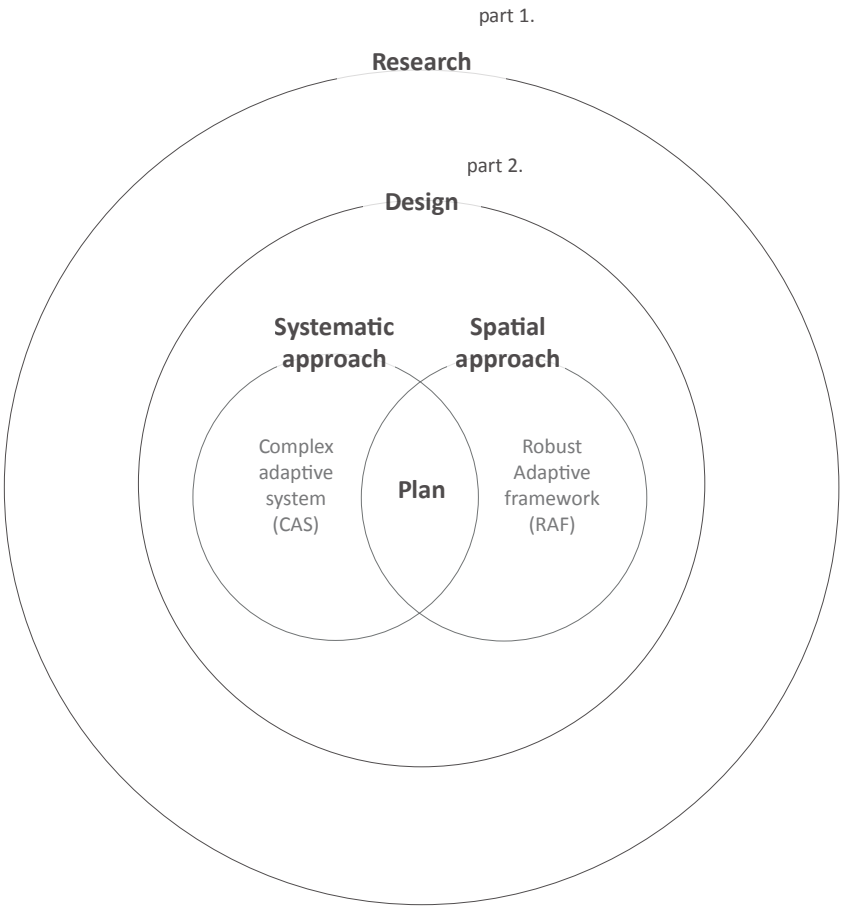


Figure 1-8. Structure of the project, Author(2017)

Layering

It helps to manage enormous amount of infomation by seperating or overlaying layers. It contributes to reveal the hidden relationships between different data. This method will be used from the analysis by 3x3x3 to materialization

Multi-scalar approach

The issues of the area can be varied by different scales. Especially, when it comes to the matter of water management, the problem of a neighborhood could be associated with the condition of entire watershed. In that case, the area needs strategy for the entire basin as well as urban design for the neighborhood in the scheme of the region. Thus, the multi-scalar approach is essentially required for design approach.

Scenario making

Adaptation is a key response to dramatically changing conditions of urbanization. In this sense, scenario making is a method that allows 'design for process' rather than designing 'comprehensive plans' that are rigid and fixed. Design for process has the capacity to deal with complexity, uncertainty and indeterminacy.(Skansi, 2016)

Process-based approach

According to Corner (2009), it is a method that works effectively in dealing with time, scale and complexity, while designing 'time and process' rather than the form. It rejects statics of the 'blueprint' plan and tries to develop operational strategies for immediate or further future. Investigations into how time can be represented in landscape, and observations of how practice nowadays represents time are one of the main aspects of this method. Time could be regarded as design tool, coming from the fact that city making is part of a long and unpredictable process while also restoring or reintroducing the natural processes and features of land¬scapes in cities. (Corner, 2009). This is a key method for Robust Adaptive Framework along with scenario making.

Spacematrix

This method makes it possible to describe an urban environment by using a set of density variables (FSI, GSI, OSR and L). These quantitative data can be used both to describe and characterize, as well as prescribe different urban environments. Therefore, Spacematrix enables different actors in both design and planning process to link different programmatic demands to different spatial solutions. (www.spacemate.nl)

Scientific relevance

There are studies prospecting that IT development will lead to the decentralization of production but also a reconcentration of higher-order activities at the same time (Castells, 1989; Sassen, 1991). There are also other studies claim that the periphery of metropolitan region are becoming the nodes of high technology cluster and information flow. (Scott, 1988; Muller, 1997; Freestone and Murphy, 1998). Based on those prospects. the adequate spatial implication would be “decentrailized concentration” (Anas et al 1998) in a polycentric structure as the foundation that is the current condition of most metropolitan regions. However, “How” remains as a question in terms of urban design and planning.

As the flow of infomation is no longer dependant on the advance of transport, designing a new urban spatial structure greared toward the high mobility that the highway system offer will not restore the equilibrium between the infromation flow and the advance of transport. Thus, It is time to discover a new tool for structuring cities. It should be another spatial element, potentially stimulating agglomeration economy. In the meantime, landscape urbanism offers a possibility to design cities in a different way. It suggests using landscape as a structuring element instead of the automobile network. However, landscape urbanism is not ripe enough to provide actual design methods. It is in the phase of forming a discourse. Therefore, it requires a lot of futher studies to use in actual design cases.

In this paper, a design method derived from landscape urbanism is developed for the target area as a case. In the end of this paper, it provides a set of rules for development and examples of plan in different scales.

Especially, the rules developed in this paper is not simply derived from the manifestation of landscape urbanism. It concentrates on discovering a way to relate quantitative data from spacematrix to design process. The linkage that that this paper found is a key of materializing the idea of landscape urbanism for the actual design of urban spatial sturcture.

Social relevance

A new type of urban development intergrated with a new water-relate infrastructure offers a viable option to protect the neighborhood in the scenario of sea level rising. For last decades, the fund for enhancing the existing water-related infrastructure has been not sufficiently collected because the economic importance of the neighborhood is neglected.

However, in the proposal, Alviso will be a new node of the region that connects the new development area and the exsiting urban area. Basically, the neighborhood will be the gate of new area. In this scenario, the developer of new offices or commercial buildings should consider impoving the new infrastructure of Alviso as well as their own plots for development.

Second, It will also provide a plan that relieves the tension of NIMBY(Not In My BackYard) in the neighborhood. Currently, the new offices are developed with the massive highway structure and the parking lot, which is expanding toward the neighborhood. However, the new type of urban form that this paper propose is shaped by blue-green infrastructure, providing the buffer between the neighborhood and new development. Therefore, negative spatial impact on Alviso can be minimized, and they will have the new spatial quality from the water-friendly envrionment.

Analysis

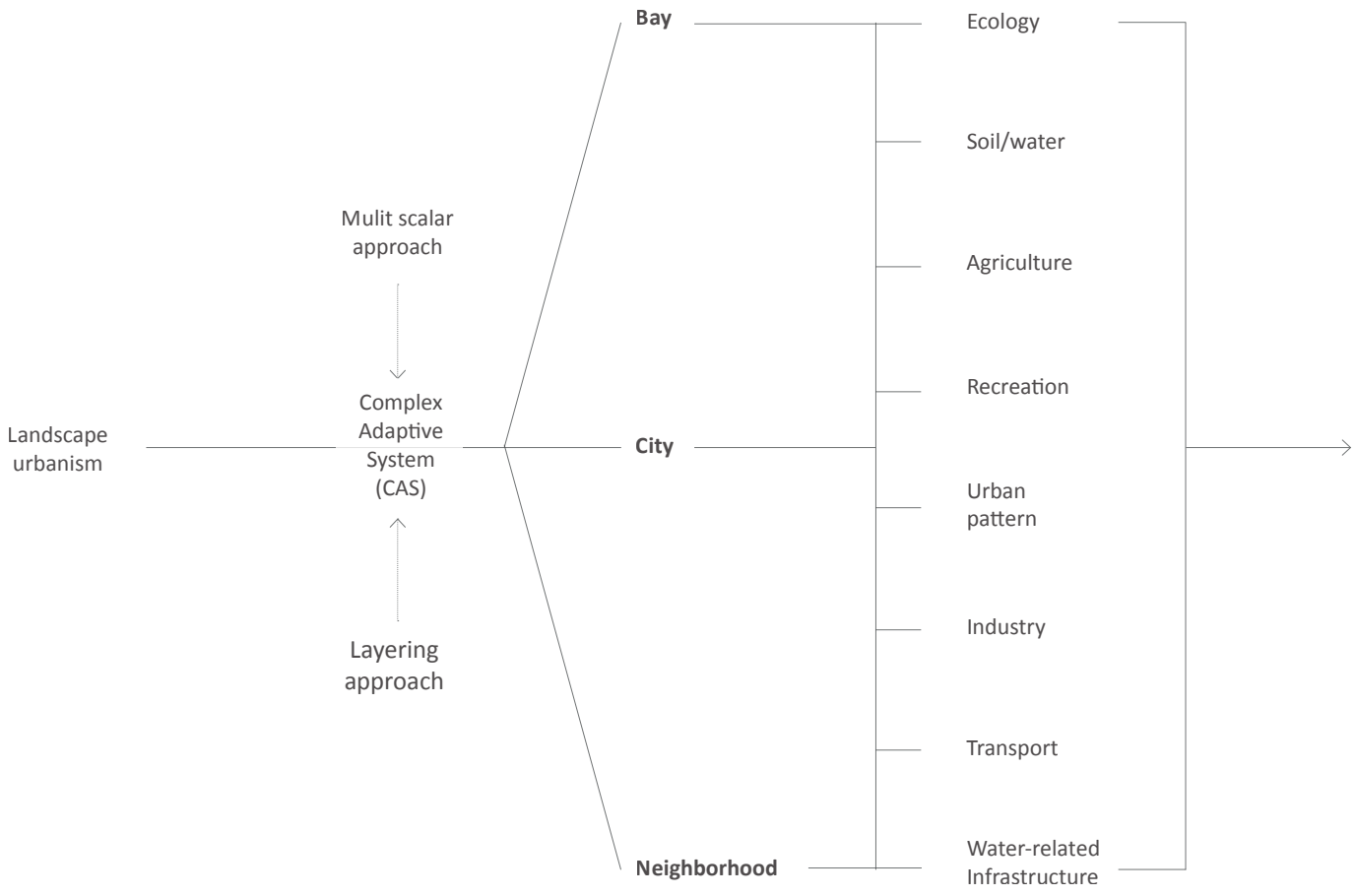


Figure 2-1
Theoretical framework part 2: systematic approach

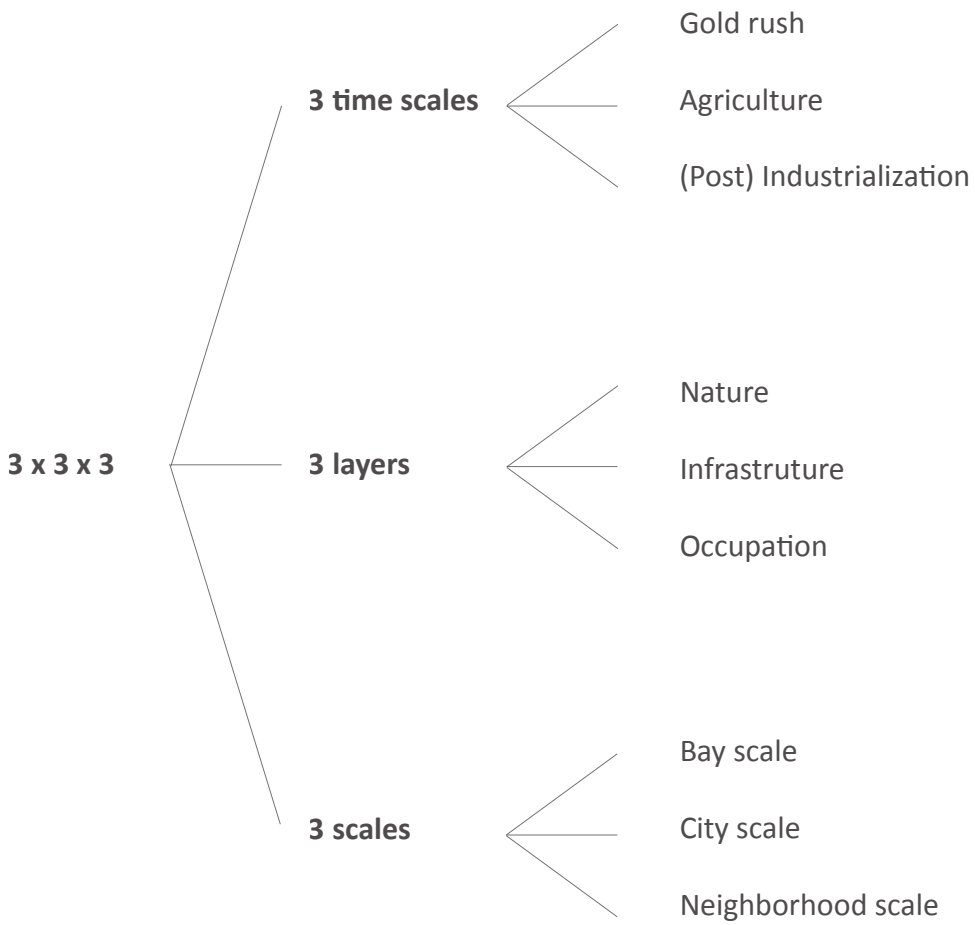


Figure 2-2
Structure of 3x3x3 analysis

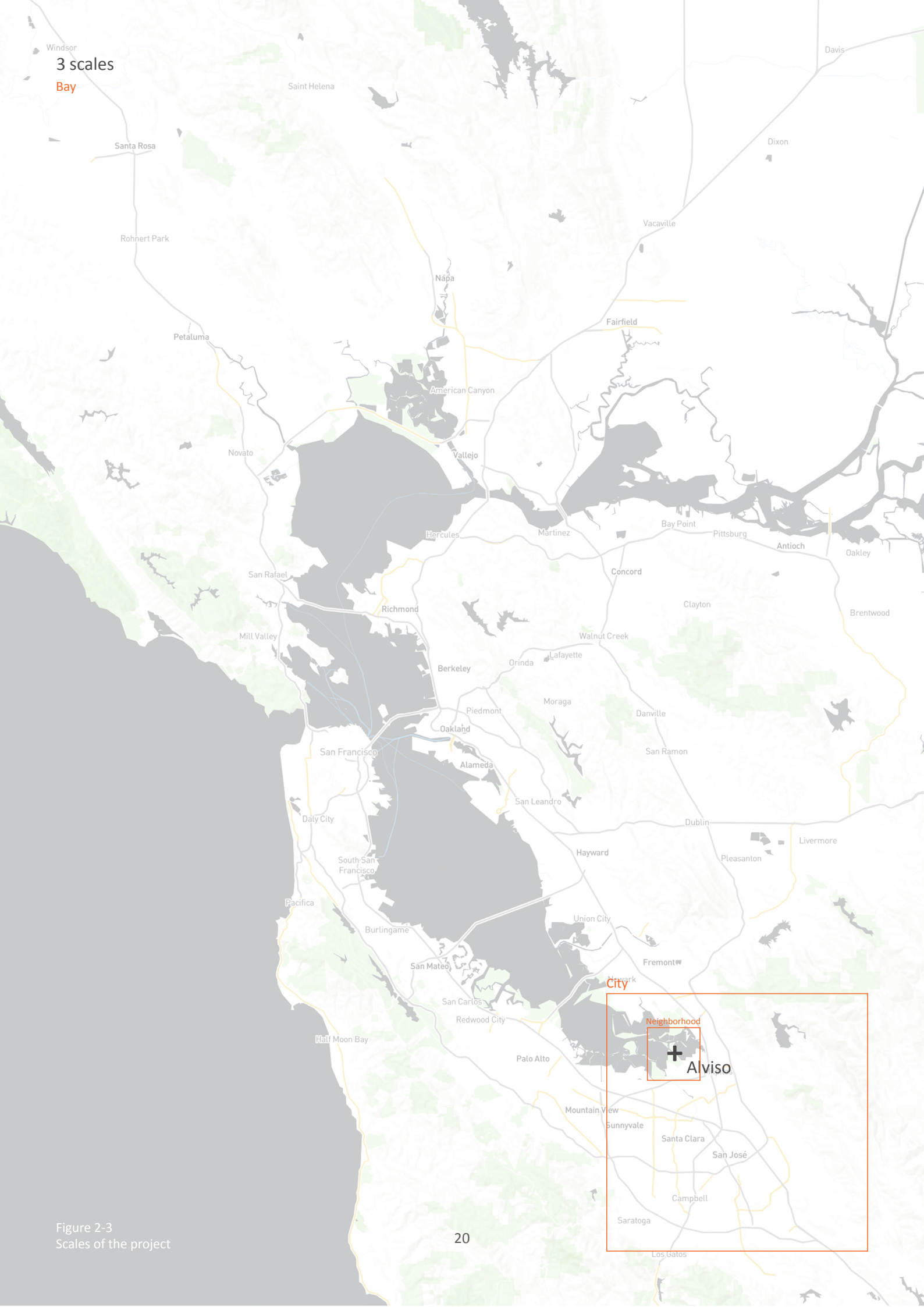


Figure 2-3
Scales of the project

TImeline

Figure 2-4.

Moments of transformation

Figure 2-5.

Driver forces

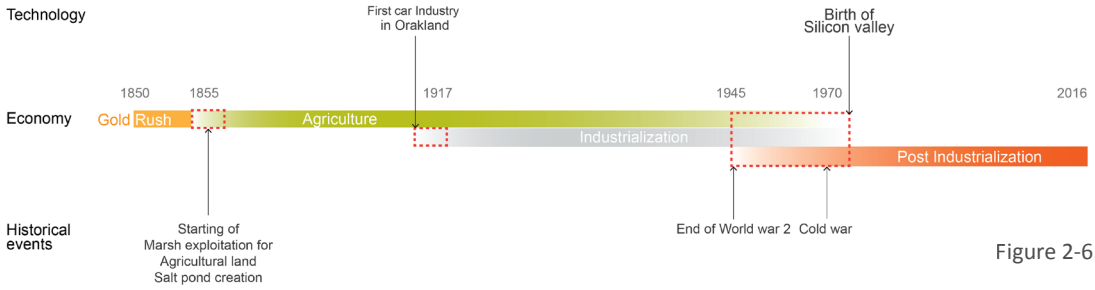


Figure 2-6.

Tracing the transformations of San Francisco Bay by economic change

To analyse the transformation of San Francisco bay through history, economic change is additionally considered along with three essential topics that are nature, infrastructure, and occupation. The economic change has been crucial factor to shape the cities in the bay area since the types natural resources that the landscape of the bay area provides through different eras have been the main driver forces of urban developments. Hence, the history of the transformation can be defined as three different periods, Gold rush, Agriculture, Industrialization.

The gold rush stands for the period of California gold rush, which happened between 1848-1855, followed by the agricultural period. The industrialization was gradually happening while agriculture was dominant in economy, yet the initiation was after 1917. Unlike previous two periods, the Industralization can be explained by two parts because the bay area has experienced several different types of industries through a century. Thus, their prime times differ in the timeline. (fig. 8) The first part of the industrialization was automobile manufacturing oriented industries, and then the second part was the time when economy started shifting to service oriented industries, which is well known as Silicon valley.

The shifts of economy happened with innovation of technologies and major historical events. (fig 4) The first moment of transformation was due to the end of California gold rush as a result of the decline of surface gold. The second moment was initiated by the advent of automobile that became the major industry for decades, followed by the surge of military industries through the World war II. The third transformation accompanied by post industrialization during the cold war. In this period, the heavy military industries transformed into information technology based industries, which led to the birth of Silicon valley today.

Bay scale

In the era of California gold rush, gold was used to be easily collected without professional machinery for mining. For this reason, many people flocked into California for the dream of gold nuggets. By that time, the settlements in San Francisco bay also started growing. However, the gold rush did not last long. It ended in 1855 because of disappearance of surface gold, which was only 7 year after it began. As gold mining became the professional task required heavy mining machine and professional knowledge, most of unfortunate miners had to find a new mean for their livelihood, and it led to the beginning of agricultural period. Fertile soil condition created by the ecosystem of delta gave them a lot of options for agriculture. After they realized the value of the landscape, they wanted to maximize the profit getting out of the land. Thus, marsh reclamation started to expand land for agriculture.

In 1861, the governments initiated the construction of levees and reclamation of marshlands in order to the inland area could be protected from floods. The construction process was labor intensive, and the new relclaimed land needed to be cultivated. Thus, many immigrants moved in the delta region in the 19th century, and the trend continued until the early 1900s. In 1850, there were already around 25000 chinese immigrants. Around 2000 more Filipinos came to settle down in the early 1900s, followed by the Hispanics and the Japanese. Up until today the racial distribution of this area shows a trace of history from that period.

As more and more farmland was reclaimed and became available, they needed to develop infrastructure to handle the increase of shipments. During the gold rush, shipments were some supplements for miners, which was able to be handled by boats. However, exploration of agricultural products pushed them to reinforce the infrastructure, which led to the development of the railway network

Gold Rush

Agriculture

Nature

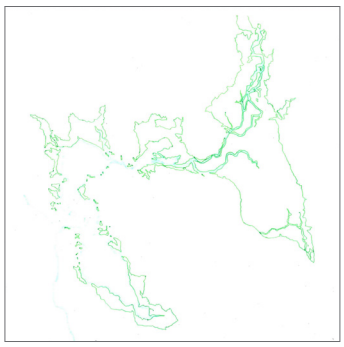


Figure 3-1. Untouched marsh

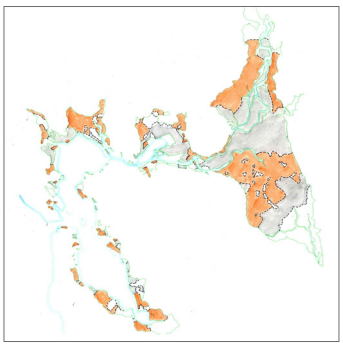


Figure 3-2. Marsh reclaimation for agricultural purposes

Infrastructure

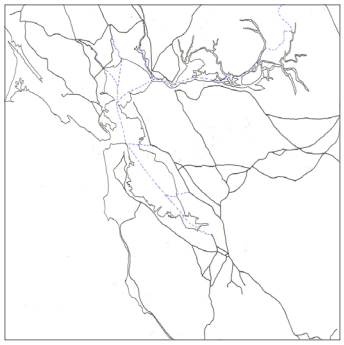


Figure 3-4. Development of Seaways for ships

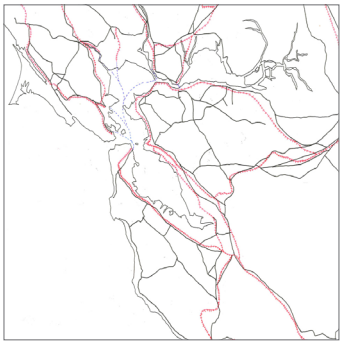


Figure 3-5. Development of railway system for shipping agricultural products

Occupation

Figure 3-7. Emergence of human settlements

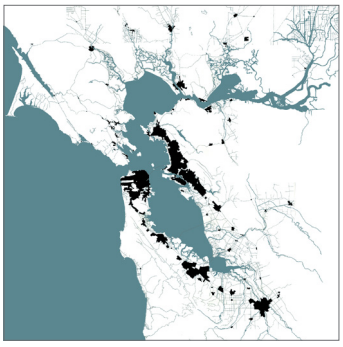


Figure 3-8. Growth of population with the growth of agricultural economy

Figure 3-1, 3-2 and 3-3, Autor(2017)
Figure 3-4, 3-5 and 3-6, Scott, M. (1959)
The San francisco bay area: a metropolis in perspective
Figure 3-7, 3-8 and 3-9, Bosselmann, P.(2008)
Urban transformation:understanding City Design and Form

Industrialization

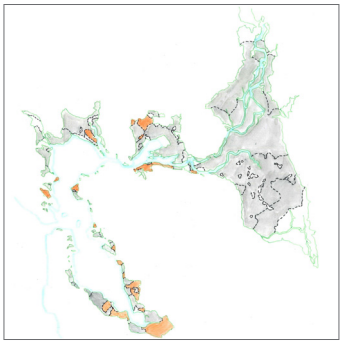


FIgure 3-3. Reclaimed marsh land were occupaid by new settlements

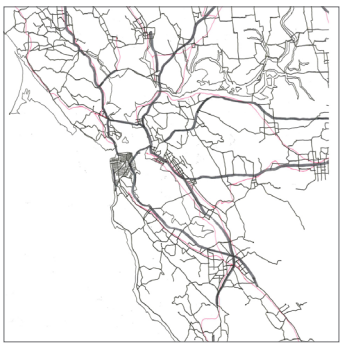


Figure 3-6. Infrastucture for aumobile became dominant

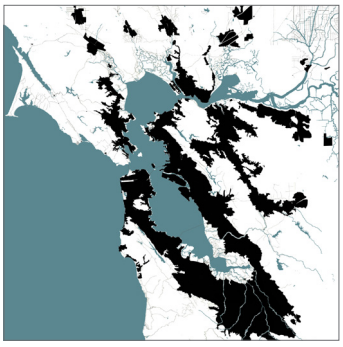


Figure 3-9. The explosion of population led to the sprawl of urbanized area

Industrialization in San Francisco bay

Industrialization of San Francisco bay was triggered by the civil war in 1850. Before the war, the bay area did not have industrial scale of manufacturing. They used to import industrial products from west of the country and export natural resources in return. However, the supplement from the West was ceased while the civil war, and as a consequence, they started building their own industries. Yet, it was not the major part of the economy in the bay area.

After the introduction of automobile technology in 1917, the industrialization got accelerated in the bay area. In few decades it became the most important industry of San Francisco bay. Finally, agricultural based economy shifted to manufacturing industry. Sooner or later, the world war II broke out. This technology became the foundation of military industry. Because of the surge in demand for battleships, many work forces moved in the bay area to work at shipyards, which led to the growth of population.

After the end of the world war II, the number of car owners rapidly increased, contributed to expansion of urbanized area in the bay. The influx of people started during the world war II doubled up because of the baby boomer generation after the end of the war. For this reason, there was high demand for new residential areas to handle the rapid growth of population. Thus, it became the main usage of the marshland reclaimed in this period, which was a change from the agricultural era in terms of the purpose of reclamation.

Polycentric region by automoible infrastructure

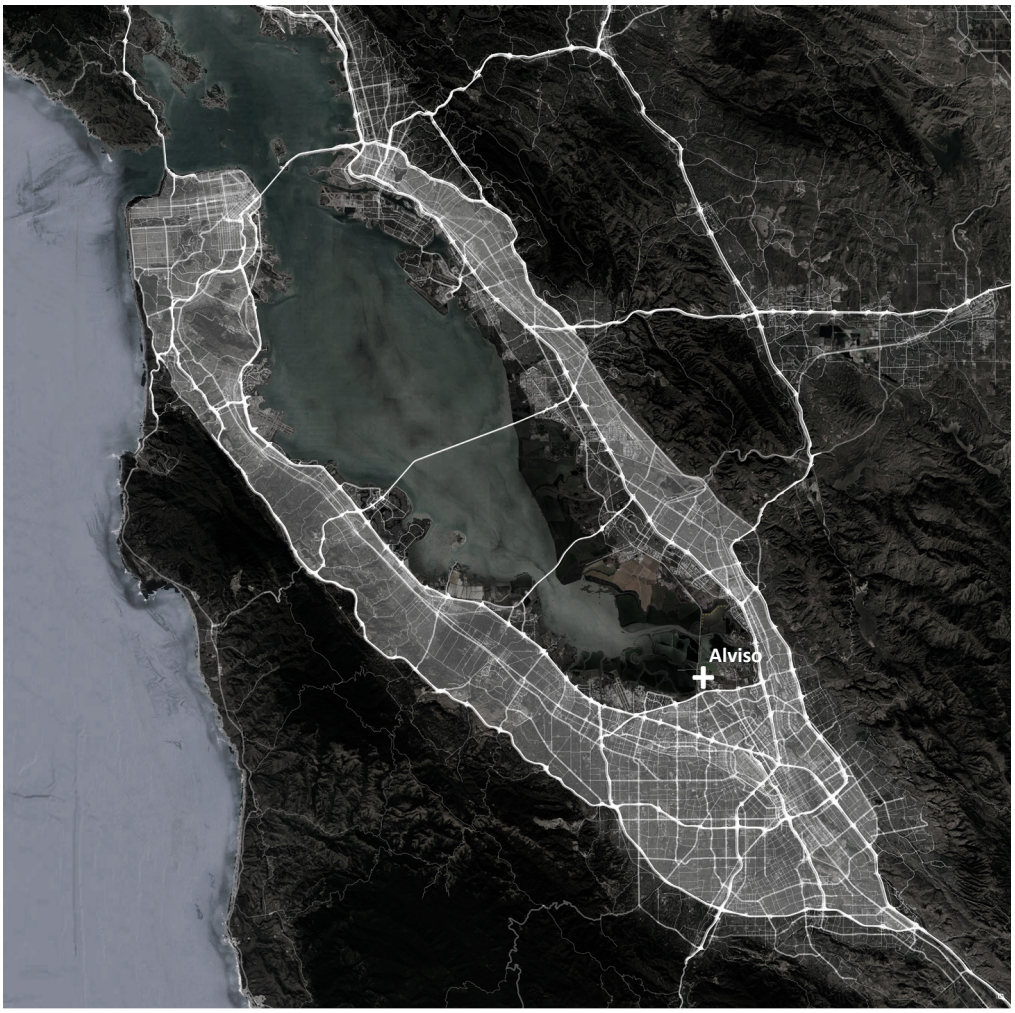


Figure 3-10.
Polycentric region by automoible infrastructure,
Autor (2017)

Polycentric region emerged by automobile technology

"In 1863, there was an active local ferry system, as well as trolley car systems. These were to fade, and mostly disappear as major modes of transportation after the advent of the automobile. The increasing popularity of the automobile at the end of World War I brought a major impact to urban development in California and the Bay area. Ownership of cars in California was far ahead of other states, and because of this the urban population spread rapidly between 1910 through 1940. As a result, a polycentric region was created. Scattered cities in the bay area were connected by rapid urban sprawl. The increase of the car ownership gave people freedom to commute a long distance without having hassles to find transportation. The vast urbanized area with many cities started functioning as one region".

Mosier. P(2001)
A Brief History of Population Growth in the Greater San Francisco Bay Region,
Geology and Natural History of the San Francisco Bay Area: A Field-trip Guidebook

Ring road and the periphery

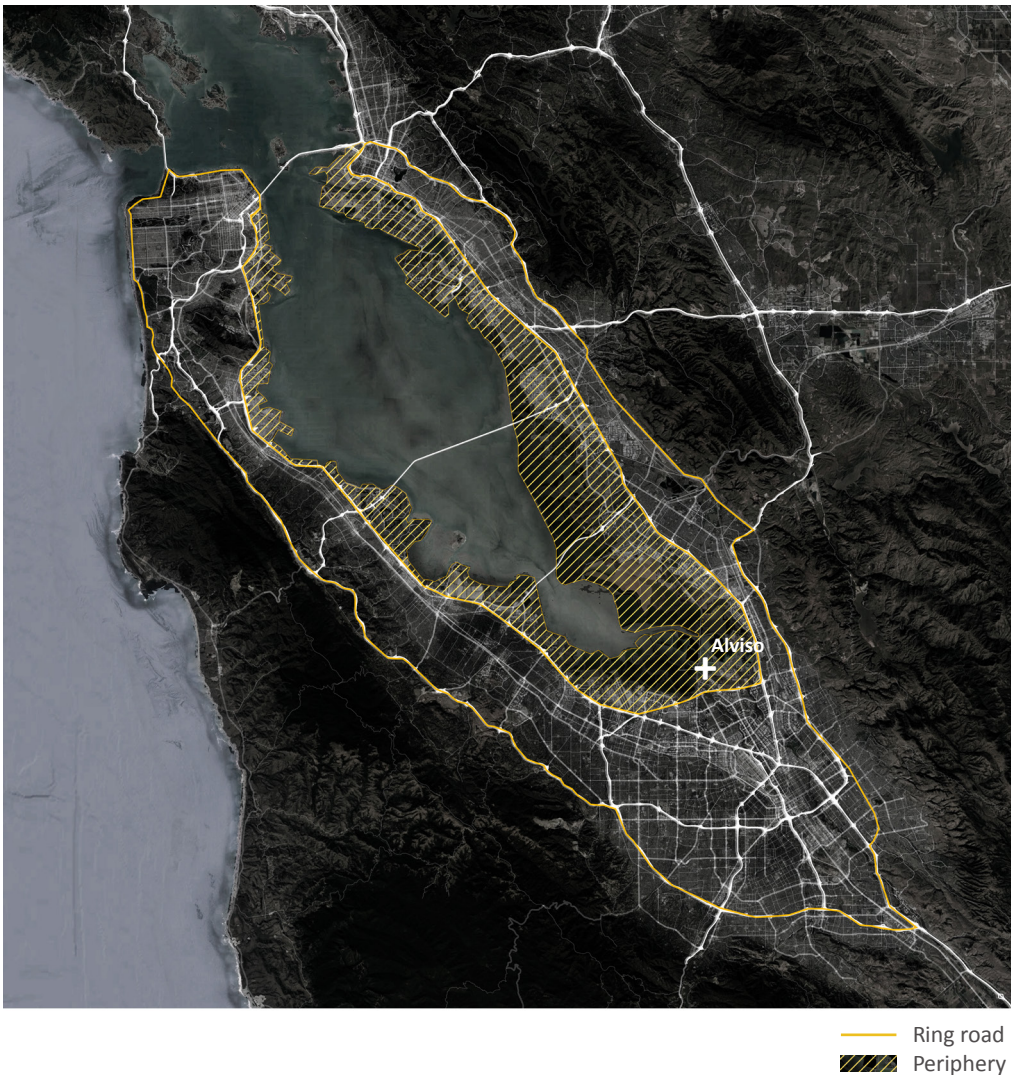


Figure 3-11.
Ring road and the periphery,
Autor (2017)

Emergence of the ring road and the periphery

According to Lee(2006), “The modern metropolis is increasingly characterized by the presence of multiple activity nodes. There are many concentrations of employment and commercial activities outside the traditional central business district (CBD) in large metropolitan areas.” These clusters are called “suburban downtowns” (Hartshorn and Muller, 1989), “edge cities” (Garreau, 1991), or “technopoles” (Scott, 1990), according to their roles and the charcteristics of production. Some centers are more specialized while others perform diverse economic and spatial functions (Forstall and Greene, 1997; Anderson and Bogart, 2001).

As cities in the bay area were also growing as a polycentric region, it was inevitable to reinforce the infrastructure to function the region. Because of that reason, the ring road structure appeared along the edge cities, which was to integrate whole region with a road, providing vehicle circulation in the periphery. At that time, it was mainly designed for reducing the time for commuting by avoiding congestion in the downtown. But the physical presence of the road created the border between the city and the periphery as many other cities with the ring roads.

Meanwhile, the concept of productive landscape also converted to the productive periphery for the industrialized region. The periphery started being exploited to serve the center. For example, the marsh turned into lots of salt ponds. Basically, the landscape became just a part of the machine, creating natural product. Thus, officially from this time, the value of landscape for urban development became neglected.

City scale

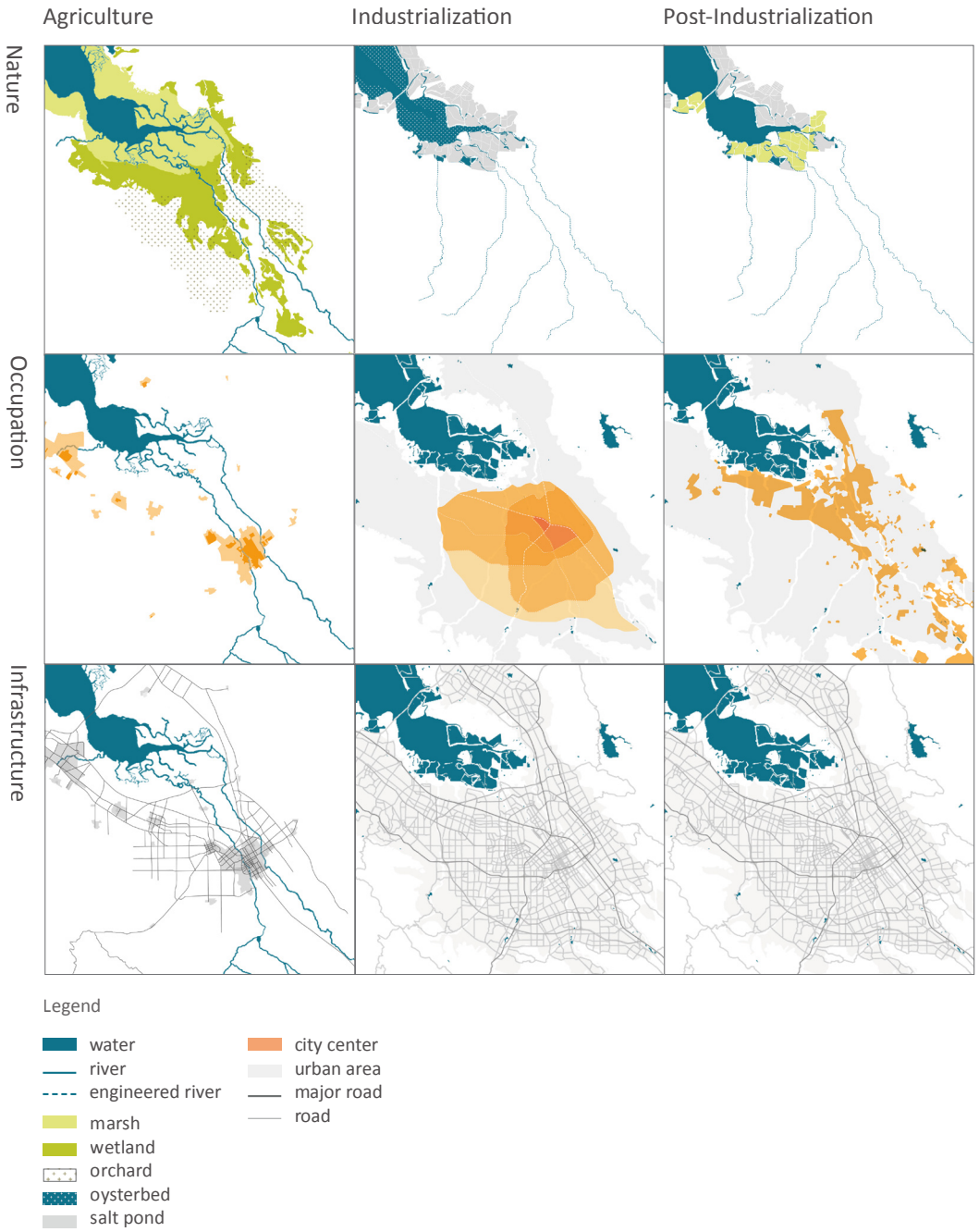


Figure 4-1.
3x3x3 in city scale,
Autor (2017)

Agriculture

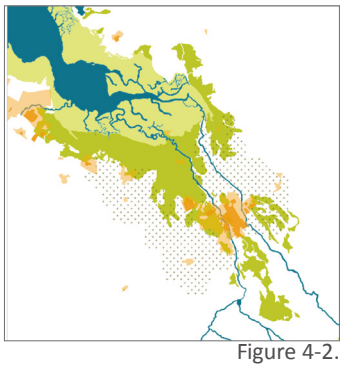


Figure 4-2.

Industrialization

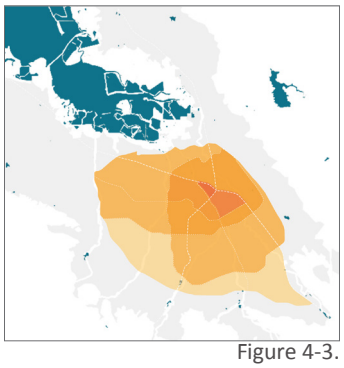


Figure 4-3.

Post-Industrialization

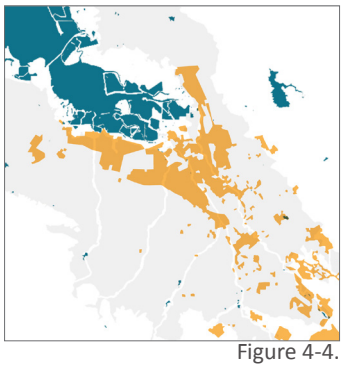


Figure 4-4.

San Jose has developed where the river streams meet because ship was the most important transportation. It was also located on the ground, which is higher than wetland. Because of this strategic location, they could not only have stable land for building a city, but they also had benefits from both wetland and pasture. The landscape condition was perfect for growing many different types of fruits and corps. Given the condition, a co-existence way of life in the urban area was possible at that time.

In industrialization, the exploitation of nature started. Because of the explosion of population, the urbanization of San Jose proceeded rapidly. In the process, the structure of the city shaped by the modernism planning practice, which has a core in the center of layered circles structured by highways. The city structure does not have any relation to the topography of the area. Meanwhile, the industrialization also influenced the aquatic resources. The marsh land is leveed for salt production while the mud flat turned into oyster bed.

In post-industrialization, the Santa Clara Valley showed remarkable growth because of major industries, such as missile development and the electronics and computer industries, earning it the name “Silicon Valley” and making San Jose now the largest city in the Bay area. Ever since the silicon valley emerged in 1970, the physical occupation of the silicon valley also has been growing, fuelled by agglomeration economics. It was started from one of many edge cities, but now it has been overpowering the downtown of San Jose.

Infrastructure

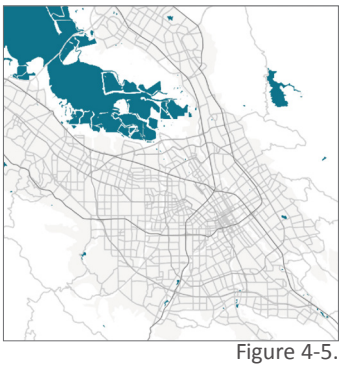


Figure 4-5.

Industrialization

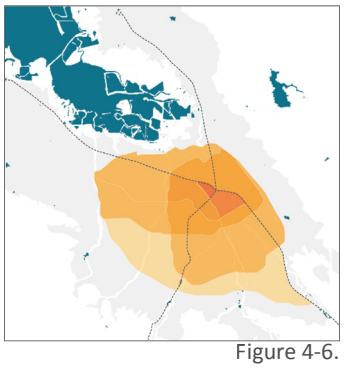


Figure 4-6.

Post-Industrialization

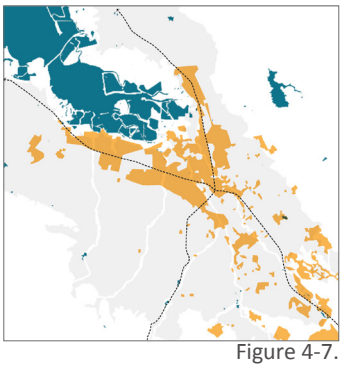


Figure 4-7.

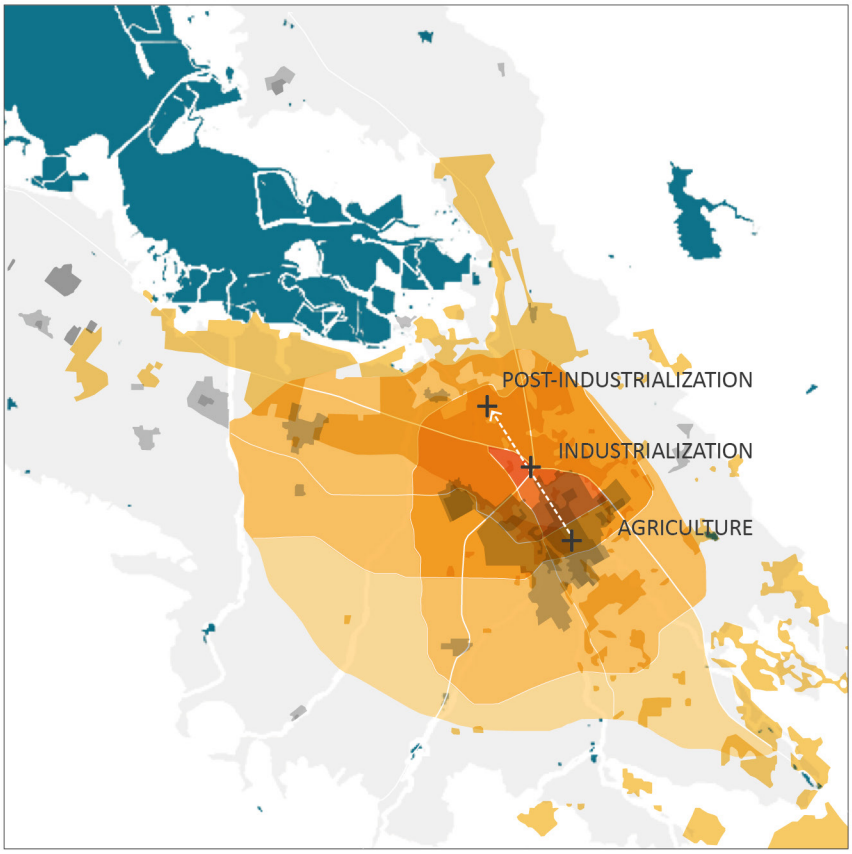
As the maps describes, the introduction of car in the area have immensely afftected the urban spatial structure. The growth of population using a private car for communting led to the suburbanization. The occupation pattern of the post-industrialization is an example.

In the map of industrialization, you can see there are the highways acossing the center of the city. In this stage of urbanization, it was proceeded by the expansion of the downtown. For this reason, the shape of the city resulted in having a core and the layered areas.

However, more advanced automobile increased the mobility in the region, and people could drive further for going to work. That was the reason why the occupation pattern in post-industrialization resulted in random patterns spattered from the core to the outside of the urban area.

When the occupation patterns of three different time are overlapped, you can see the that the pivots of urbanization moved towards the bay. It is an evidence of surbanization in this area.

CHANGE OF CITY CENTER



+ City center

Figure 4-8.
Change of city center,
Autor (2017)

"they built monocentric city models roughly between the years 1840 and 1920. Since then they have mainly been building suburbs, and the growth of suburbs has passed through three stages. First came the bedroom communities that permitted the downtown workers to live in the late 1940s and brought shopping malls and industrial park to the suburbs. The shopping mall grew to serve the rapidly growing suburban population, and the industrial parks attracted manufacturing plants that needed large amounts of relatively cheap land and ready access to highways. These developments changed the nature of suburbs, but there was still a heavy reliance on the economy of the central city. In the third stage, corporate offices and many other activities have moved to suburban centers that Garreau calls edge cities. This stage began in the early 1970s."

McDonald, J.F and McMilan, D.P. (2011)
Urban economics and real estate theory and policy

Suburbanization

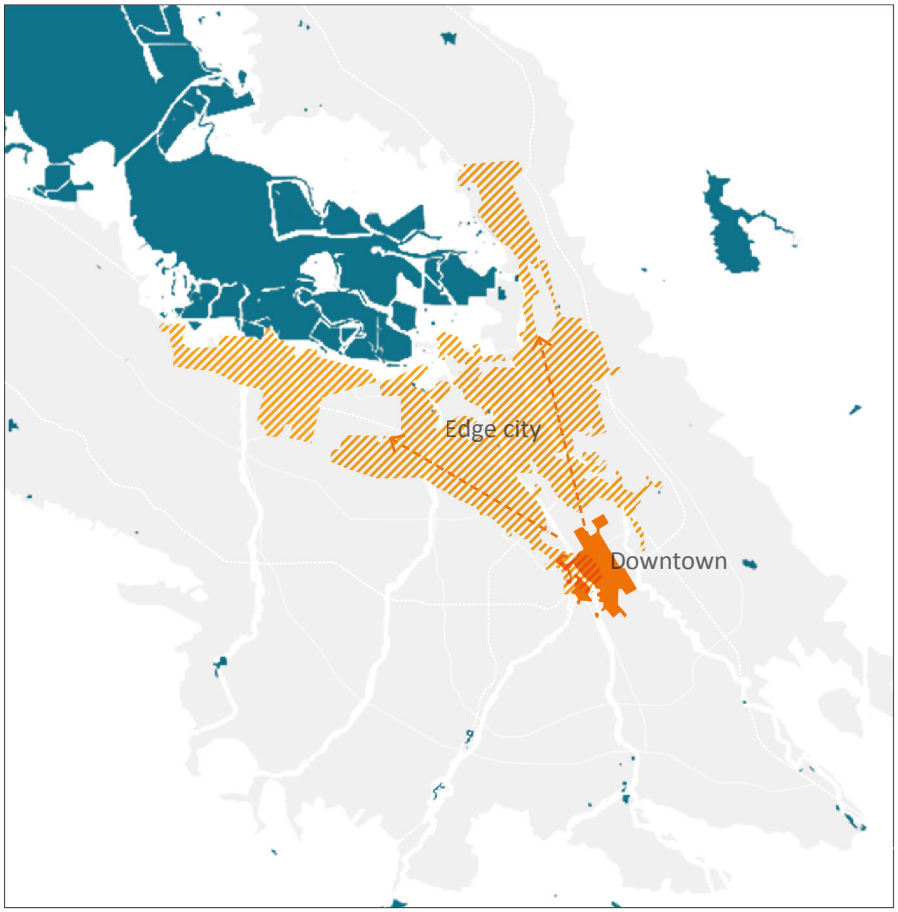


Figure 4-9.
Suburbanization,
Autor (2017)

1. downtown.

San Jose's urban development patterns resemble those three stages of suburbanisation. When San Jose emerged next to the river stream, it was a monocentric city. The downtown developed from the original occupation of the city, led to the development of CBD.

2. secondary downtowns

After CBD was developed, traffic caused longer commuting time, followed by increase of land price. Thus, a new idea for urban spatial structure was making a secondary downtown outside of the city. As the map illustrates that the new downtown was developed where the inter-city road connections across with the airport. The location proves that it was outside of the city at that time.

However, the urban sprawl continued and the secondary downtown was merged with the downtown. As a consequence, it spawned new secondary downtowns outside of its new boundary. The interesting point the transformation is the new occupation pattern was strongly influenced by existing urban spatial structure. Since they built the airport and highways right above the downtown, when there was urban expansion, they had to find a detour of the direction of urban development. Basically, both highways and the airport have been blocking the flow of agglomeration economics.

3.edge city

Many theories of economic geography argue that the technology of telecommunication changed the pattern of urban spatial structure. They claim that agglomeration economics is based on influences of good spatial resources, such as good mobility by enhanced automobile infrastructure, or unique place, which could be suitable for harbour.

From this point of view, the current urban sprawl does not have any strong connection with site condition. The silicon valley is there because there was available land outside of the downtown. After that, it was merely sprawled by the concentration of skilled labor attracting more firms. Many sub-centers emerged first, and then they were clustered as a polycentric region.

Today, the economy of the polycentric region is too big for San Jose. Basically, it is not working as a sub-center of San Jose anymore. Besides, It also lost the physical connection with the downtown because they are dis-connected by the airport and highways. Currently, the roles are reversed. Now the old down town is turning into a new employment center of Silicon valley.

Structure of Edge city

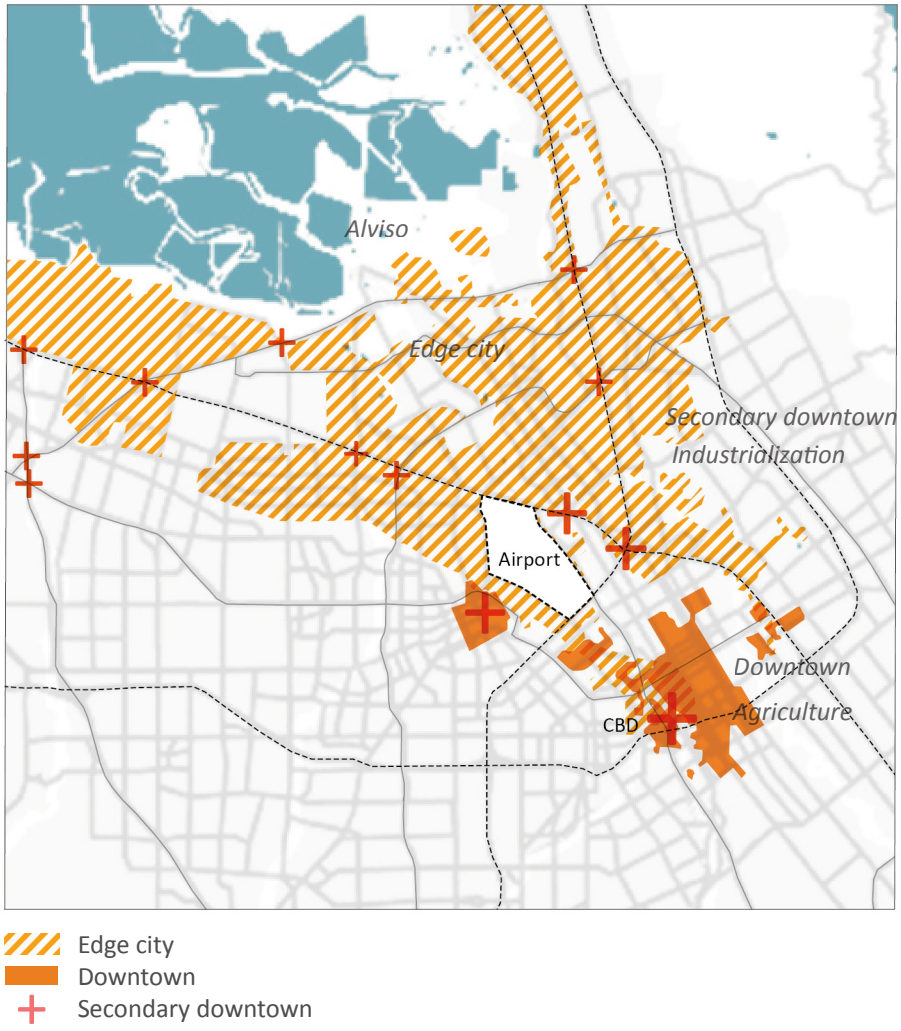


Figure 4-10.
Structure of edge city,
Autor (2017)

Process of Suburbanization

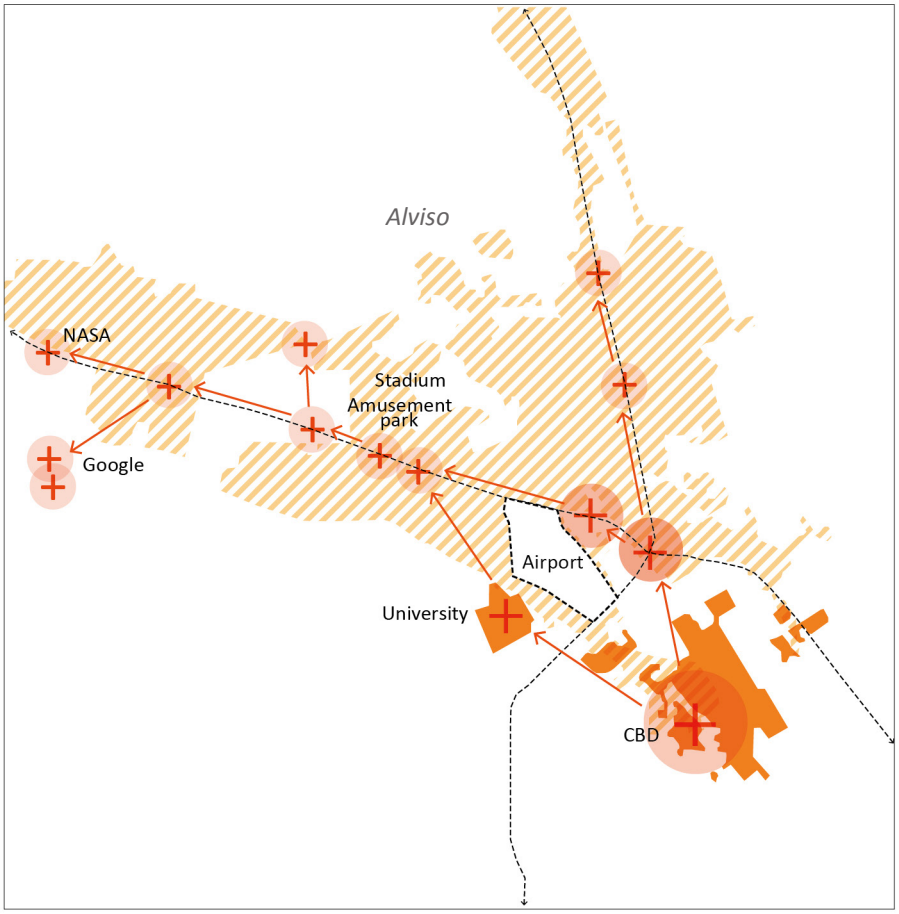


Figure 4-11.
Process of suburbanization,
Autor (2017)

Highway intersection
as the key structuring element

The process of the urbanization from building the downtown to the edge city reveals the core structure and the logic of development in this area. The map of process of suburbanization shows it is clear that secondary downtowns are always developed on the interstate highway . Basically, the highway structure has been the key element of new development for decades here. As a consequece, you can see many secondary downtowns with the highway intersection as the core of the urban form.

In the area, there are three types of secondary downtowns, which are business downtown, commercial downtown and residential downtown. As the diagram, the structure of secondary downtown, describes, the builidng blocks are arrayed around the intersection of highway.

As it is possible to identify each downtown by a certain program, they are monofunctional. At the same time, it is a representation of new development between secondary downtowns. Like seeding, the development started by building a secondary downtown led to the expansion of the urban area around the new downtown, in which case, the typololologies for further development are the duplictaion of the urban forms that you can find in secondary downtowns.

For instance, the area between business downtown and commercial is filled with commercial and business typologies while the new development between bussiness and residential downtown will be about the mixture of 4 different types of housing and offices.

Secondary downtowns

Figure 33. Commercial

Figure 34. Business

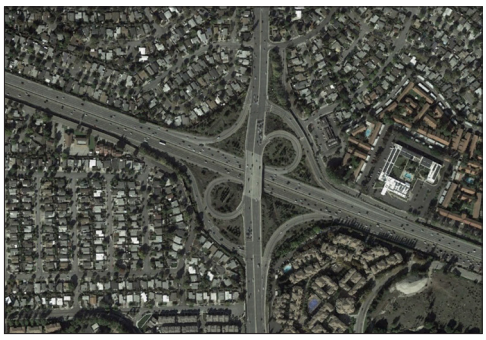
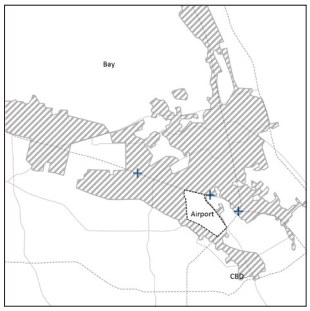
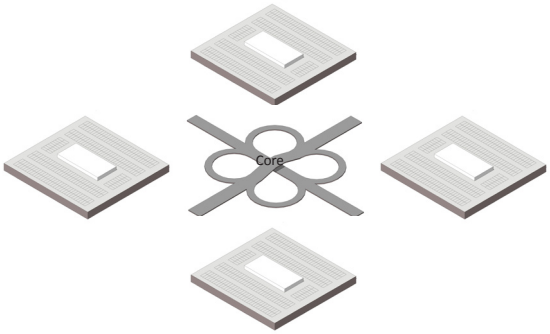


Figure 35. Residential

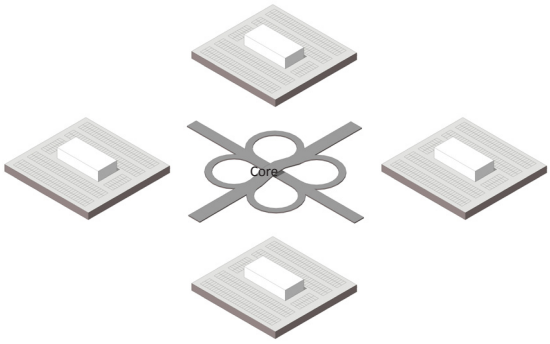
Figure 4-12, 4-13 and 4-14
Secondary downtowns
Google earth (2017)

Commercial

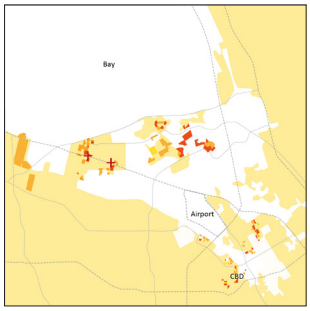




Business



Residential



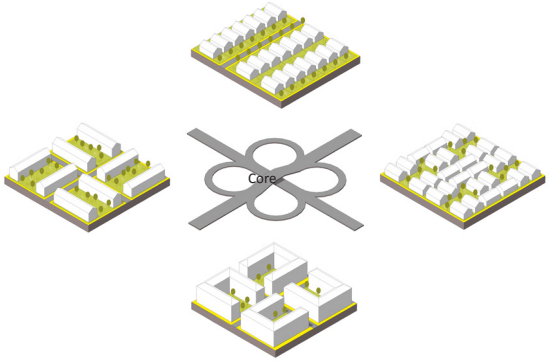


Figure 4-15.
Structure of secondary downtown
Autor (2017)

To understand the change of the urban envrionment from downtown to the edge city with concrete data, spacematrix was used for analysing the typoloiges.

“Spacematrix makes it possible to describe an urban environment by using a set of density variables (FSI, GSI, OSR and L). These quantitative aspects can be used both to describe and characterize, as well as prescribe different urban environments”. (www.spacemate.nl)

Building intensity (FSI)
“FSI reflects the building intensity independently of the programmatic composition and is calculated as follows” (Berghauser Pont and Haupt, 2010):

$$FSI_x = \frac{F_x}{A_x}$$

F_x gross floor area (m²)
A_x area of aggregation x (m²)
x aggregation (lot (l), island (i), fabric (f) or district (d))

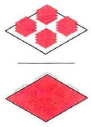


Figure 4-16.

Coverage (GSI)
“GSI, or coverage, demontrates the relationship between built and non-built space and is calculated as follows” (Berghauser Pont and Haupt, 2010):

$$GSI_x = \frac{B_x}{A_x}$$

B_x footprint (m²)
A_x area of aggregation x (m²)
x aggregation (lot (l), island (i), fabric (f), or district (d))

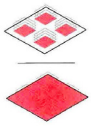


Figure 4-17.

Building height (L)
“The average number of storeys(or layers), L, can be arrived at by ascertaining the intensity and coverage or, FSI and GSI, for the aggregation x. If more floor area is developed in a certain area, without changing the footprint, L will increase. If the building height should remain constant, then FSI and GSI have to increase” (Berghauser Pont and Haupt, 2010)

$$L = \frac{FSI_x}{GSI_x}$$ x aggregation x

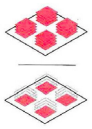


Figure 4-18.

Spaciousness(OSR)
“The variable OSR, or spaciousness, is a measure of the amount of non-built space at ground level per square metre of gross floor area. This figure provides an indicaton of the pressure on non-built space. If more floor area is developed in an area (with the same footprint), the OSR decreases and the number of people who will use the non-built space increases. The unit of OSR is m2/m2”. (Berghauser Pont and Haupt, 2010)

$$OSR = \frac{1 - GSI_x}{FSI_x}$$ x aggregation x

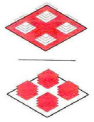


Figure 4-19.

Figure 4-16, 4-17, 4-18 and 4-19
Equations and diagrams of spacematrix
Pont, M.B. and Haupt, P. (2010),
Spacematrix

The scales of the area used for the calculation is Island, which is the adequate scale to clarify the changes of spatial condition because the entire area is desinged by the same logic coming from the theory of agglomerative economy and its economic stimulator, infrasturcture for mobility.

To investigate the differences between the spatial condition of the downtown and the edge city in this homogeneous urban structure, made by highway, both district and fabric scale require some deduction about the highway and the grid system. Thus, the island scale is chosen for the calculation of sample areas.

Island is referred to in the traditional city as an urban block, comprises the lots and, in some cases, non-built space not designated for building. These non-built spaces constitute the tare space between the lot and island. Some examples include playing fields, small squares or parking areas. The border of an island is defined by the surrounding public streets. When there is no bordering street. the periphery of the island is set by the lot boundaries.

Based on the notion of island scale, the area is categorized by 7 different typologies. The downtown is simplified by one mixed use type. The edge city is identified by 6 types, which are 1 business, 1 commercial and 4 residential types. After the data of those types are found in numbers for spacematrix. The edge city will be compared to the downtown, and as a consequece, it will describe the trend of development in the area and its problems.

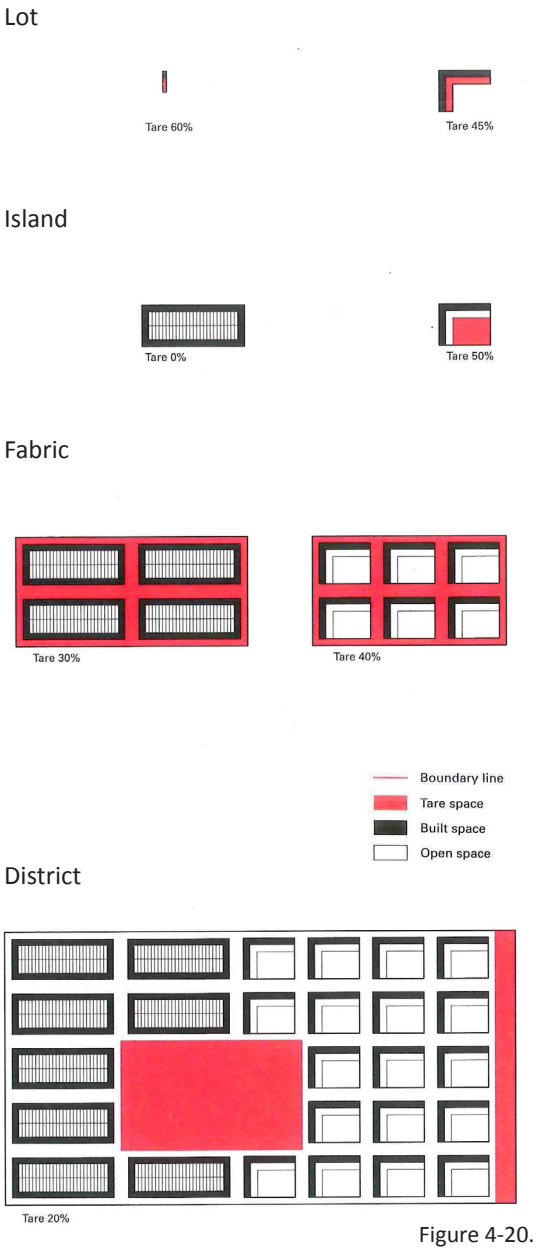


Figure 4-20.

Figure 4-20.
Lot, island, fabric and district
Pont, M.B. and Haupt, P. (2010),
Spacematrix

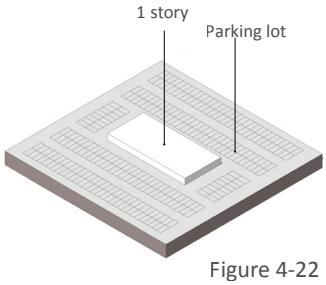
Commercial and Business

The commercial type and the business type are the most basic components of the silicon valley. they are spreaded with low density all over the edge city. They are usually with a building surrounded by a huge parking lot. A difference between the commercial block and the business block is merely about the number of stories of building. Commercial buildings are usually a single story while office buildings have up to 4 storeis.

Location

Figure 4-21.

Commercial



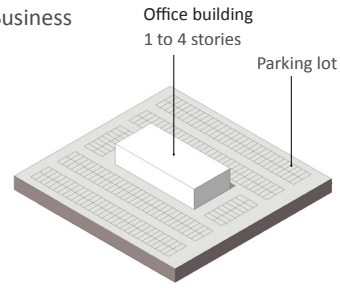
A	7.4ha
FSI	0.14
GSI	0.08
OSR	6.39
L	1.88

Figure 4-22

Figure 4-24.

View of the sample area

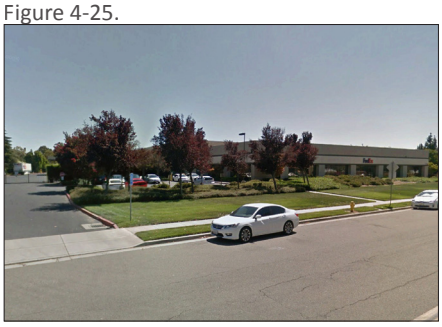
Business



A	9.2ha
FSI	0.33
GSI	0.08
OSR	2.78
L	4.34

Figure 4-23.

Figure 4-25.



View of the sample area

Figure 4-21, 4-22 and 4-23
Author(2017)
Figure 4-24 and 4-25
Google street view(2017)

Residential type 1/2

The residential area is basically the rest of the area which is not occupaid by the business or commercial blocks. The residential type 1 is the most typical typology in the area. The house has 1 or 2 stories with private back and front yard. In terms of density, this is the lowest one among 4 types.

The type 2 is rare. The exact time of this type of development is unknown, but presumably it is relatively a newer version of housing than the type 1. It consists of the same type of houses as the type 1, but with a different way of parcelling. It is designed to provide a shared garden per more than two households. As a result, It has higher density than the type 1. Especially, the change of the coverage(GSI) is notable.

Location

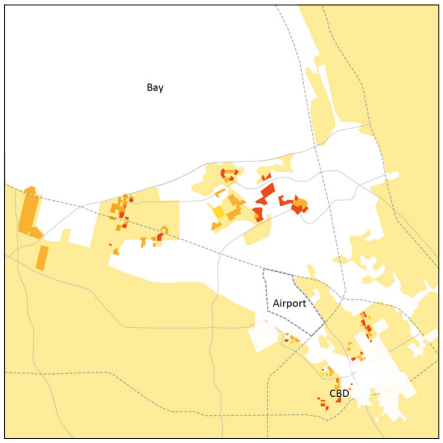
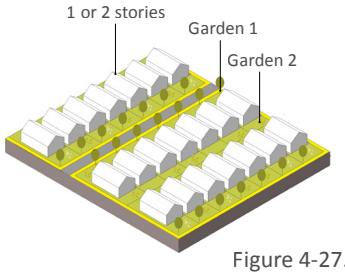


Figure 4-26.

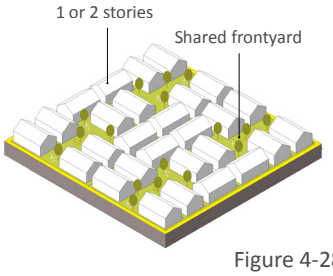
Type 1
Low density
The oldest residential typology in San Jose



A	4.0ha
FSI	0.39
GSI	0.22
OSR	2.03
L	1.75

Figure 4-27.

Type 2
Low-medium density



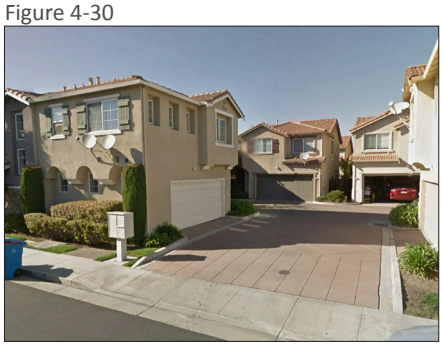
A	3.9ha
FSI	0.74
GSI	0.39
OSR	0.81
L	1.89

Figure 4-28.

Figure 4-29.

View of the sample area

Figure 4-30



View of the sample area

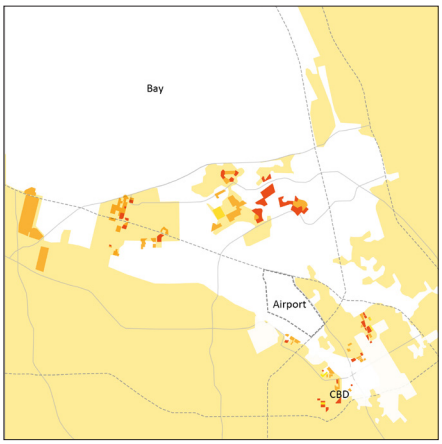
Figure 4-26, 4-27 and 4-28
Author(2017)
Figure 4-29 and 4-30
Google street view(2017)

Residential type 3/4

The type 3 has row housing with 3 or 4 stories. with a courtyard located in between two buildings. It has medium density.

The type 4 is the lastest type of development in the area. The current development trend for housing in the silicon valley is usually with this type. It has more than 5 stories, which is the highest density in terms of FSI among all residential types in the area. The closed form of buildings creates gated community. For this reason, the courtyard is usually not visible from the outside of the block

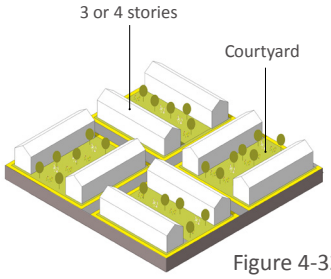
Location



Type 3
Type4

Figure 4-31.

Type 3
Medium density



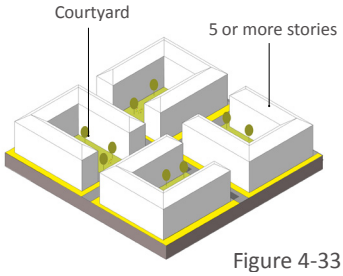
A	2.1ha
FSI	0.88
GSI	0.35
OSR	0.74
L	2.50

Figure 4-32.

Figure 4-34.

View of the sample area

Type 4
High density



A	7.3ha
FSI	1.97
GSI	0.44
OSR	0.28
L	4.49

Figure 4-33.

Figure 4-35.

View of the sample area

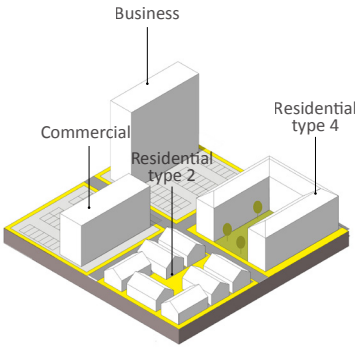
Figure 4-31, 4-32 and 4-33
Author(2017)
Figure 4-34 and 4-35
Google street view(2017)

Mixed use

The downtown of San Jose is designed with grid system. As a mixed use area, business, commercial and residential buildings are developed together in the same block. There are some old housing areas with the residential type2, but the downtown is usually with the type 4 . Business and commercial building are surrouded by parking lots as well as those buildings in the edge city but the Builidng height(L) is significantaly higher than the edge city.

Location

Figure 4-36. location of mixed use area, Autor(2017)



A	3.1ha
FSI	6.19
GSI	0.72
OSR	0.05
L	8.59

Figure 4-37.
Typology of the mixed use area, Autor(2017)

Satellite view

Figure 4-38.
Google earth(2017)

Density gap

When you put the data of 7 typologies in the spacematrix, you can see that there is a big gap in terms of density between the downtown and the edge city. While the typology of the downtown shows the condition of highly urbanized area, the typologies of the edge city demonstrate either the condition of rural area or suburban area. Therefore, the transition area is currently missing in the area.

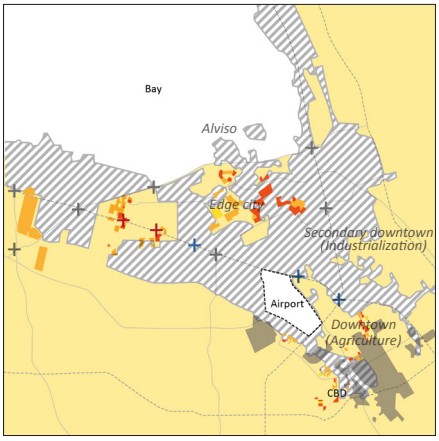


Figure 4-39. Typologies, Autor(2017)

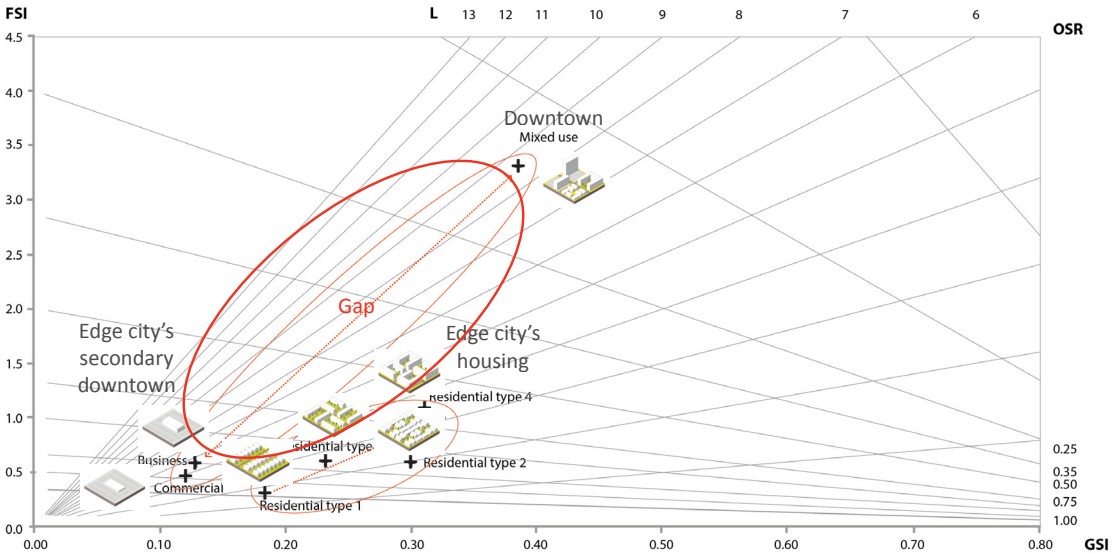


Figure 4-40. Density gap in Spacematrix

Neighborhood scale

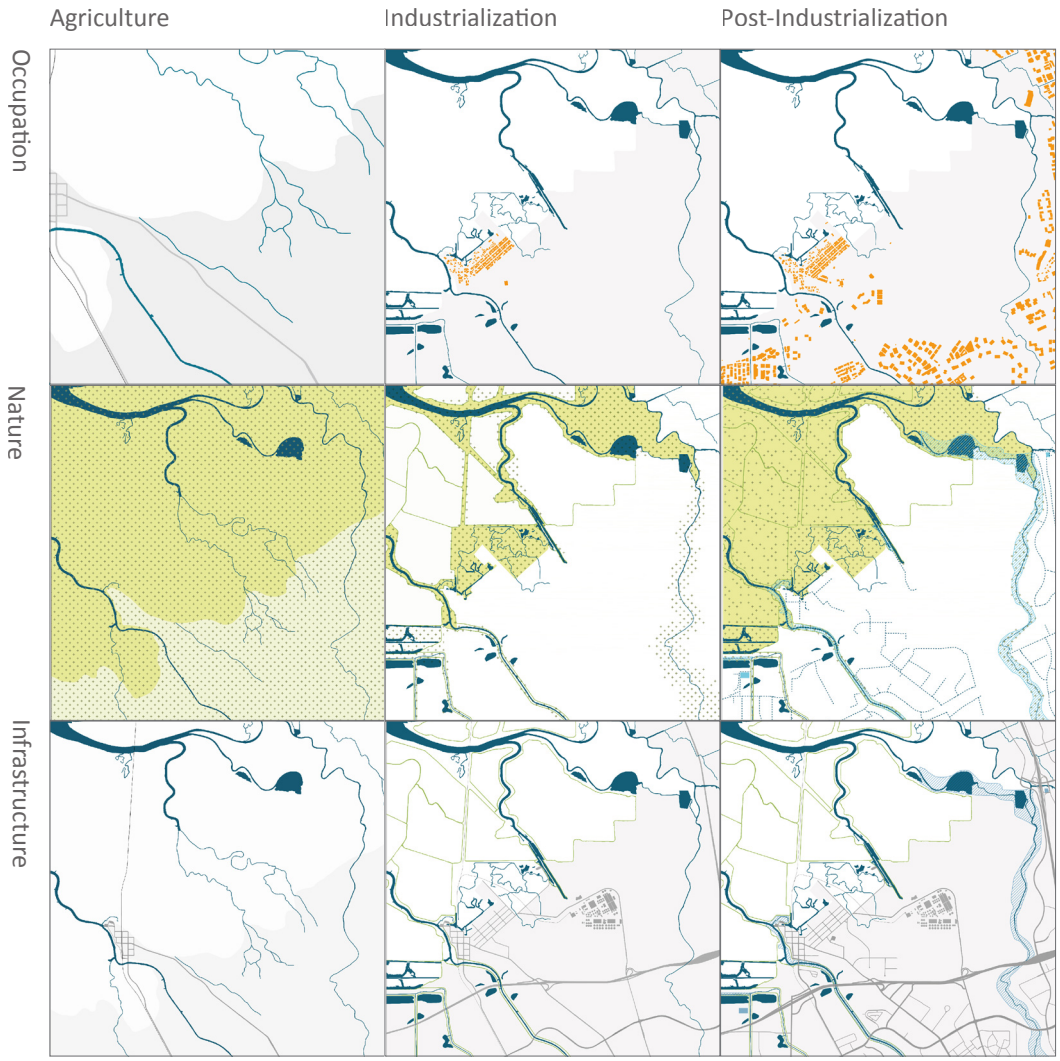


Figure 5-1.
3x3x3 in neighborhood scale,
Autor(2017)

Agriculture

In Agricultural period, Alviso was located by the Guadalupe river because there was a harbor shipping agricultural product processed in the town. Considering the whole area has no dramatic change of topography , the shape of the land with Alviso looks like a cape without any relevant environmental context of the area. For this reason, it is possible to make a hypothesis that the land was shaped by people to have proper bethymetry and view for the harbor. Indeed, the fuction of the town of that time was largely dependant on the trades in the harbor.

However, the transportation was not only one factor influencing the economy of Alviso. As the nature map of the time shows it was surrounded by fertile land created by the landscape ecology of the esturary. Surrounding of the town was used as agricutural land, especially for orchard. Loring (1966) decribes Alviso in the thesis 'the History of Alviso, California;

"Alviso was a flourishing farming area with humus-rich soil and low-hanging fog. Production shifted from grains to fruit and orchards stretched as far as the eye could see. The orchards supported strawberries, apples, peaches, prunes, and currants. For irrigation, growers tapped artesian wells instead of relying on the periodic flooding of the Guadalupe River. During this period, Santa Clara County was noted as the "Garden of the World." The prosperity of the orchards gave rise to a peaceful and productive Alviso."

In this period, people used the land around the town for growing fruits. When they harvest the fruits, they used the land for drying them for some time, and then transport them to Alviso to make prune brandy. Finally the goods are traded in the harbor or transported to other cities by ship. When the Bayside canning comany's business was booming in 1906, 80% of residents in Alviso were employees of the canning comany. That time was indeed the peak of Alviso's eonomic condition throughout the history. When it was high season for canning business, at least 500 workers were required to handle the demand. At its height of production, the Bayside Company was the third largest cannery in the world.(Loring, 1966)

Basically, the location, infrastructure, landscape and its ecology were all connected by the economic circultation of Alviso. In this context, the urban fabric was focused on supporting the economic function of the town. The map describes the structure of the town. The city center was located where the main infrastructures are acrossed. In the map, you can see the train track and the road connecting to other towns are meeting around the city center, and the harbor and the cannery are also located by the square.

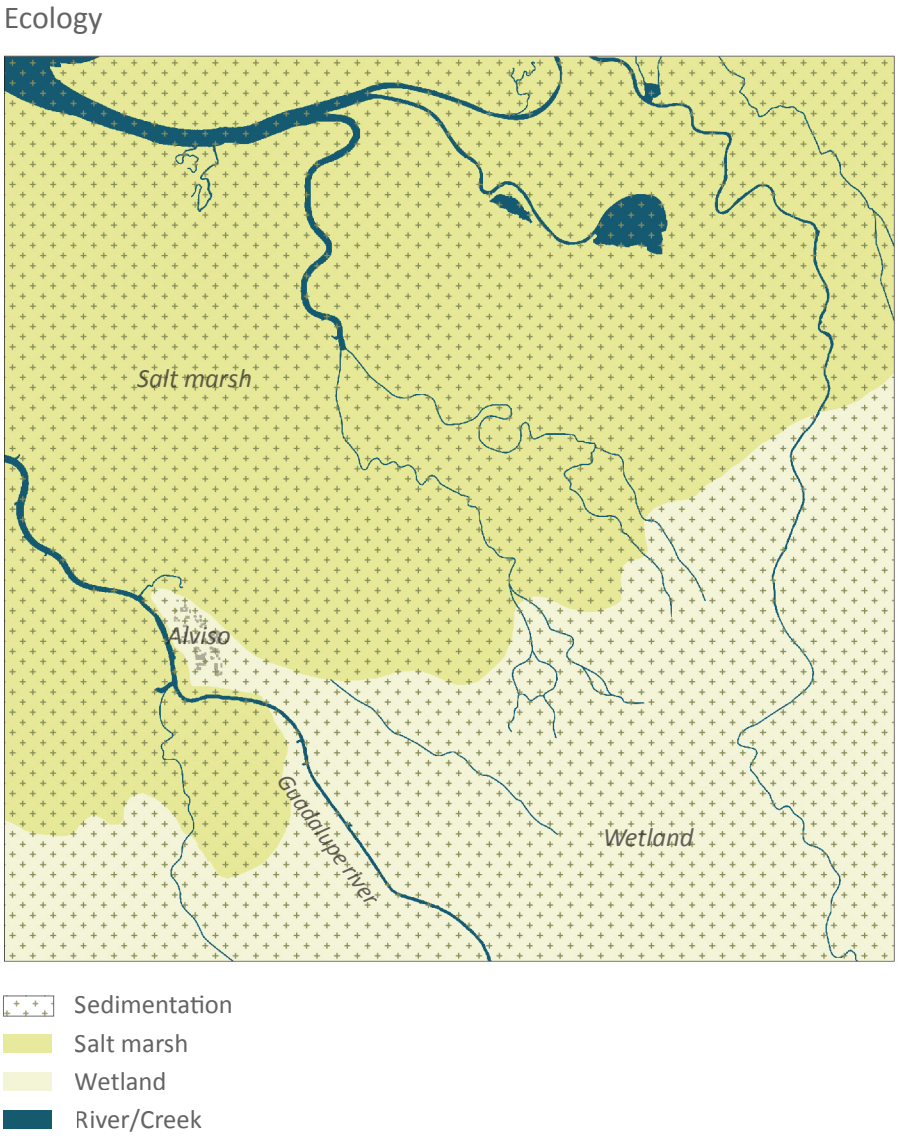
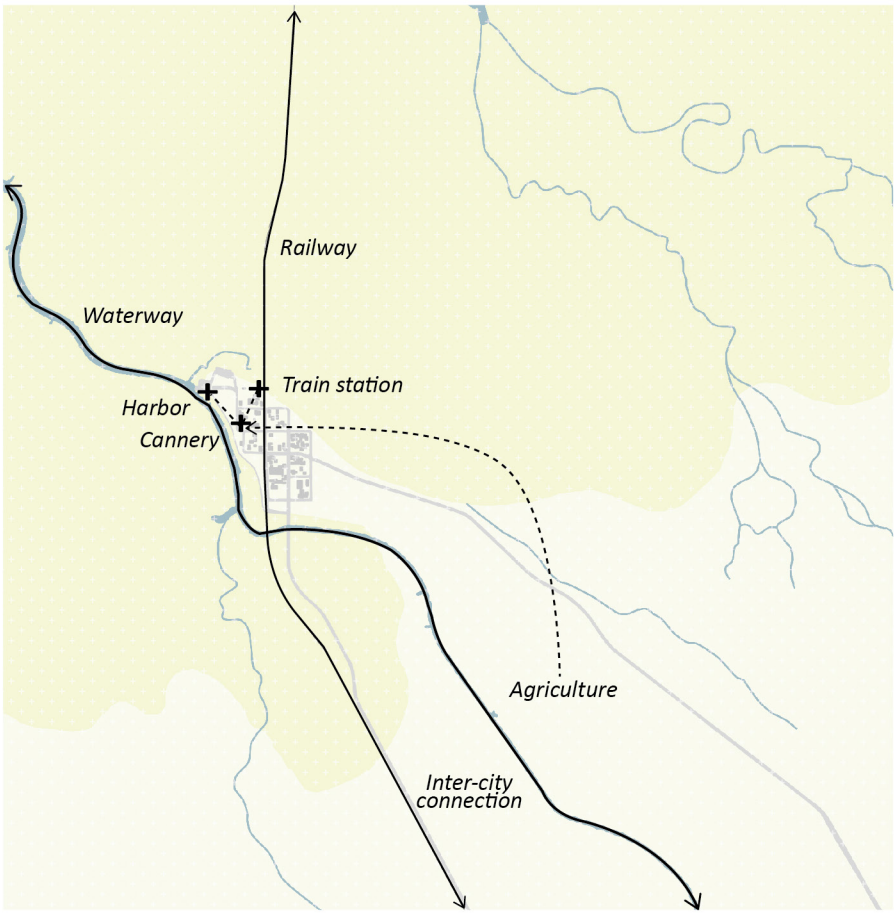


Figure 5-2.
Ecological pattern of Alviso in agricultural period,
Autor(2017)

Agglomeration economics



Major facilities for agglomerative economy
Domestic flow of product
Interstate flow of product

Figure 5-3.
Agglomeration economics of Alviso in agricultral period,
Autor(2017)

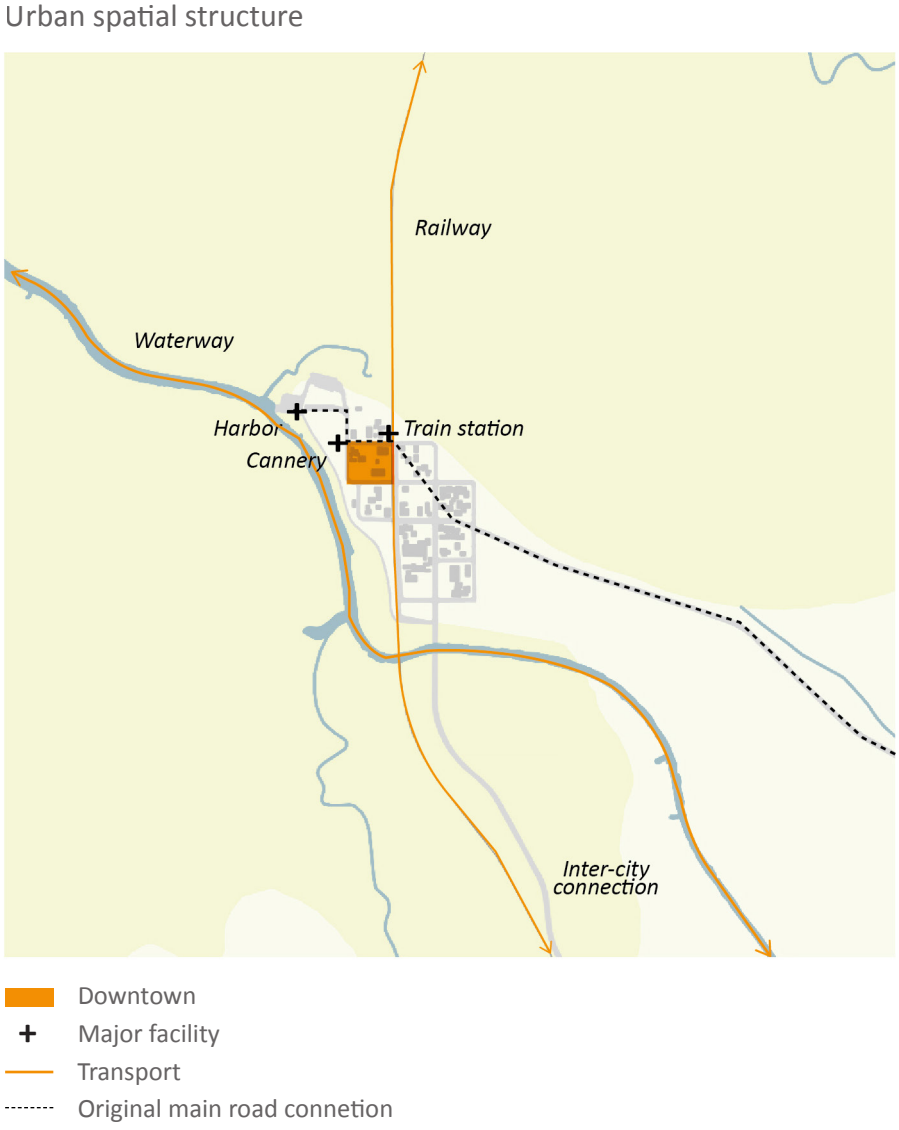


Figure 5-4.
Urban spatial structure of Alviso in agricultural period,
Autor(2017)

Bird eye view of Alviso

Figure 5-5. Bird eye view of Alviso
Burrill, R. and Rogers, L.(2006)
Alviso, San Jose

Industrialization

In Industrialization, Railroad service connecting San Francisco to San Jose commenced, but this route bypassed the town of Alviso because shipping by rail versus steamship was much less expensive. The railroad led to the decline of Alviso as a major port and trade center. In the meantime, the owner of Bayside canning comany died unexpectedly, and the great depression affected the economy of the town.(Loring, 1966)

On the contrary, the residential area of Alviso got more expanded by land reclamation. However, the major purpose of the reclamation was pofitizing marsh for salt production.

salt was and remains one of the most important mining industries in California. Indeed by volume and by value salt often surpassed gold. By the 1930s salt mining was among the largest land uses in the San Francisco Bay region. For this reason, Leslie salt company started buying vast marsh land.

As as result, big chunks of the land turned into diked salt ponds and the streams of river and slough were also engineered to support the new program of the area. From this point of the timeline, the ecology of the area, such as, natural pattern of sedimentation, started being disrupted.

“Before the land reclamation, the marsh was the bay’s nursery for young fish and crabs, the most important links in the Pacific flyway hosting millions of ducks and geese each year, and vast factories for shellfish and shrimp. However, the salt company converted almost the entire shoreline of the bay south of San Francisco into vast stagnant pools walled off from the tides of the bay.”(Booker, 2012)

In addition, according to the research conducted by the interdisciplinary Flood Risk Management Research Consortium (FRMRC) in the UK, engineered channel increase sedimentation excessively, leading to the flood as it remains in the system. As the map decribes, Alviso is combined with leveed salt ponds. It does not only explain the function of the town for the salt industry, but it also proves that the neighborhood cannot be safe from flood issue anymore because of having less space for floodable area, engineered river, and increased amount of sediment. There will be higher risk of flood. Thus, the town will need some defense measures.

In the meantime, Automobile became the most dominant transportation in San Francisco bay. As the map illustrates, the interstate highways were constructed in between Alviso and the center of San Jose. In addition, the waste treatment plant of the city was also built next to the neighborhood. By these facilities the area of alviso was defined as the area outside of the edge city. Thus, the division between the former marsh and the metropolitan area of San Jose was established, which proves the first stage of “a big edge city’s life cycle” (R. Lang, 2003). As a consequence, Alviso were isolated with the salt ponds while the metropolitan was shaping at a major highway intersection.

Engineered nature

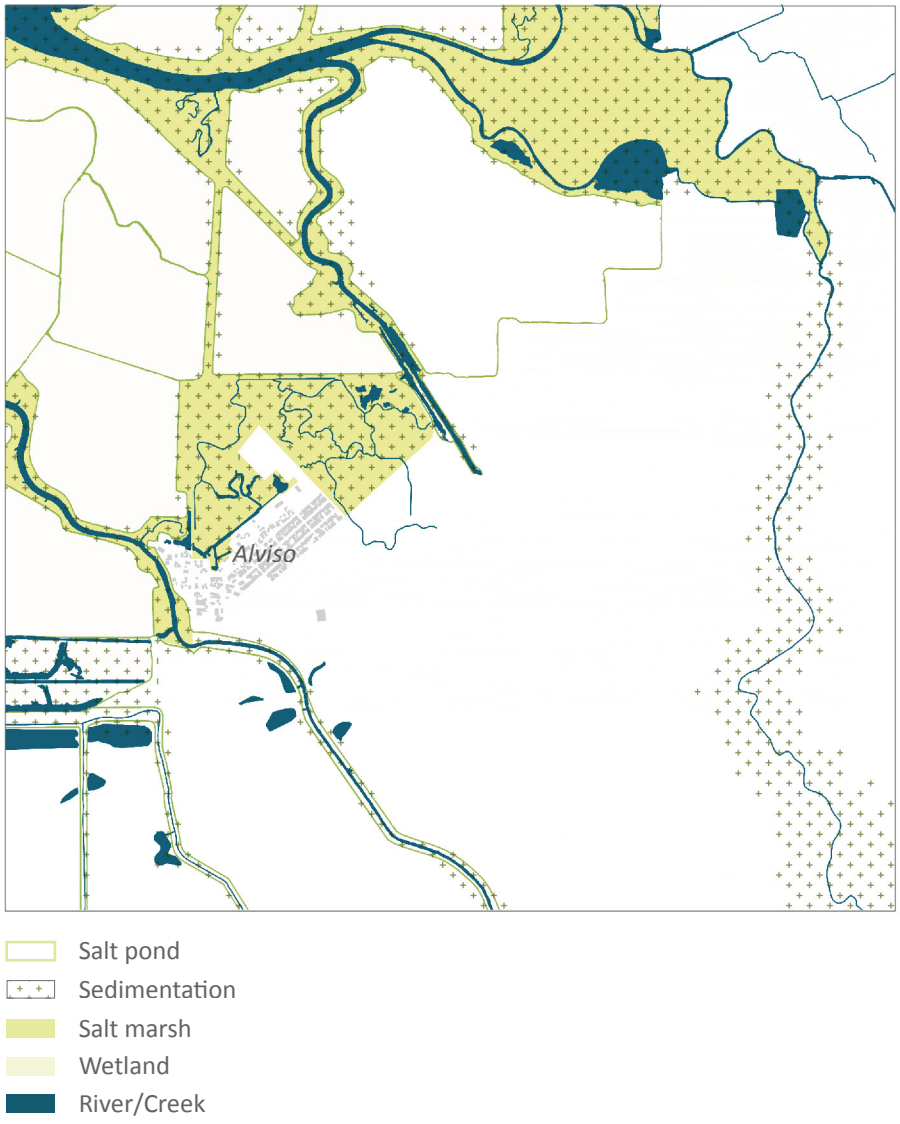


Figure 5-6.
Engineered nature of Alviso in industrialization,
Autor(2017)

Infrastructure for suburbanization

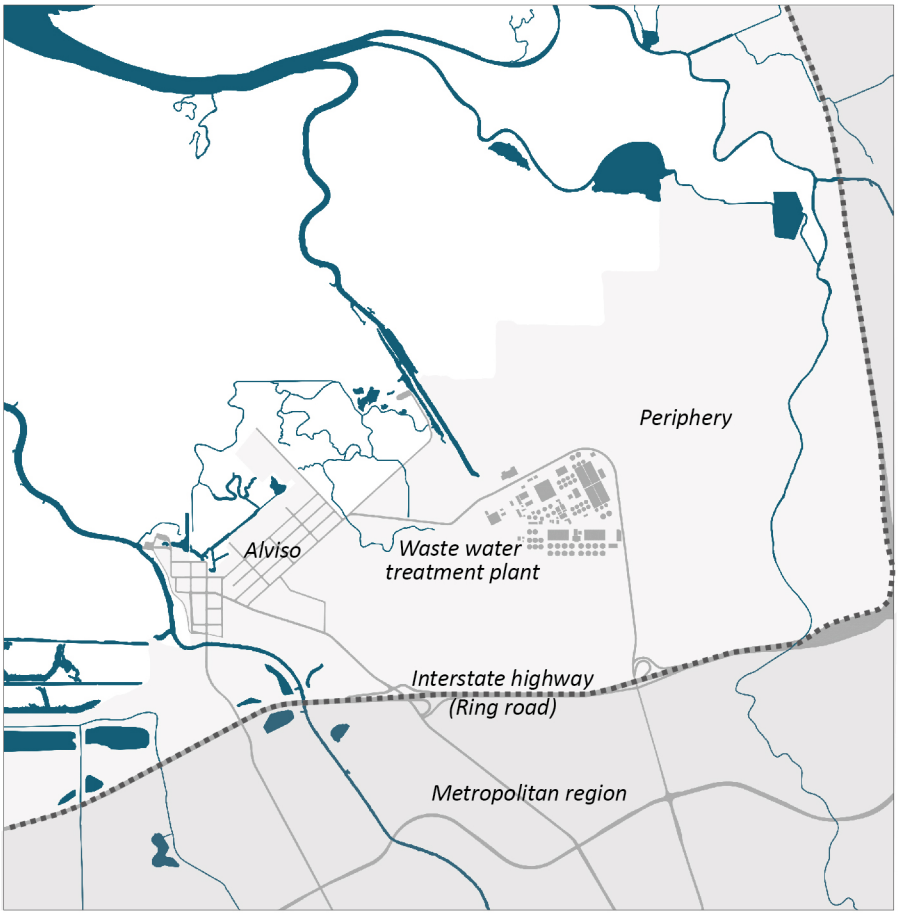


Figure 5-7.
Infrastructure for suburbanization,
Autor(2017)

Stage 1 of a edge city's life cycle
"Formation"

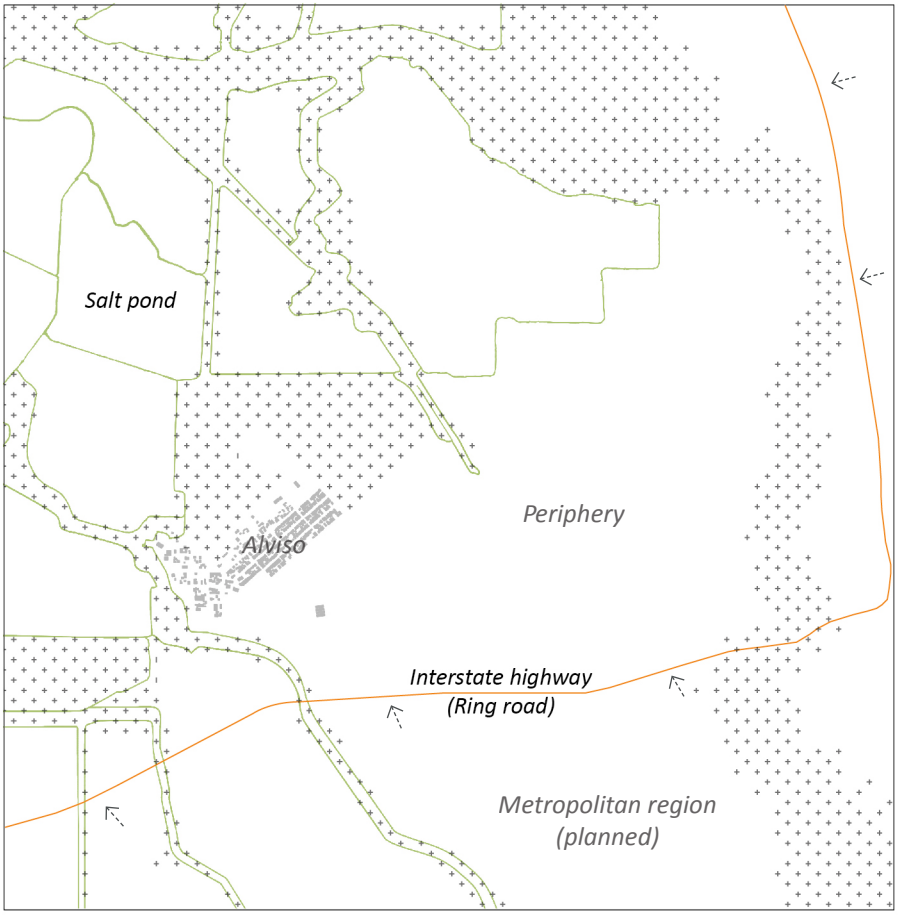


Figure 5-8.
Stage 1 of a edge city's life cycle in Alviso
Autor(2017)

Post-Industrialization

The most significant change is that marsh restoration projects are going on the salt ponds, which means, most of those salt ponds are no longer active. Fort this reason, landscape ecology of the area is partially on the process of restoring, including the sedimentation pattern. On the other hand, there has been no replacement of the industry in Alviso for decades. The urbanisation did not proceed more than it was in the previous period. It means that the agglomeration economics does not occur anymore from the spatial condition of this area.

On the other hand, the urban sprawl from San Jose is reaching toward Alviso. The edge has been more developed with additional roads for new office and residential areas along the major roads. As the second stage of a big edge city's life cycle (R. Lang, 2003) describes, "it is at a relatively low density but in a fairly contiguous manner, pushing out into both open space and some older residential areas. Some multi-family housing is built and many land parcels originally passed over for office space are developed."

Since the urban spatial structure is mainly designed for the mobility of cars, every office block is surrounded by highway and filled with parking lots. As a consequence, the area has become fragmented by each building, which is the sign that the silicon valley is facing the third stage of the life cycle. It describes that some development spills out into small isolated clusters that are disconnected from but within several miles of the edge city.

This is the development pattern that you can see around Alviso now. If this continues, there will be the strong NIMBY(not-in-my-backyard) sentiment mounts in the local community, especially among surrounding homeowners, besides, there is physically not so much available land left. It means the "push up" will happen as a next step, and as a consequence, there will be the increase of land price by the constrain of the available land for development in the future, which will be a huge impact on the community of Alviso. According to the data, a big share of the population of Alviso is low-income people.

Therefore, the vacant land in between Alviso and the edge city has to be prepared for the process in the future. A new land use with the regulation for density control, and the new urban form for the rule should be ready for the scenarios. In this case, the neglected value of the landscape for decades, but a key element for urban development, can be a design tool to mediate Alviso and the silicon valley in a new urban form. However, that is not all problems accelerating the process of "push up". There is an issue related to the infrastructure of the area. It has the flood problem by sea level rising. The theories of agglomeration economics have proved that the infrastructure directly related to the well-being of life matters a lot to agglomeration economics. If there is safety or health issues in the area, it will be a major constrain of future development. Therefore, the landscape should be not only a design tool for urban spatial transformation, but it also need to be a method for water management in this area.

Urban sprawl towards Alviso

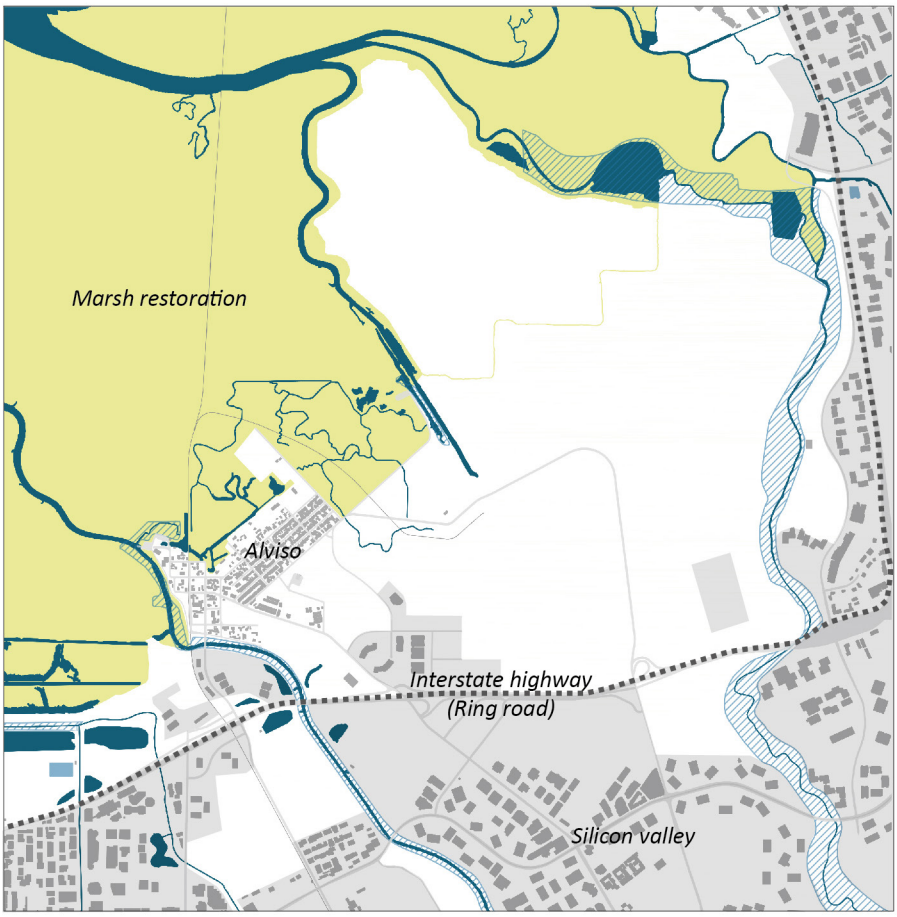


Figure 5-9.
Urban sprawl towards Alviso
Autor(2017)

Stage 2 to 3 of a edge city's life cycle

"Push out", "Push up"

Figure 5-10,
Stage 2 to 3 of a edge city's life cycle in Alviso
Autor(2017)

Flood management

According to Guadalupe River Park Conservancy, the Guadalupe River frequently floods San Jose's downtown and Alviso community, with severe flooding in 1862, 1895, 1911, 1955, 1958, 1963, 1969, 1982, 1986 and 1995. The Guadalupe River's natural channel directly upstream of the confluence with Los Gatos Creek has a capacity of 7,000 cubic feet per second (cfs), roughly the flow of a 10-percent or 10-year flood event.

However, the flood management finally became a major issue of this area in post-industrialization because the area started being occupaid by offices of the silicon valley. Therefore, the awareness of the problem initially started by the flood of Guadalupe river in 1986.

"In February 1986, the river overflowed its east bank upstream of St. John Street, flooding residences and businesses. In January 1995, a similar flood occurred and flooded the same area. In March 1995, severe flooding occurred when the Guadalupe River and Los Gatos Creek combined to produce the highest flow in 50 years. In the most extensive flooding of the city's core in four decades, streets turned into rivers, forcing residents from their homes and driving office workers from high-rise buildings. Approximately 300 homes and businesses were flooded by four separate breakouts along the river, with damage estimates of up to $10 million. According to current U.S. Army Corps of Engineers estimates, average annual equivalent damages are $27.25 million."

Guadalupe River Park Conservancy(2017)
www.grpg.org/flood-control

After decades of governmental studies, on-again/off-again funding, several design changes and lots of public discussion,

the construction of the Lower Guadalupe project in the Alviso area started in 1992 and it was completed in December 2004, ensuring that floodwaters from the upper reaches of the river can be carried successfully through the lower Guadalupe River to San Francisco Bay. The Upper Guadalupe project is scheduled to be constructed over the next 15 years.(Guadalupe River Park Conservancy, 2017)

As a result, the area has the engineered streams of rivers with flood control channels assisted by underground culvets though blocks. In this system, sediment conveyed by the channel from the upstream will be accumulated in the downstream of the channel, especially in the zone where the head of tide meet the stream of river.

For this reason, they have to dredge the sediment of the channel to maintain the capacity of it every year. In this process, thousand tons of sediment are directly dumped in the ocean without finding the usage of it

Sea level rising

Sea level rising is a long term threat of Alviso. Based on the research, Global Sea Level Rise Scenarios for the United States National Climate Assessment, conducted by NOAA, they identified four scenarios of global mean SLR ranging from 0.2 meters (8 inches) to 2.0 meters (6.6 feet) by 2100.

They argues that higher mean sea levels increase the frequency, magnitude, and duration of flooding associated with a given storm, which often have disproportionately high impacts in most coastal regions. Extreme weather events will continue to be the primary driver of the highest water levels.

However, "a consensus has not yet been reached on how the frequency and magnitude of storms may change in coastal regions of the US. The greatest coastal damage generally occurs when high waves and storm surge occur during high tide. In many locations along the US coast, small increases in sea level over the past few decades already have increased the height of storm surge and wind-waves." NOAA(2012) Global Sea Level Rise Scenarios for the United States National Climate Assessment

Thus, considering the impact of different weather events combined with scenarios of SLR is crucial in developing adaptation assessments. The major issue of the target area is it does not have adaptation measure except for low horizontal levee. Beside, it has lots of underground culverts, which will be most likely submerged in the sea level rising scenarios.

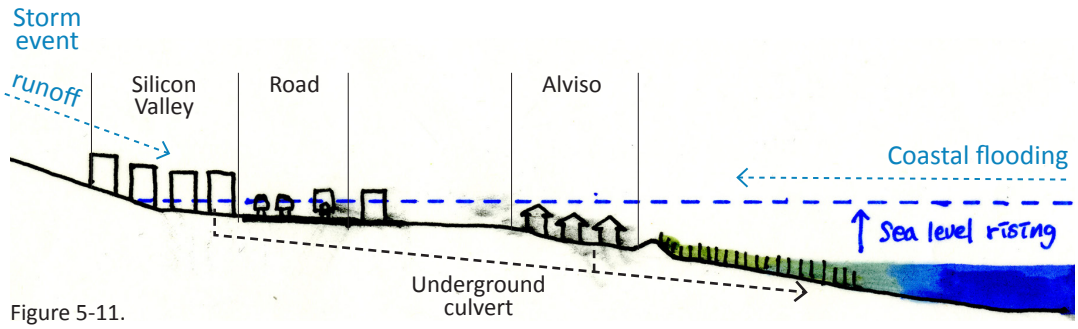


Figure 5-11.
Diagrammatic section of Alviso
Autor(2017)

Water related infrastructure in 2016

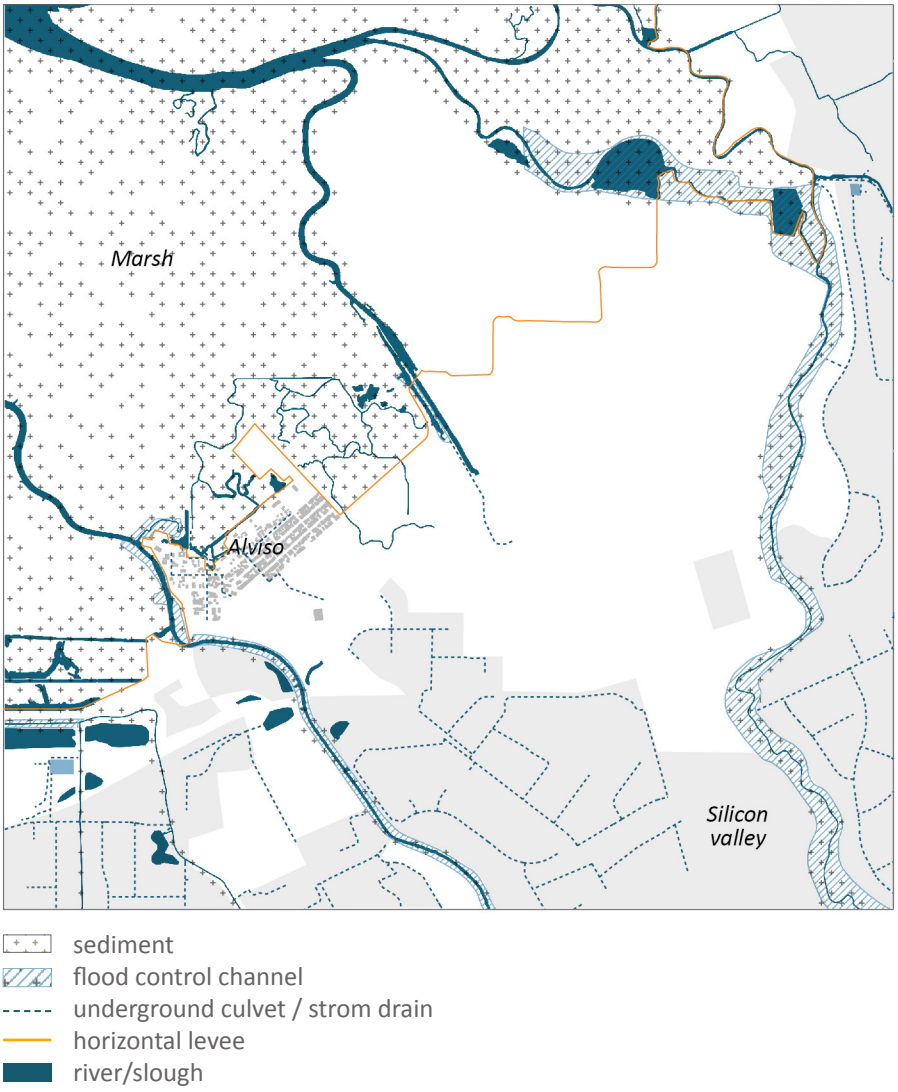


Figure 5-12.
Water-related infrastructure of Alviso in 2016
Autor(2017)

Sedimentation in flood control channels

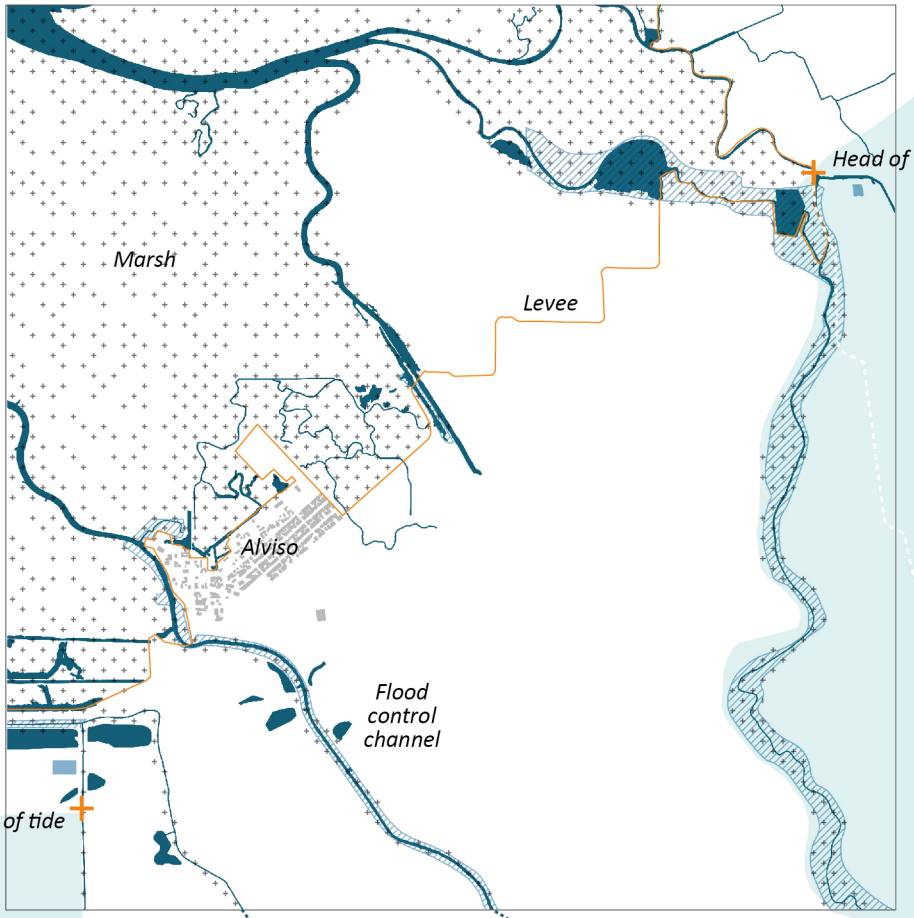
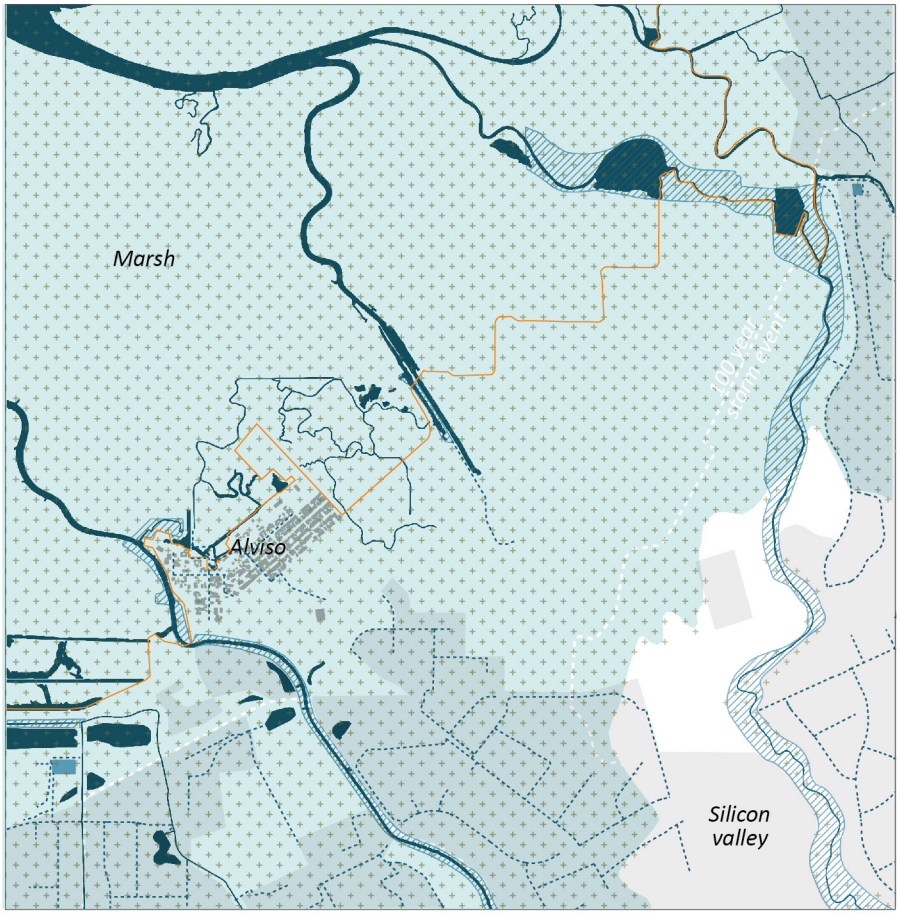


Figure 5-13.
Sedimentation in flood control channels
Autor(2017)

Water related infrastructure in 100 years



Sea level rising
(+1.5 m in 100 years)

Figure 5-14.
Water-related infrastructure of Alviso in 100 years
Autor(2017)

Stage 3 of a edge city's life cycle
"Push up"

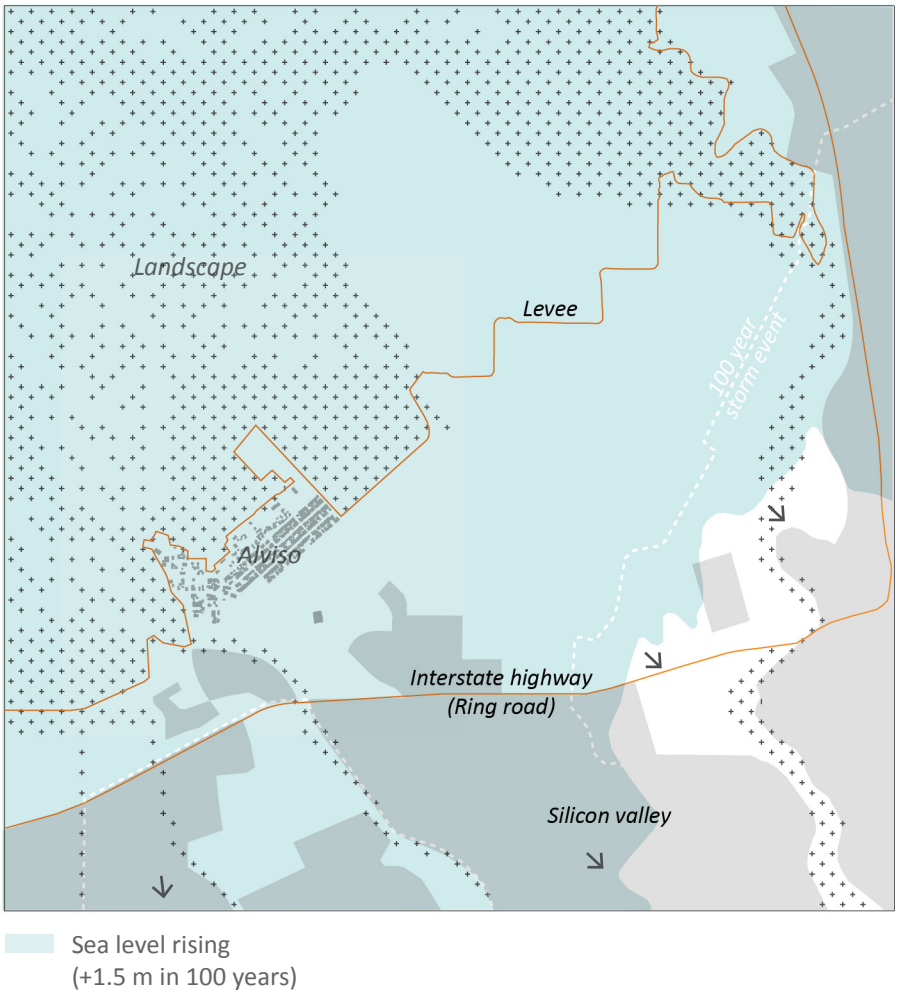


Figure 5-15.
Stage 3 of a edge city's life cycle in Alviso
Autor(2017)

edge city, stage 3

The most recent studies about edge city propose the concept of “edgeless city” as the current phenomenon of urban spatial transformation after the edge city. Lang (2003) describes that “edgeless cities is a form of sprawling office development that does not have the density or cohesiveness of edge cities.” “This ‘generalized dispersion’ of jobs over clustering, however, would be more of a norm if the benefits from locating in job centers diminished (Gordon and Richardson, 1996), and the same change would be expected if even subcenter location becomes too costly, as in the CBD (Fulton, 1996).”(Lee, 2006)

However, the silicon valley is not heading towards the edgeless city because of geographical restriction. It is facing the ocean in the direction of the expansion. There is simply no land for dispersion. According to Robert E Lang’s life cycle of a big edge city, an edge city, such as, Silicon valley, goes through the three stages of life cycle before it transforms into a edgeless city.

The first stage is “formation”. In this early stage of edge city, it starts forming at a major intersection of highway. At this point, except for some upscale housing area, there is no other development found around This is the period when a significant cost saving over downtown is possible. Lang (2003) describes, “It also enjoys good commuter access. The road network comprises exit ramps and feeder roads, and building sites develop as independent pods off these roads. Inexpensive surface parking surrounds most buildings. The new edge city begins to establish a reputation as a major commuter destination in the region.”

The second stage is “push out”. It is the period when the edge city expands radially from the intersection. “the edge city expands, at a relatively low density but in a fairly contiguous manner, pushing out into both open space and some older residential areas. Some multi-family housing is built and many land parcels originally passed over for office space are developed. At this stage, the edge city becomes firmly known as a destination.” (Lang, 2003) From this stage, the edge city starts showing problems derived from its urban spatial structure. One of them is congestion by the increase of population because the highway network of the edge city was never designed for urban level traffic.

Life cycle of a big edge city

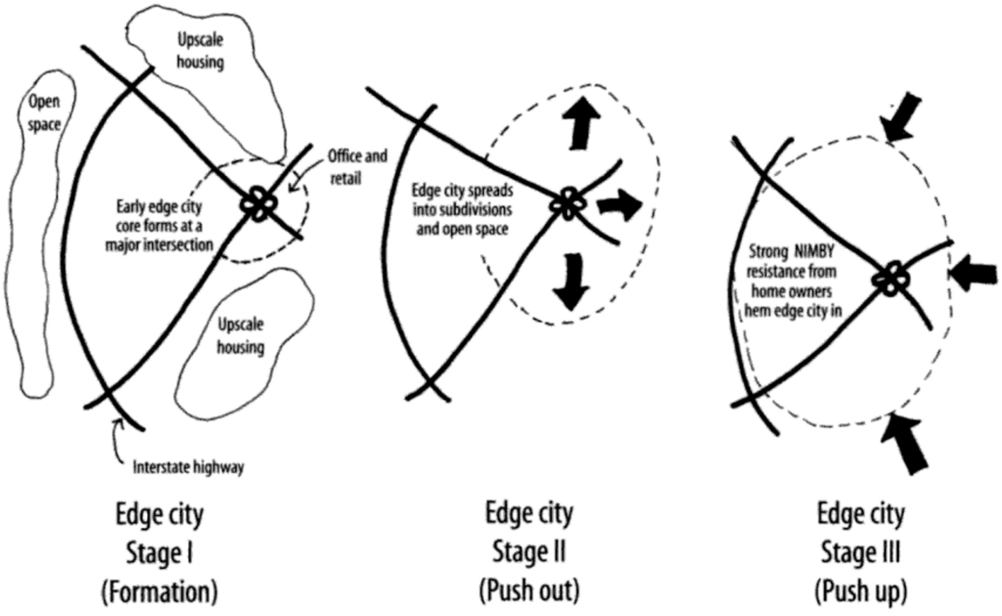


Figure 5-16. Life cycle of a big edge city
Robert E Lang(2003)
Edgeless city

The third stage is “Push up”. As available land for new development is usually limited when the expansion the edge city reach the boundary of the metropolitan region, which is usually drawn by the inter-state highway, The direction of development turn back to the core. For this reason, numbers of problems start appearing in relation to the land-contrained market. “Building heights and cost rise. Expensive parking decks are built in place of surface parking to make more use of land. The network of feeder roads becomes overwhelmed. An all-day rush hour results because worker make multiple automobile trips to run errands and go to lunch. The cost benefit of the edge city relative to that of the downtown has either substantially narrowed or disappeared altogether.”(Lang, 2003)

Seemingly, the Silicon valley is going through the second stage. Thus, the next stage prospected for the silicon valley is most likely the final stage of the edge city’s life cycle, which is “push up”. However, in this stage, there will be an issue of land price increase by higher density. Basically, the silicon valley will face a potentially serious development dilemma. If they grow inward it raises cost and produces congestion. Yet their opportunities to grow outward are curtailed by limited developable land and NIMBY opposition.

For instance, Alviso shows what is actually happening in the process of facing both “push out” and “push up” in neighborhood scale.

While the expansion of silicon valley is approaching toward the neighborhood over the inter-state highway, Alviso oppose to the new development in their backyard. However, mitigating the development pressure is not one and only pressing issue of the town. As Alviso is located in the lowest point of the bay, it is extremely vulerable to sea level rising. In fact, the neighborhood already suffer from flood when there is intensive rainfall. Within 100, the rising sea level will be another crucial factor accelarating the process of “push up” in this area.

Therefore, the management of development pressure is not seperable from the flood issue in this area. In fact, the improvement of water management might lead to a solution for the increase of development pressure.

Stage 1 of a big edge city's life cycle "Formation" in Industrialization

Stage 2 to 3 of a big edge city's life cycle "push out", "push up" in Post-industrialization

Stage 3 of a big edge city's life cycle "push up" by sea level rising

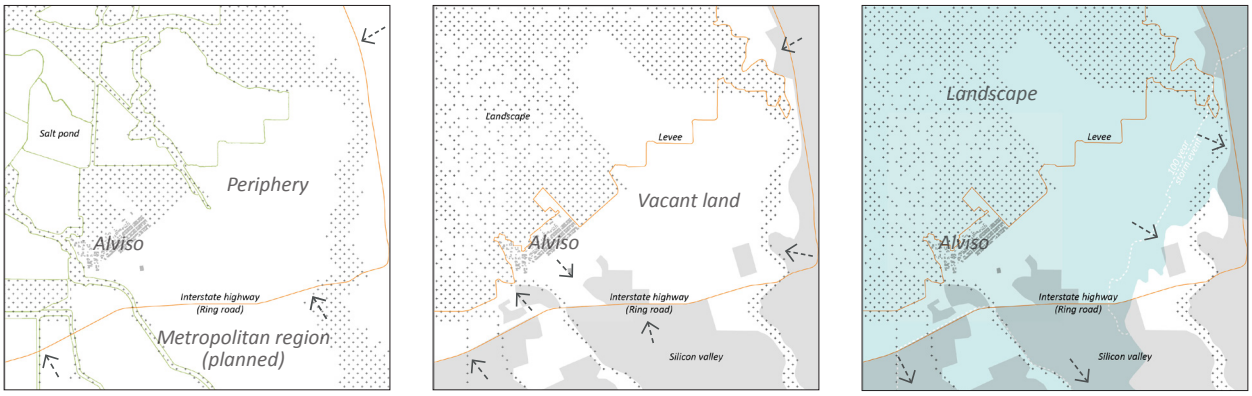


Figure 5-17.
Life cycle of a big edge city in Alviso
Autor(2017)

Synthesis

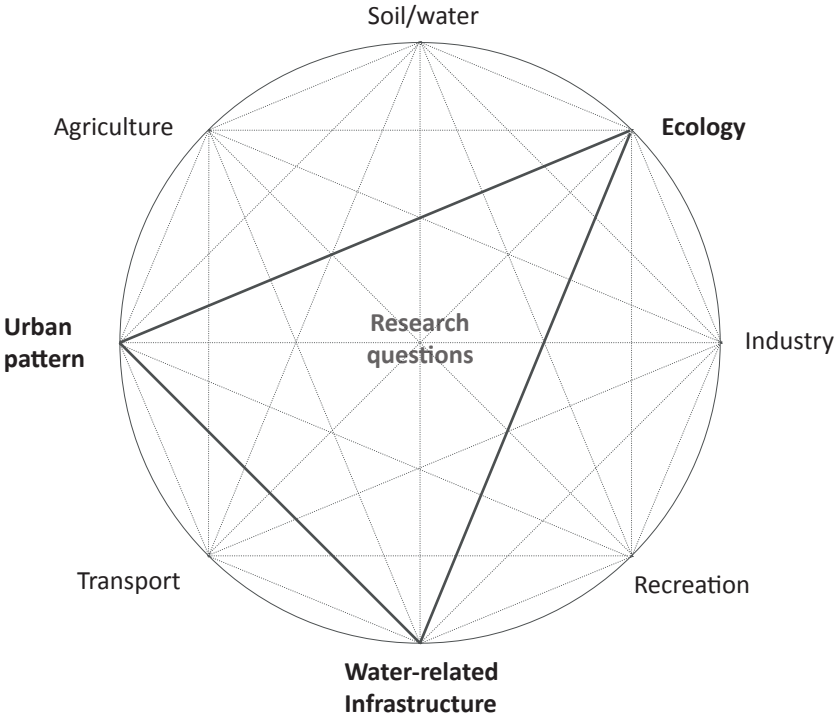


Figure 6-1.
Synthesis based on three major aspects
Autor(2017)

Ecologic pattern of agricultural period

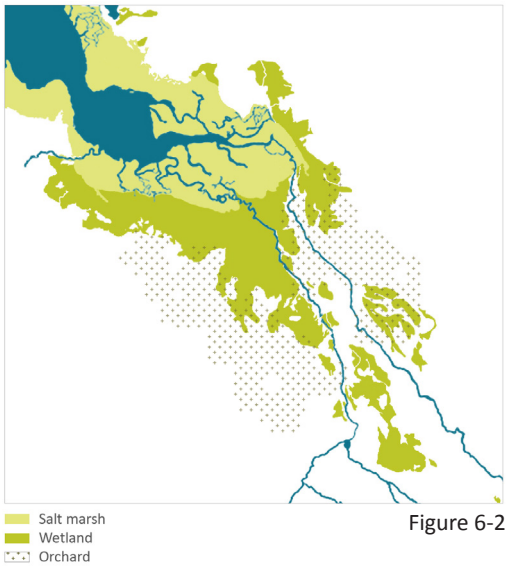


Figure 6-2

Occupation of agricultural period

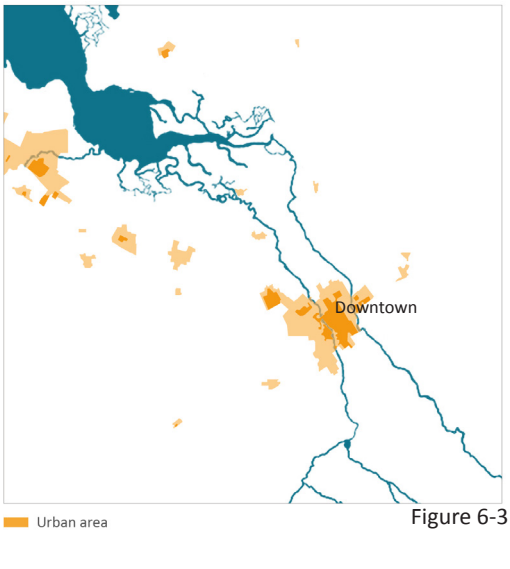


Figure 6-3

The city center of the San Jose changed its location several times. It has been influenced by agglomerative economy in relation to accesibility to infrastructure. In this area, the crucial type of infrastructure for urban development has been dependant on the type of tranport that people use the most in each period.

In agricultural period, ship network played a important role for trading in San Francisco bay. However, the trend changed by the invention of automobile. Car became the most popluar type of transport in a short time in the area, and the city were designed for car using population. Meanwhile lots of economists reinforced the urban design method based on highway structure as the core of a city by many theories and crunching numbers to prove the economic value that will bring to the city. For this reason, the trend has been still continuing in this area.

There are maps to prove the process of urban development in relation to agglomerative economy. As you can see the map of occupation in agricultural period, the urbanization of the south San Francisco bay started from where two river streams meet on stable ground condition. It is affected by the ecologic pattern created by natural river system of this watershed.

By having this location, the downtown of San Jose was able to access waterway for mobility ,and enriched soil for agriculture, which was the most important economic activity of the area in this period.

Change of the city center
in industrialization

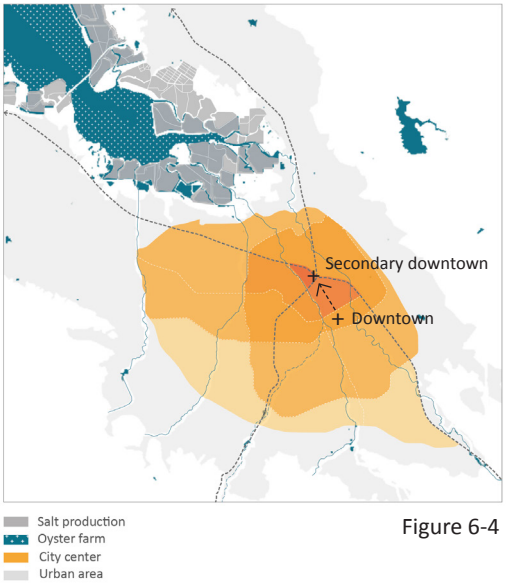


Figure 6-4

However, the economic trend changed in the industrialization, and the center of the city moved to a new location. As the map of occupation pattern in the industraization shows, there was explotation of urbanzation by the growth of population. and the center of this new development was structured by new highway.

At the intersection of the highway, the first secondary downtown of San Jose was built. With the new downtown as the core, the urban area was shaped in a form of egg.

Change of the city center
in Post industrialization

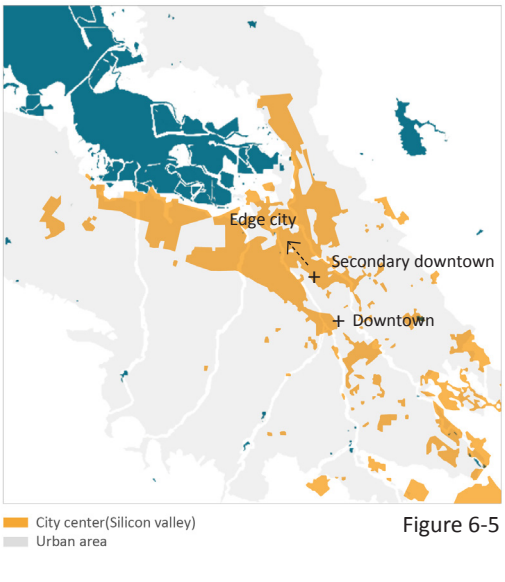


Figure 6-5

In post industrialization, the economic center moved once again. Today it is called Silicon valley. It is developed in a form of edge city with good mobility provided by interstate highway connection. Thus, it is located in the periphery of the city, and it does not need any kind of strong connection with the downtown of San Jose.

Besides, the type of the industry they have also does not require the close proximity to the CBD. Today, there is disconnection between the current economic center in the edge city and the downtown of San Jose

The issue of disconnection and the impact on San Jose

The major issue here is there is a possibility that silicon valley will migrate in forseeable future.

Today silicon valley plays a crucial role in the local economy of San Jose. In response, the downtown is accepting the role of providing what the silicon valley needs. Recently, there are articles about San Jose turning into a bed town for employees of the silicon valley. However, there is still limit about providing what silicon valley needs because of physical condition of the area.

First, the economy of silicon valley has been booming since it was built. For this reason, you can easily find new construction site in this area. Recently the needs of housing for their employees is getting higher, many it companies, including google, started building a new campus with residential builidngs in the area.

The problem is there is physically not enough space for new development anymore as it is in the prephery facing the bay.

Second, the area is the lowest point of San Francisco bay. which means it is vunerable towards flood by storm surge and sea level rising. If the trend continues as it say the sea level will rise 1.5m in 100 years. The marked area in the map will be submerged. Thus, available area for silicon valley is even smaller than now and it also threats lots of existing office areas.

In summary, the possibility of silicon valley leaving the area will be higher by the factors desicribed eariler, and as a consequece, the gap between the edge city and the downtown will become bigger in a long term, which will affect the economy of San Jose chronically.

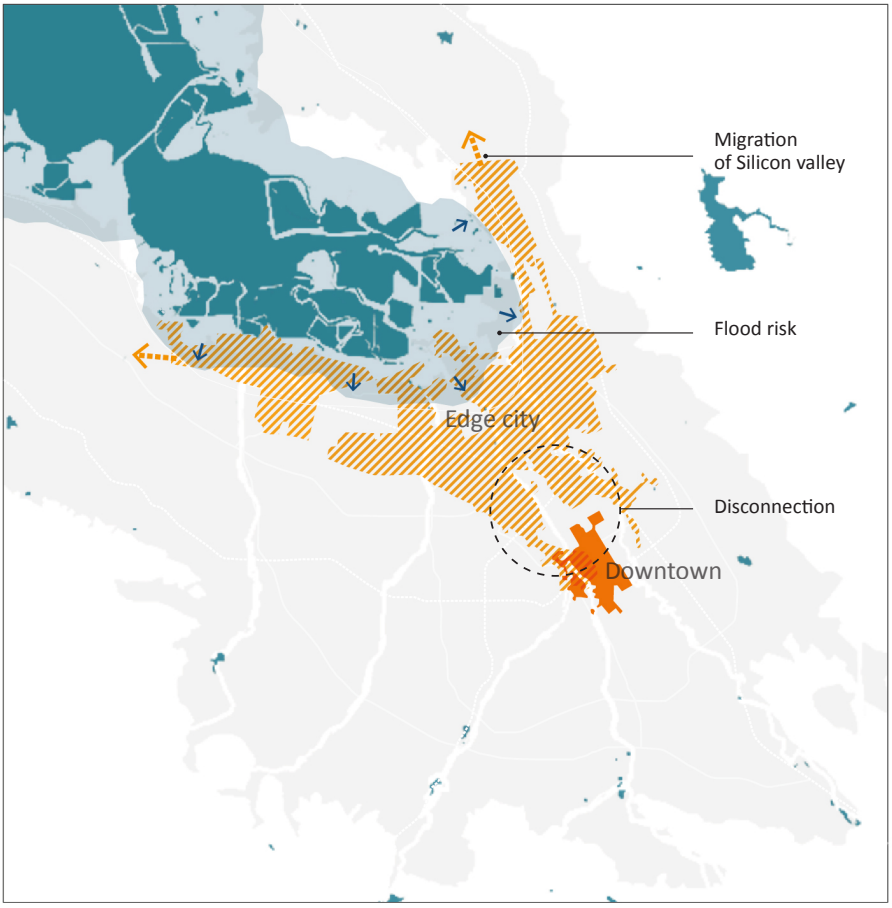


Figure 6-6.
Issues of San Jose
Autor(2017)

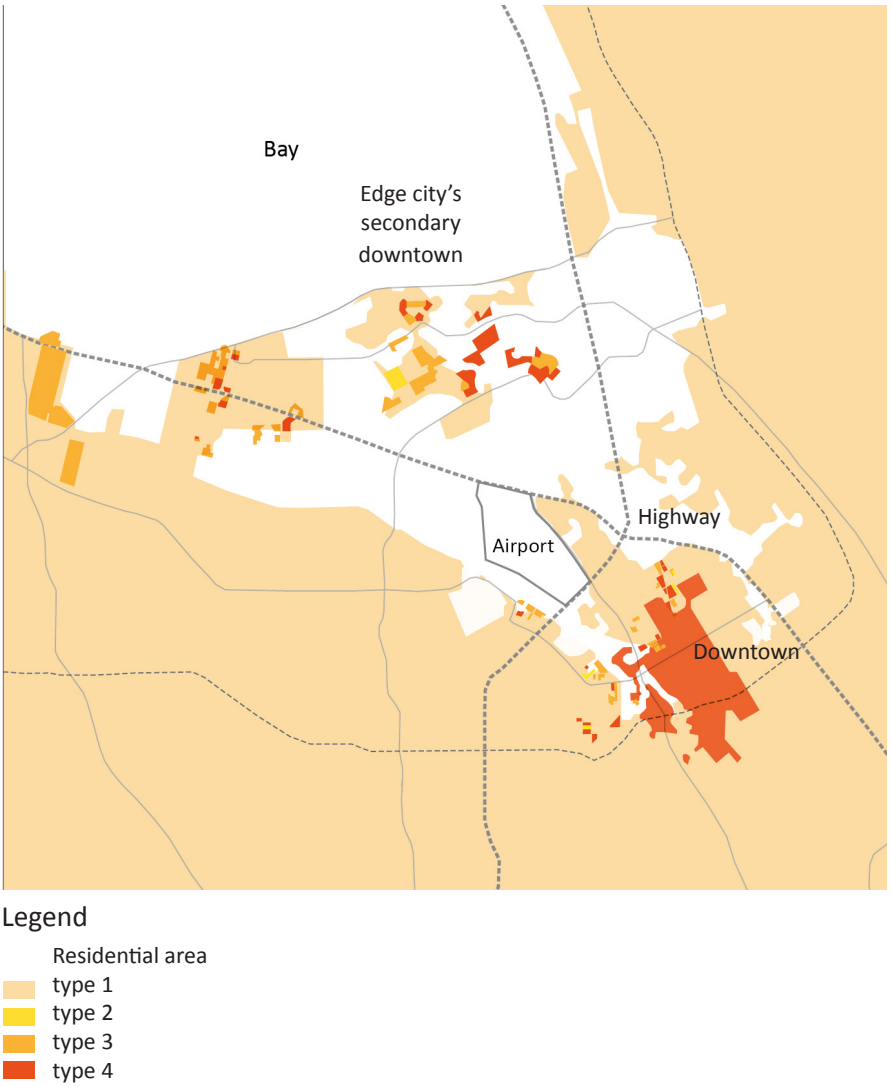


Figure 6-7.

Gap by infrastructure and monofuctional land use
Autor(2017)

When you zoom in the area to see the situation around “the gap” between the downtown and the edge city, you can find spatial hindrances for connection, such as highway and airport. These two mega structures blocking the flow of urban fabric from the downtown.

However, the major influence on the disconnection is coming from the vast monofunctional area developed along the infrastructure. As the map of residential area shows, there is the void where any housing cannot be found. This is the area called Silicon valley, which is filled up with only offices and commercial buildings.

As Figure 43 and 44 show The typologies of the area are also not various, and they have car oriented forms. Generally, a block consist of a building, which is less than 4 floors, and a huge parking lot around the building. it does not allow any other types of economic activities or informality emerged by residents around the area.

Basically, the monofunctional landuse of the area make a clear border between the edge city and the downtown by disconnecting the flow of people, which is often closely related to allocating residential area.

However, the gap is not only made by the homogeneous urban form, but it is also influenced by a dramatic change of density. the spacematrix proves there is a huge gap between the typologies of the edge city and the downtown in terms of density.

While the typology of the downtown shows the condition of highly urbanized area, the typologies of the edge city demonstrate either the condition of rural area or suburban area. Therefore, the transition area is currently missing in the area. If there is a new development for bridging the seperated areas, that can be a solution to deal with the disconnection issue in terms of urban planning and design.

Typology of downtown

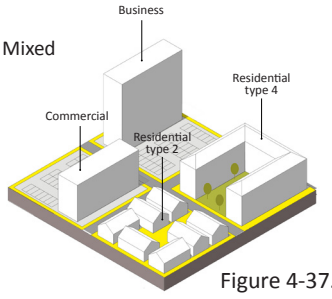


Figure 4-37.

Typologies of non housing area in Edge city (the void on the map)

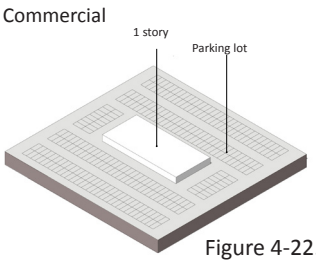


Figure 4-22.

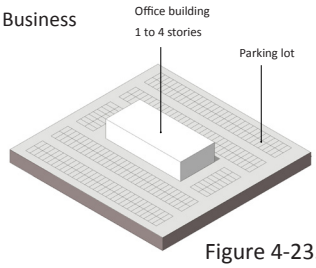


Figure 4-23.

Gap by lack of density control

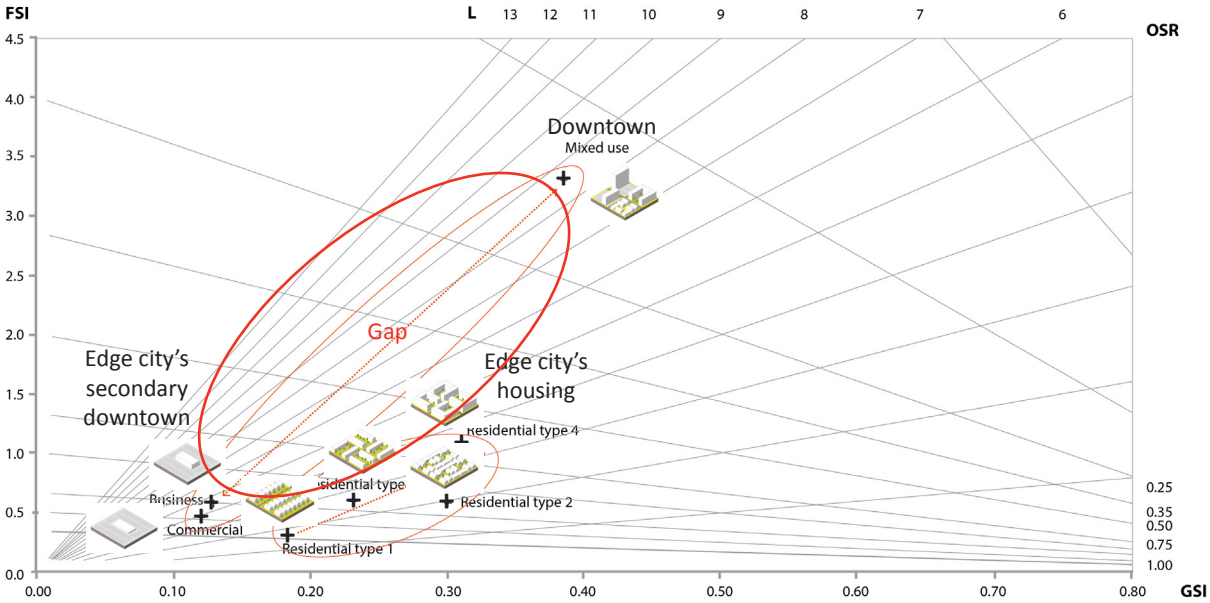


Figure 4-40.

Typologies of housing area in Edge city

Type 1
Low density

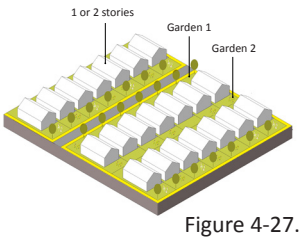


Figure 4-27.

Type 2
Low-medium density

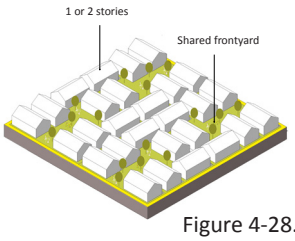


Figure 4-28.

Type 3
Medium density

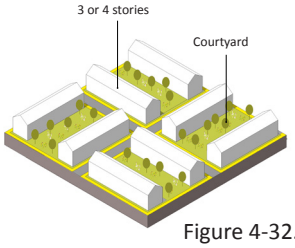


Figure 4-32.

Type 4
High density

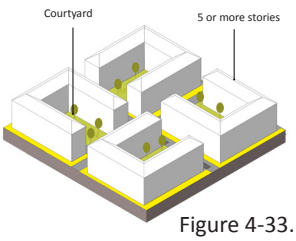


Figure 4-33.

Development pressure and flood issue

Another problem of the area is about the development pressure from the silicon valley toward the bay and the flood risk coming from the other way around.

According to the life cycle of a big edge city, the neighborhood is going through the stage 2 and 3, which are “push out” and “push up”, However, there the flood risk of the ares is increasing by the trend of sea level rising, which means the available area for development will be less and less and the exsiting urban area is also under the threat of flood by higher sea level in the future. As a consequence, the pressure coming from development will be more and more intense in this area.

Therefore, the area will need three measures for the development trend.

First, it is essential to reinforce the flood control infrastructure to protect existing urban area. This does not mean upgrading the current system. A new system can be introduced.

Second, find a way to provide safe vacant area for new development by the benefit of new flood control infrastructure in this area. If this measure is neglected, the migration of silicon valley will be accelarated.

Third, re-assigning density for the exsiting area can give space for new development. Currently the area is designed with extremely low density for the suburban condition as it was described earlier. Therefore, there is enough room for higher density in the edge city.

Stage 2 to 3 of a big edge city’s life cycle “push out”, “push up” in Post-industrialization

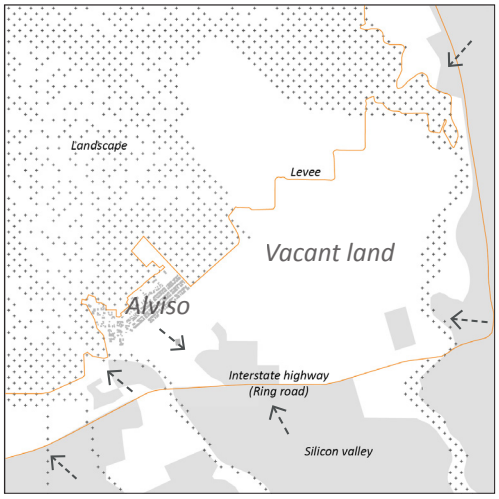


Figure 5-10

Stage 3 of a big edge city’s life cycle “push up” by sea level rising

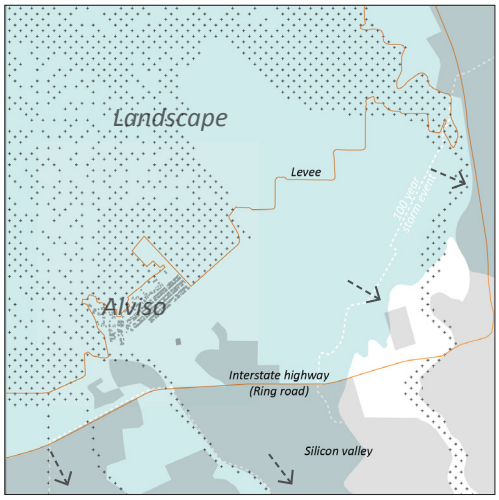


Figure 5-15

Today silicon valley plays a crucial role in the local economy of San Jose. In response, the downtown is accepting the role of providing what the silicon valley needs. Bascially there are two separated parts of economy functioning in the city, which proves there is 'disconnection' between them. It is about both spatial and economic.

In the meantime a possibility of silicon valley leaving the area is getting higher by the factors desicribed eariler, and as a consequence, the spatial disconnection between the edge city and the downtown will become bigger in a long term, which will affect the economy of San Jose chronically.

a reason of having the 'disconnection' is that the monofunctional landuse of the edge city make a clear border between the edge city and the downtown by disconnecting the flow of people, which is closely related to allocating residential area.

Another reason is about the density gap. While the typology of the downtown shows the condition of highly urbanized area, the typologies of the edge city demonstrate either the condition of rural area or suburban area. Therefore, the transition area is currently missing in the area.

Lastly, there is the development pressure from the silicon valley toward the bay while the flood risk increases every year by sea level rising. It means the available area for development will be less and less, and the exsiting urban area is also under the threat of flood by higher sea level in the future. As a consequence, the pressure coming from development will be more and more intense in this area.

Main research question:

How to improve territorial connectivity and water adaptivity through the restructing of landscape elements for future urban development?

Sub-research questions:

What are the phases of landscape dynamics practically valid for new urban development?

What is the spatial quality that the landscape ecology can offer for urbanization?

How to integrate water management with the new development in the phases of landscape ecology?

What is the strategy to re-connect fragmented urban areas in new development with water related infrastructure?

How to utilize landscape ecology as a tool for the reconnection?

How to manage the density gap for the re-connection?

What is a possible intervention for the monofunctional industrial area for the re-connection?

Design

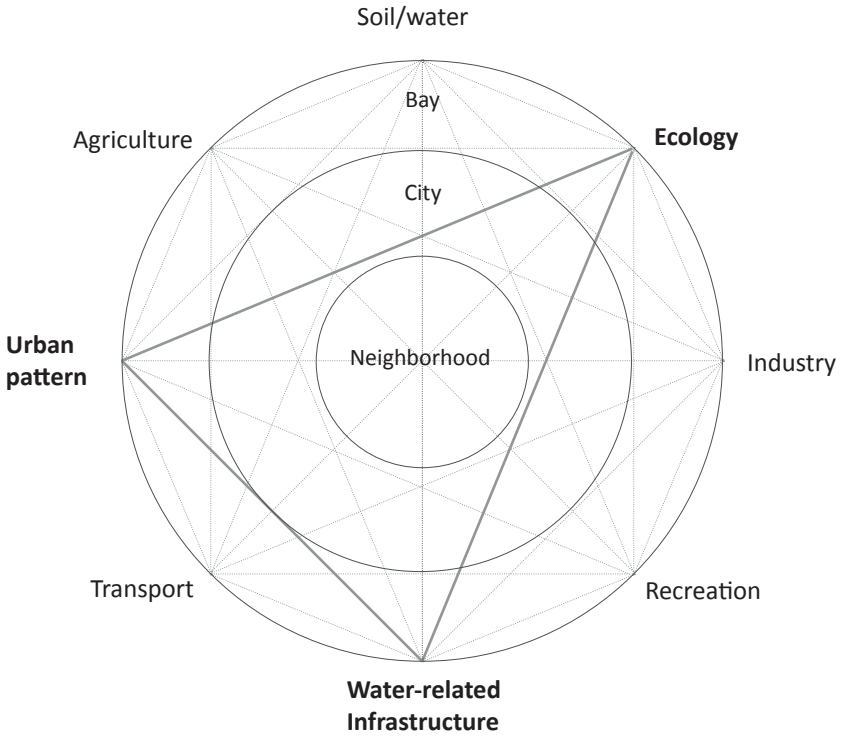


Figure 7-1.
Structure of design

The situation of disconnection stems from the economic force in the process of urban planning and design. When the economic activity was tied up with site specific condition coming from natural environment. the urban shape was dependant on the ecological pattern.However, the type of industry was shifted to manufacturing industry, and then IT industry became the most dominant industry in the area. By those changes, the urban form is no longer related to the given environment of the area while it became more dependant on vehicle circulation based on the popularity of using private car.

Nevertherless, there is a hidden layer which connects scattered pieces of the urban areas. It is ecological pattern created by the river system of this watershed. Although there is no longer visible relation to the shape of the city as it was shown in the agricultral period. The topography, the spatial quality and the safety issue created by the water system have influenced the urban development through the history.

If you compare the occupation pattern of the post-industrialization to the nature map from the agricultural period, you can see the hidden information about the relation of them. The unprecedented pattern of the occupation is overlapped with the wetland. Considering the trend of climate change, the new urban form integrated with wetland seems to be inevitable. Thus, it is a proof that there is a possibility of “retrofit” by utilizing landscape for a new pattern of urban development.

Therefore, the proposal for new urban development for this region is about making a new urban core utilizing the two river systems in the city.

Although two different tributaries are running through the city. There is a possibility that they can be treated as one basin because the topography. When there are two sub-watersheds next to each other. they usually share a ridge in between them. However, in this case, the division between the two basins is subtle. When you look at the watershed in the regional scale, the valley of the watershed is located in the middle of the two basin.

For this reason. the vision of the city, the new urban core. binds the downtown, the first secondary downtown, and the edge city by new development induced from the new water structure.

The areas between different city centers will be the place for the re-concentration by re-development while the area of down stream will give space for new development. The important part of the new development area is not only for providing new plots for the expansion of the silicon valley, but it is also about developing the flood defence measure for the future development of the entire region. Thus, a design method of the new development that this paper proposes is designed to provide an example to other areas in the bay as a new type of urban development, combined with flood defense system for sea level rising trend.

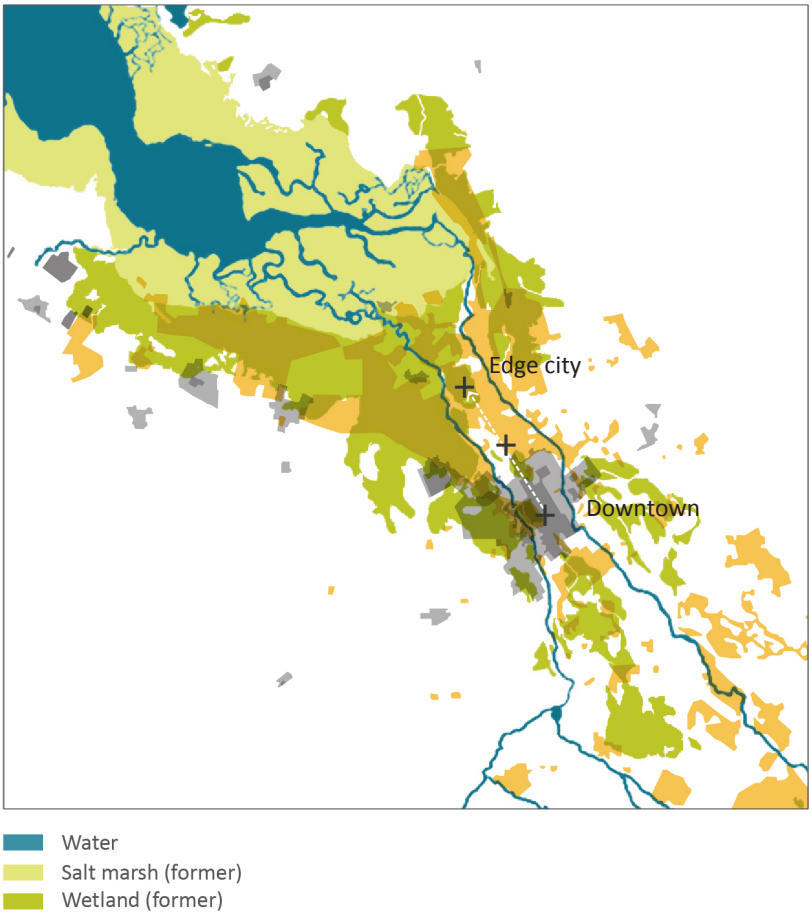


Figure 7-2.
Ecological pattern overlapped with occupation pattern

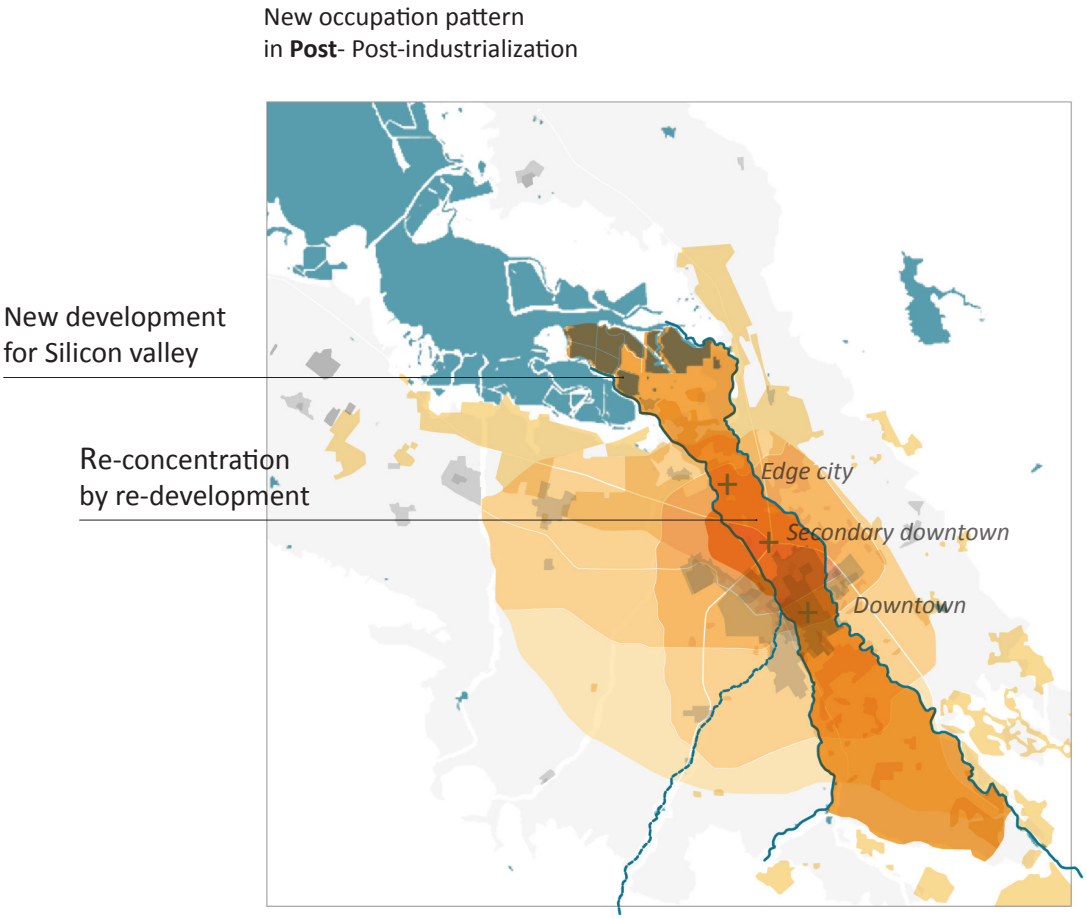


Figure 7-3.
New urban core

Flood control by making archipelago
with higher ground level

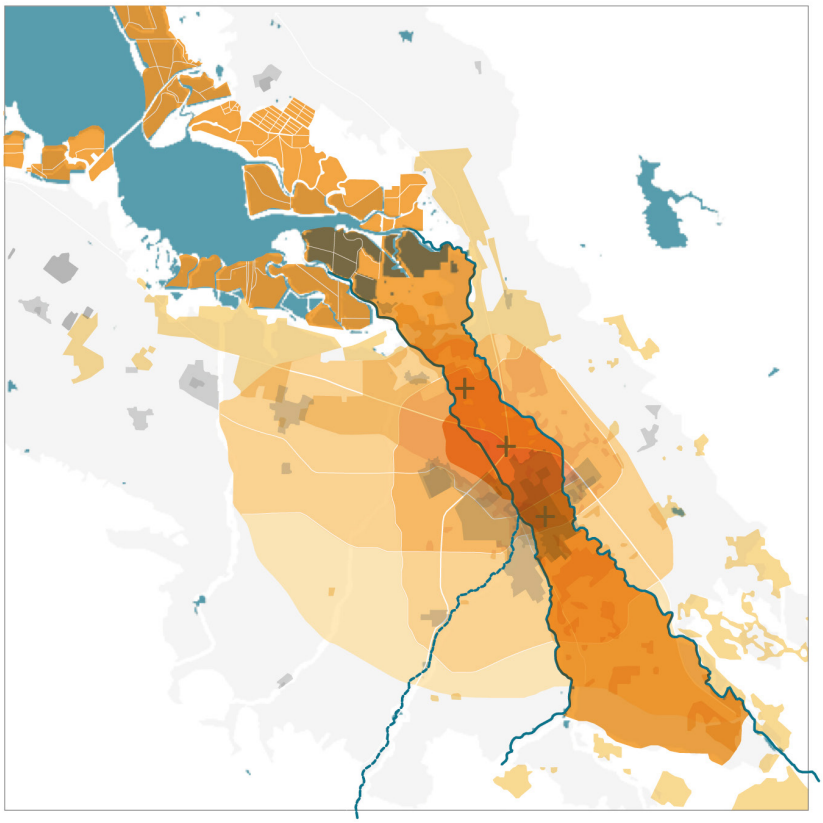


Figure 7-4.
Flood control by making archipelago

Key idea of desigining the new development area is utilizing the exsiting condition of landscape. Currently, the bay area, which was supposed to be marsh, is covered by salt ponds. Each pond is surrounded by low levee for storing salt water, and it is going to be the foundation of making new archipelago.

Although the levee should be hightened to make a safe high gound for development, it already has a certain infrastructure corresponding to the water system in the bay. Therefore, the exsiting salt pond shape and formation will be respected at large.

Since it is a part of the river system, it is important to consider how the entire water system work because what will happen in the down stream is basically the result of how the river flew through the city from the upstream and mid stream .

For this reason, the vision of making a new urban core should be also with the entity of the water management for the whole area. Moreover, distributed tools for different focusing areas will be also helpful to induce new development evenly through the area as well as control flood risk.

Basically, the strategy to make the urban core is creating the network of blue/green infrastructure, connection the two rivers.

As it was described, to get the expected result in the downstream for making archipelago, some treatments for the upstream and the midstream are required.

Therefore, 6 different tools, focusing on different results, are suggested.

First, Sub-coring means making the spine of the new water management system in between two river. It will assist the function of the river in the upstream and mid-stream. At the same time, the marsh restoration area of the downstream provide space for sedimentation.

Second, Splitting is about making sub-streams of the river to settle sediment through the new development area.

Third, Braiding is the second step of splitting. the the paralell sub-streams are connected by additional sub-streams. By this measure, sediment delivered in the area will be distributed in the area.

Fourth, Stitching is connecting the two rivers horizontally. When it is combined with the Sub-coring, the burden on both existing rivers will be relieved by this connections to the subcore.

Fifth, Binding is about changing the highway and the airport into a part of blue/green infrastructure. As they are the physical divider in terms of urban fabric. the re-development of those infrastructure is mainly aiming for are-connecting divided areas with new public space by blue/green infrastructure.

Lastly, Netting is making a network of all tools. By this measure, different tools will be working as an entity of water management.

Preferably, those 6 tools are applied to the area in orfer. In that case, first three tools, sub-coring, splitting and braiding focus on new development by sediment concentration for the archipelago. After harvesting enough quantity of sediment for the development. the fourth to the sixth can be proceeded. Therefore, stitching, binding and netting are designed for re-development with sediment control

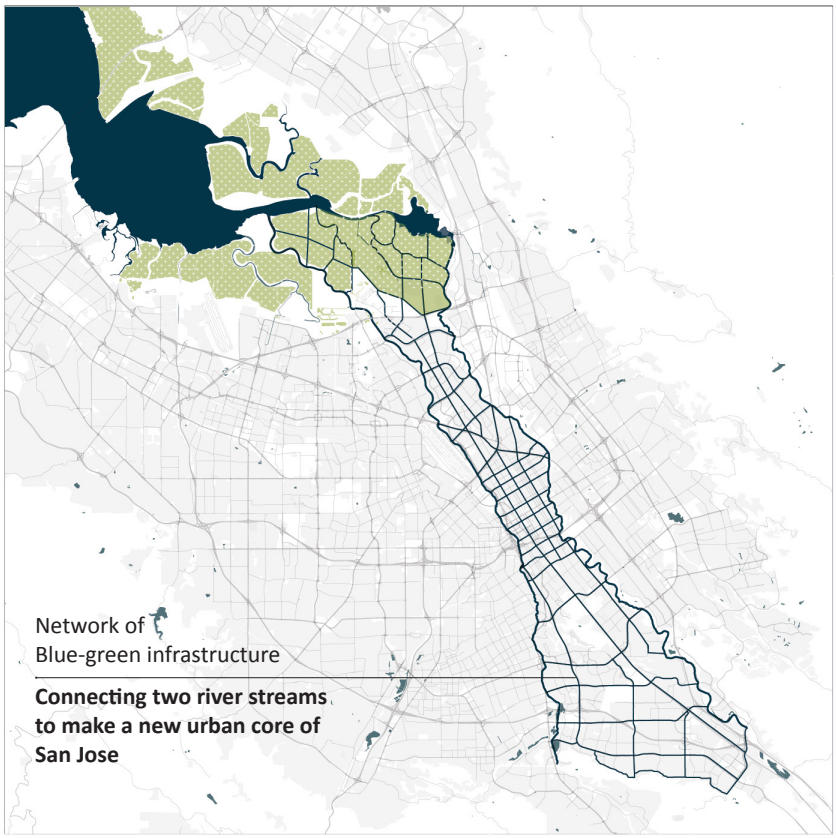


Figure 7-5.
Network of blue-green infrastructure

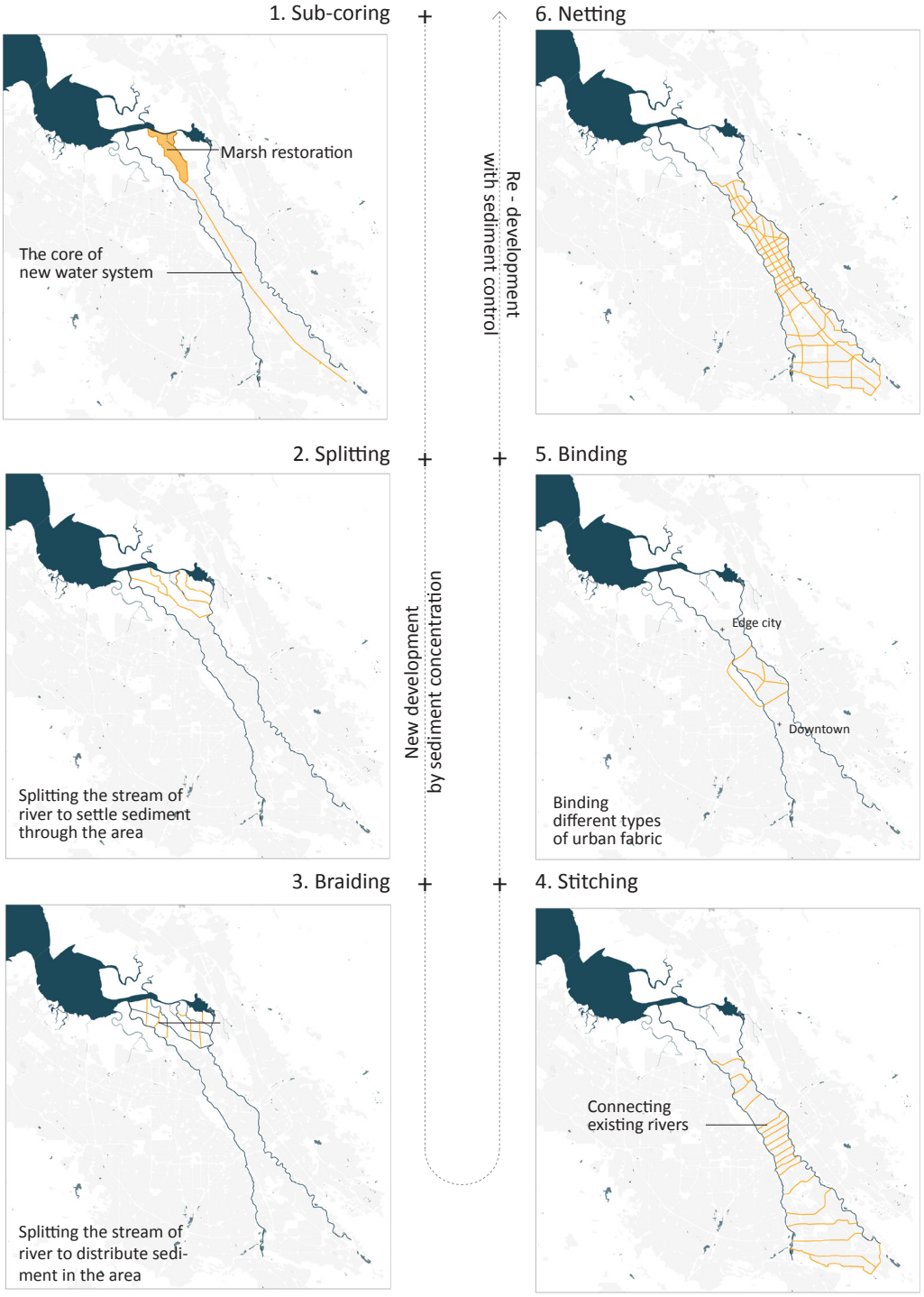
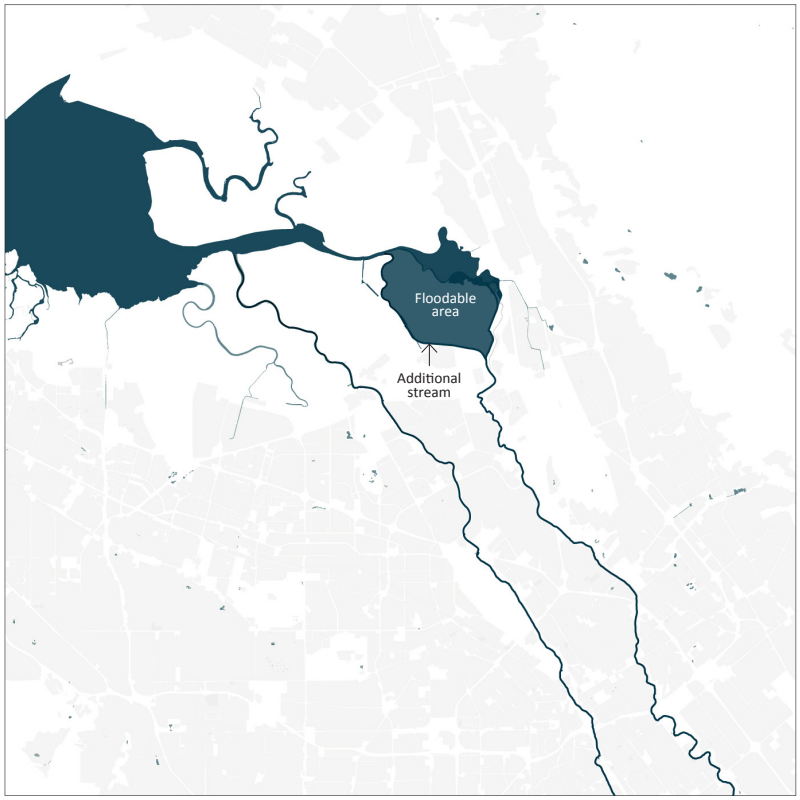


Figure 7-6.
Tools for development



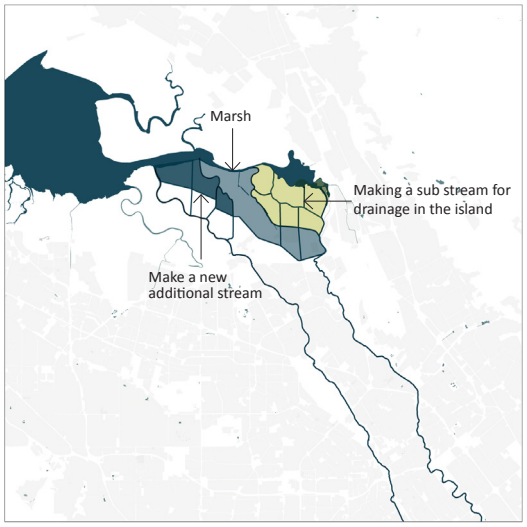
Phase 1.

process of development

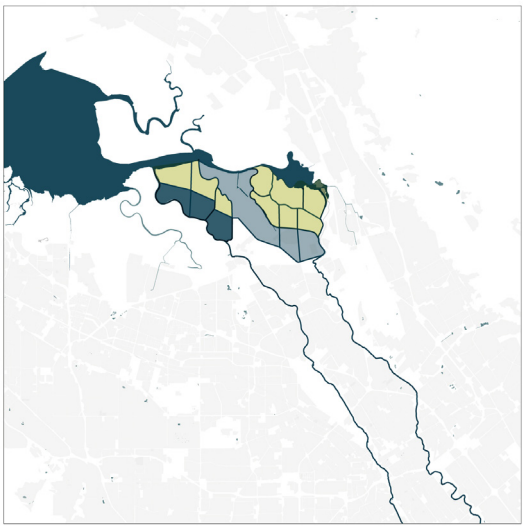
The focused area has 6 layers of different tools. Especially, Sub-coring, splitting and braiding area more crucial to the area. in the area scale, the process of development can be elaborate based on the tools. First, one sub-stream from the river can be built. The area between the new stream and the river will be floodable area for collecting sediment.

Figure 7-7.
Process of development in the area scale - phase 1

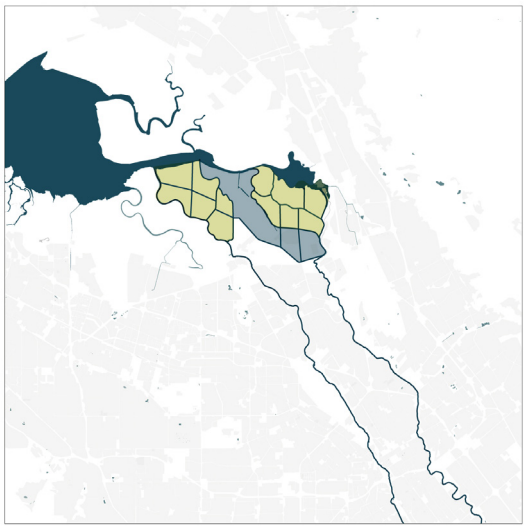
Phase 2.



Phase 3



Phase 4.



Phase 5.

Second, the area between the river and the new stream will became an island with highten ground with sediment. There will be a drainage canal to stabilize the land and basic road structure will be built along the edge of the island.

In the mean time, the second sub-stream can be built. in this case, the new floodable area is designed for marsh restoration. It will function as the core of the water management system in this area.

Third, there will be a new island made by the same logic applied to the first island. the circulation of new road and drainage canal of the new island will be designed in relation to the previous development.

Fourth, the same logic will be applied for making new districts until it reachs the existing urban area where Alviso is located. After all, the area will gain 4 new districts for development.

Figure 7-8.
Process of development in the area scale - phase 2,3,4 and 5

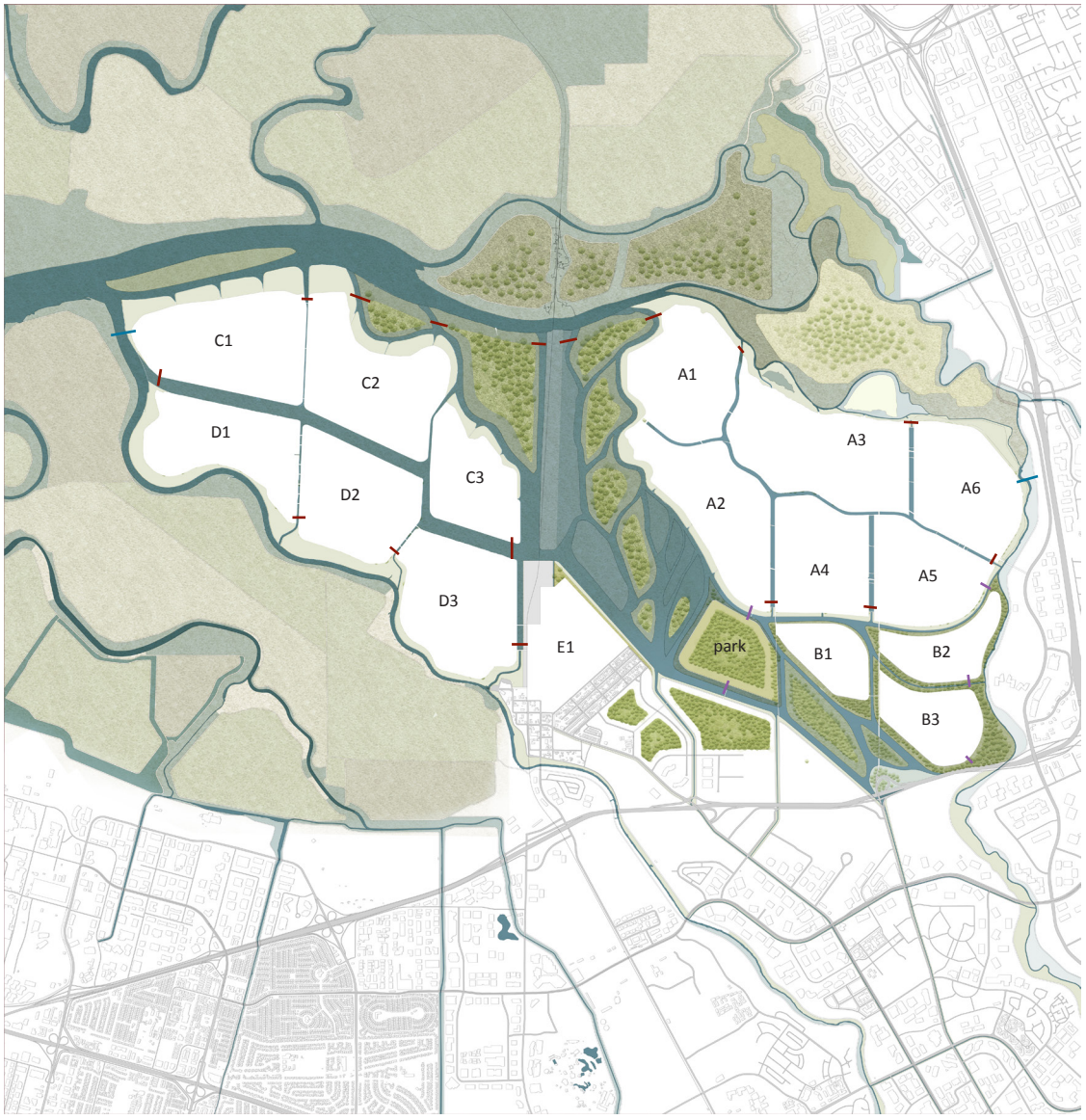
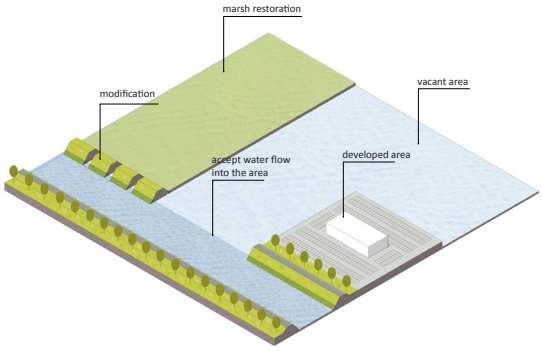


Figure 7-9.
Master plan for landscape setting

process of development

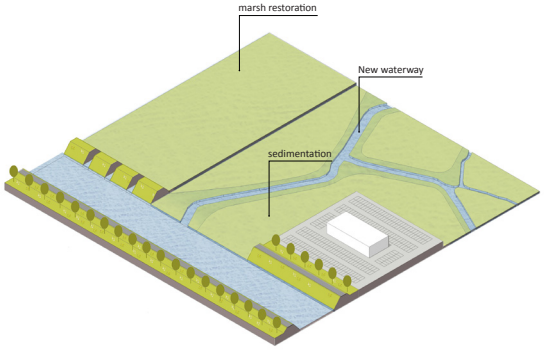
In the district scale, it is possible to elaborate the process of development in relation to the change of spatial quality by the new water system.

From phase 1 to 3 is about the process of making a new island as it was described in the area scale. After this basic process is done. the distric will have a certain spatial condition on the edge of the island, which can be designed for both green buffer and new development.



Phase 1.
Open the channel

The existing river with levee will be open in this phase. The water will flow into the floodable area

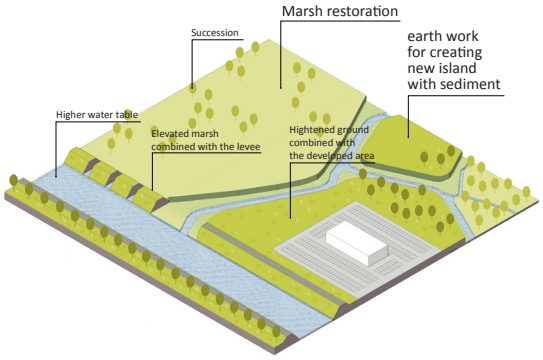


Phase 2
New waterway

Based on natural patterns of water flow, new water ways can be built.

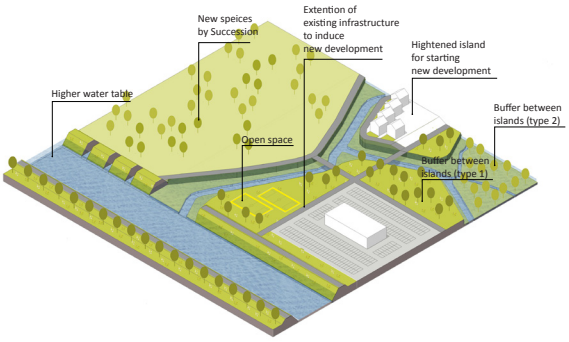
Figure 7-10 and 7-11
process of development in district: phase 1 and 2

Phase 3
New land



With the sediment carried by the water ways, new land can be formed in this phase. Some part of the area will retrieve the natural shape of marsh.

Phase 4
Blue-green infrastructure

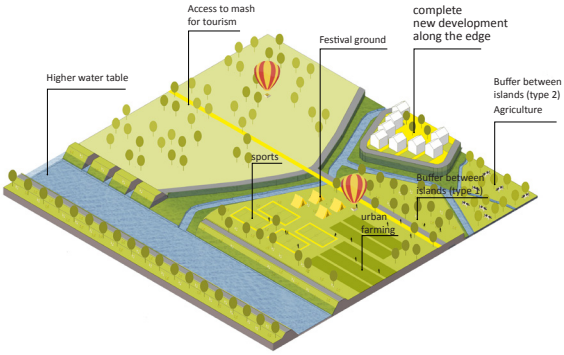


The new road will be built on the new ground, which will be a stimulator of new development. In the meantime, certain amount of new islands' edge and naturally formed islands in the marsh will be reserved for green buffer.

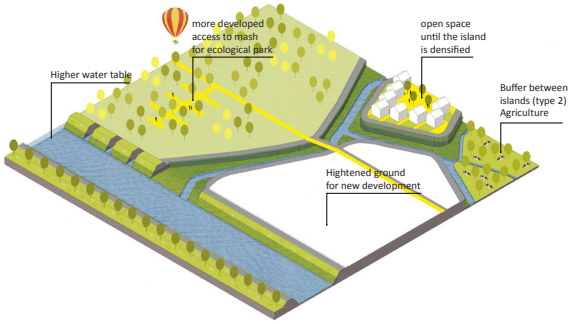
Figure 7-12 and 7-13
process of development in district: phase 3 and 4

However, the pace of urban development is not preciesly predictable. there is a possibility to have new development as soon as making an island is complete, but the land could be empty for a long period. In that case, phase 5 sugggests a way of managing the land for the time gap.

After that, If there is demand of new development on the land, it can be developed from the edge of the isalnd as the new water front and its view are the most valuable asset of this new area.



Phase 5
Soft urbanisation



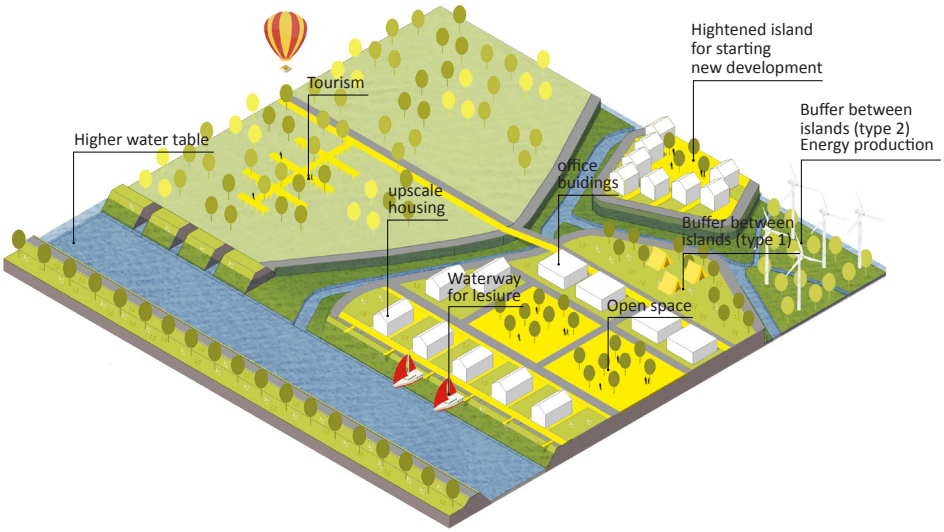
Phase 6
New land II

When there is the time gap between the completion of making a new island and the start of new development. The land can be used for public open space, such as, festival ground, camping site, weekend farm and ecological park connected to the marsh. by being frequently used, there will be higer potential to attract new development on the land.

When there is needs of development on the island, the programs for soft urbanisation will be removed. However, ecological park with the marsh will be contineously developed along with the new development.

Figure 7-14 and 7-15
process of development in district: phase 5 and 6

In the phase 7, the edges of the islands are developed depending on different spatial condition. The conditions are based on those factors of surroundings;



- the width of water way
- the depth of water way
- proximity to the island accoss the water way
- programs on the edge accoss the water way
- The materials of the edge (soft/hard)
- the form of the edge (variations of slope)
- proximity to main road

Figure 7-16
process of development in district: phase 7

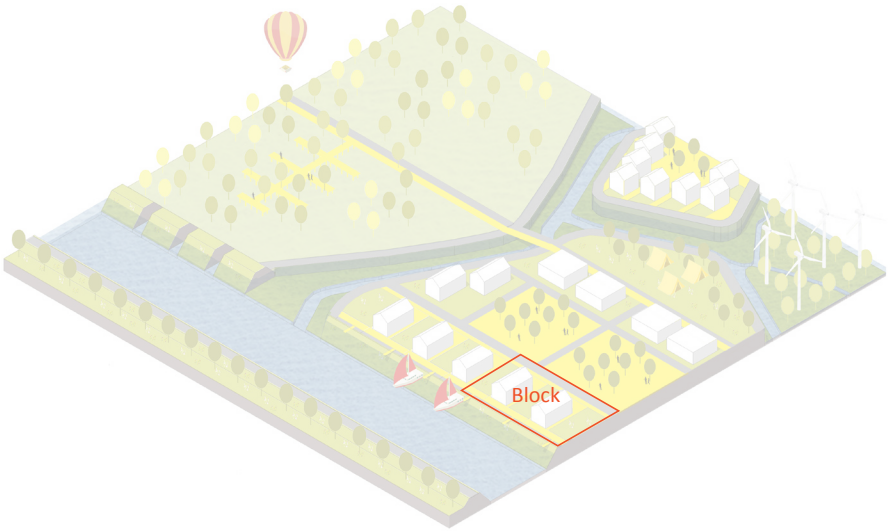
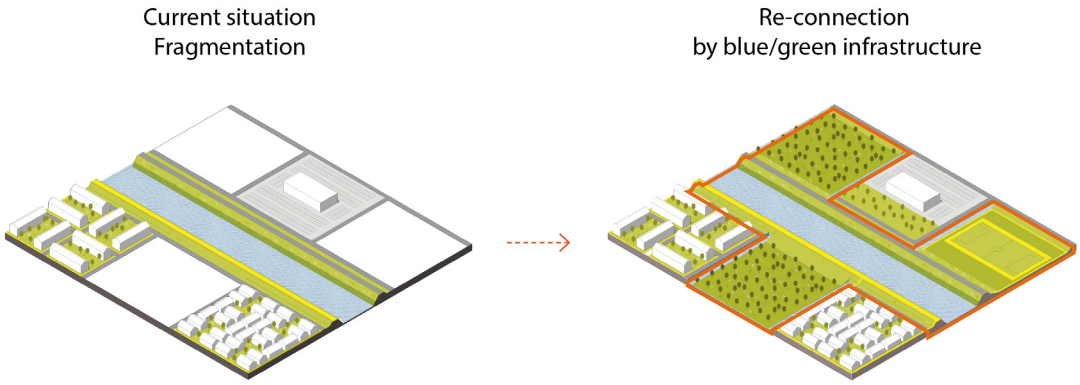


Figure 7-17
Block scale



When there is new development from the edge of the island, managing the block scale becomes important because it will be the actual scale that they have to deal with. It is the scale which is directly related to the materialization of the vision.

As the key of the vision is that the disconnectivity issue of urban fabric can be dealt with the blue/green infrastructure. In other words, substantial amount of land in between exsiting buildings will be occupaid by the new infrastructure and new development. Then the major question is how to manage the ratio between the open space and the coverage in a block, which will eventually affect the coverage of the entire area.

In the case of the exsiting area, the vast area has already covered by urbanization. Thus, it is imperative that the size of new development area should not overwhelm open space provided by the green and blue infrastructure, as it has to play the role of connecting exisitng areas which are fragmented by different types of development happend in the past.

The new development area on the archipelago also need the rule of development for coherence as the extention of the existing urban area.

Figure 7-18
Connecting fragmented urban forms with blue-green infrastructure

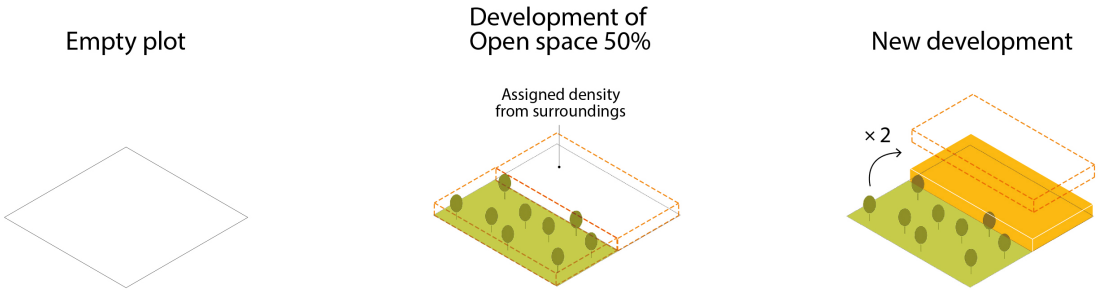


Figure 7-19

As it is described, to reach a certain level of balance between the coverage of development and open space in this region, the open space should be more dominant element for furture development.

For this reason, the maximum percentage of the development area is limited by 50%. The other half of the land is reserved for open space.

In the case of the exsiting area, if they want to re-develop the area, at least they have assign the half of the land for open space based on the new rule. It can be seen as a disadvantage for the stakeholders. For this kind of situation, they can have an incentive in terms of building height(L).

For instance, if there is a plot, first, the building height will be calculated based on the average number of the surrounding blocks. For this stage, It is with the 100% of the plot. Then, the rule comes in the second stage. The 50% of the land will be reserved for open space. As a consequence, the height assigned for this half of the land will be added to the other half of the land for the development.

In the case of new development area on the archipelago, there is no references for building height as there are no surrounding blocks yet. For this situation, the height is calculated based on the hypotetical situation that the 100% of the block is covered by one story building. Thus, the maximum number of stories is 2 based on the condition that 50% of the block is developed and the other half is reserved for open space.

By this rule, the maximum FSI, GSI and OSR can be determined for new development. However, the types of development can be still varied by the change of GSI and OSR, even if FSI is fixed.

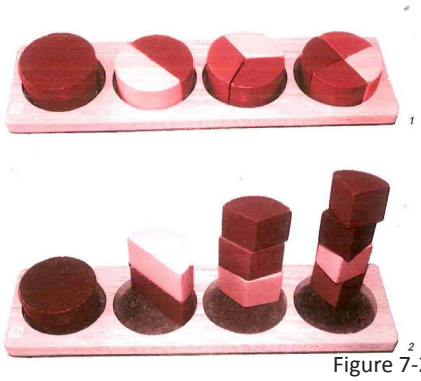


Figure 7-20

Figure 7-19. Open space:New(re-) development = 1:1
Author(2017)
FIgure 7-20. Identical FSI with different GSI, OSR and L
Pont, M.B. and Haupt, P. (2010), Spacematrix

As Figure 7-21 illustrates, the open space consist of three different elements. There are garden, semi-public open space and public open space.

The purpose of the differtiation is for allocating water management facilities properly, based on the characteristics of the open space.

First, the garden is privately owned type of open space. It is usually combined with buildings. In most cases, having retention or detention facilities are not prefered because of maintenance issues and a possibility of infestation by storing rain water. Therefore, infiltration facilities are recommanded for the garden.

Second, the semi-public open space is the area connection the private area and public open space. It still belong to the private land, but it is more accessible from outside of the land. it is usually with hard structure, such as, plaza or pedestrian.Therefore, detention facilities designed as a water feature can be an adequate element of the open space.

Third, the public open space is a part of the blue/green network. As the green buffer, it is in a form of park. The flow of runoff pass through the area as the last stage before it is discharged to the river. Therefore, retention pond combined with infiltration facilities are recommanded.

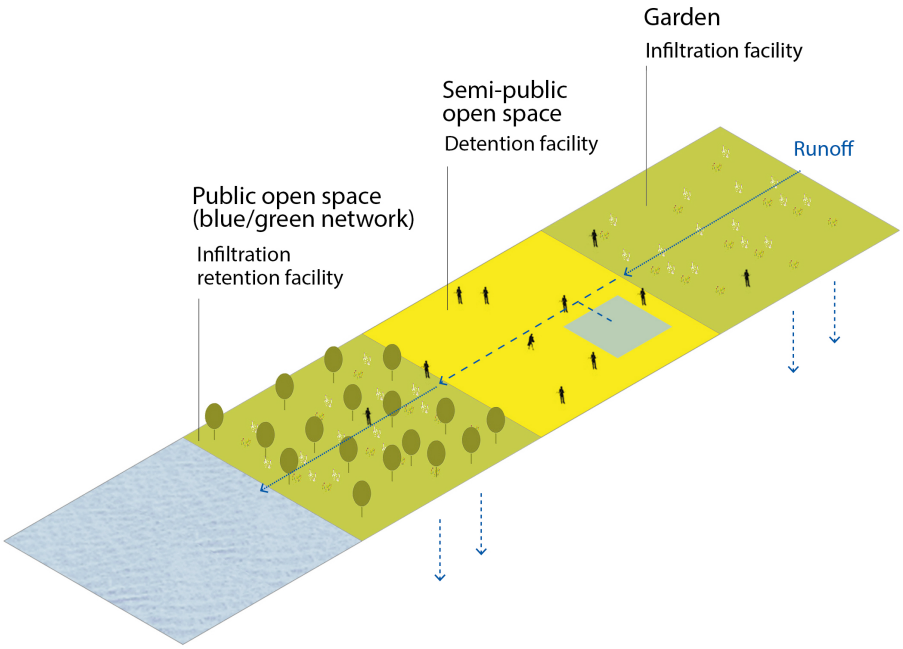


Figure 7-21. Three different elements of open space

Figure 7-22. Edge of block

the development of blocks on the edge of an island is the most crucial part of the new development because it is on the extenstion of the rivers, passing through the existing urban area with the issue of disconnection.

The development of these waterfront area is the spine of new density control. It is a major strategy to fill the disconnected part.

There are three types of development for the waterfront. The type 1 is the maxium type of development described earlier. The coverage is 50% of the block and the other 50% is open space. The garden and the semi-public open space 25% of the land respectively.

The second one is a medium type of development. The coverage, the garden and the semi-public open space share 30% of the block respectively. The buiding height for this model is around 1.5 floors, considering this is the medium case between the heightest FSI with 3 floors on the 30% of the land and the lowest FSI with a sigle floor on the same size of the land.

The waterfront type 3 is a minimum type of development. The building coverage is 25% with one floor, and the garden shares the same size of the land as the coverage. The rest of the land, which is 50% of the block is reserved for the semi-public open space.

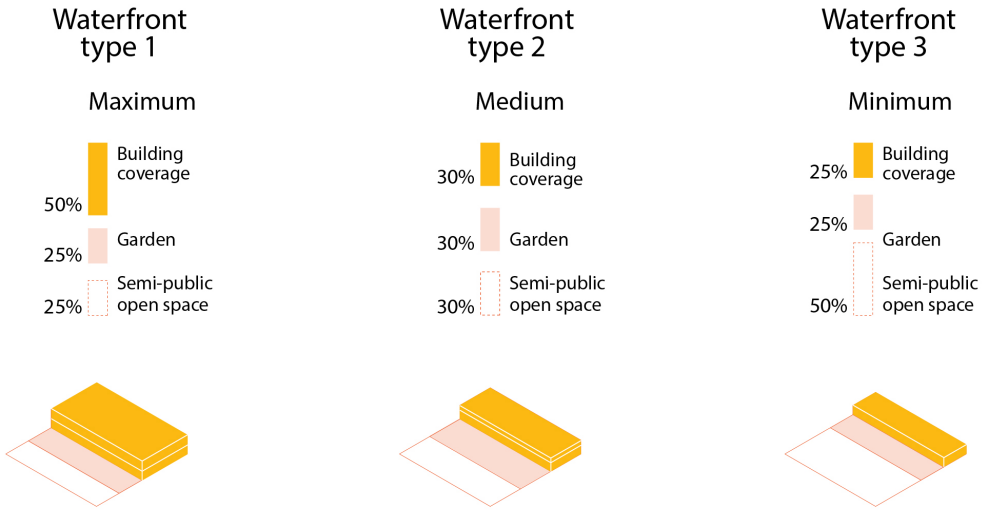
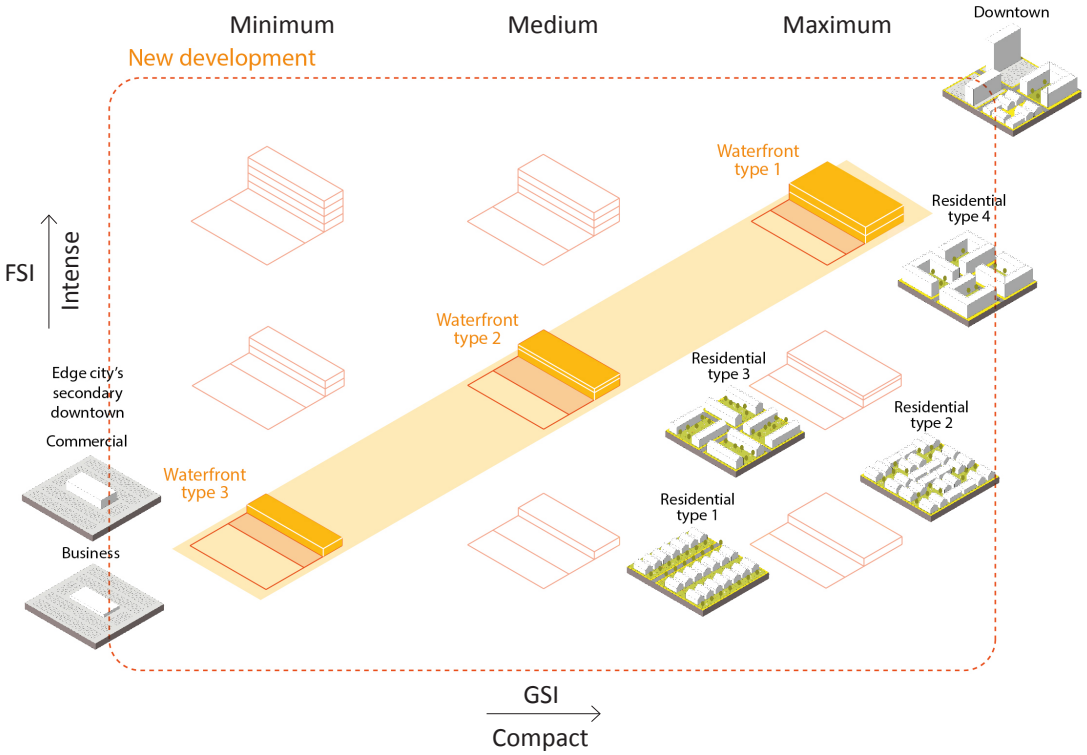


Figure 7-23. Waterfront development types



Therefore, the three types of waterfront development are the axis of bridging the the edge city and the downtown.

Those types are representative models of minimum, medium and maximum development based on the ratio between building coverage and open space.

The variations of each model with different FSI are for futher development after the development of the edges is completed. After all, thosemodels are designed for filling the density gap between the exsiting typologies.

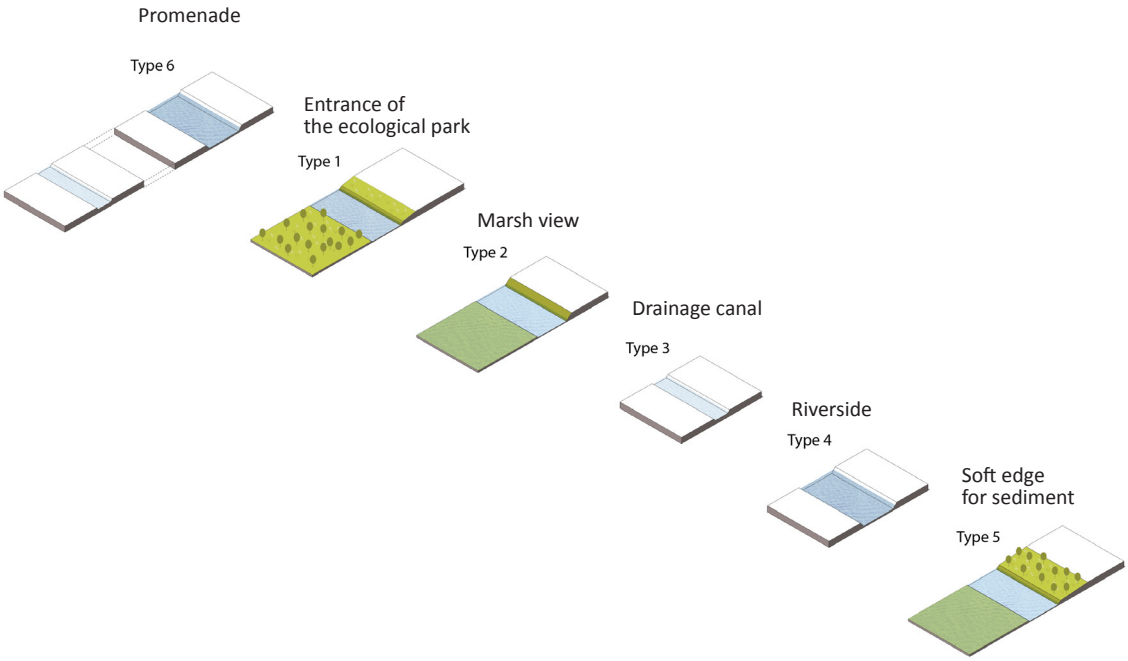
Since types of development are defined, the next step is identify the types of the edges.

As it was described in the chapter of district, the edges are categorized by 6 different types with the conditions below;

- the width of water way
- the depth of water way
- proximity to the other edge accoss the water way
- programs on the other edge accoss the water way
- The materials of the edge (soft/hard)
- the form of the edge (variations of slope)
- proximity to Arterial roads

Figure 7-24. Bridging exsiting urban forms withWaterfront development

Edge types



Criteria

Water way

Type	Width	Depth
River	wide(>15m)	deep(>5m)
marsh	various	medium(>2m,<5m)
drainage canal	narrow(<5m)	shallow(<2m)

View

Program of the edge oppsite
Housing
park
marsh
commercial/business

Edge

Material	Form
hard	slope (access to water)
soft/hard	slope/no slope
soft(natural)	no slope

Proximity

The edge opposite	Infrastructure (Arterial)
close	close
medium	irrelevant
far	far

Figure 7-25. Six edge types

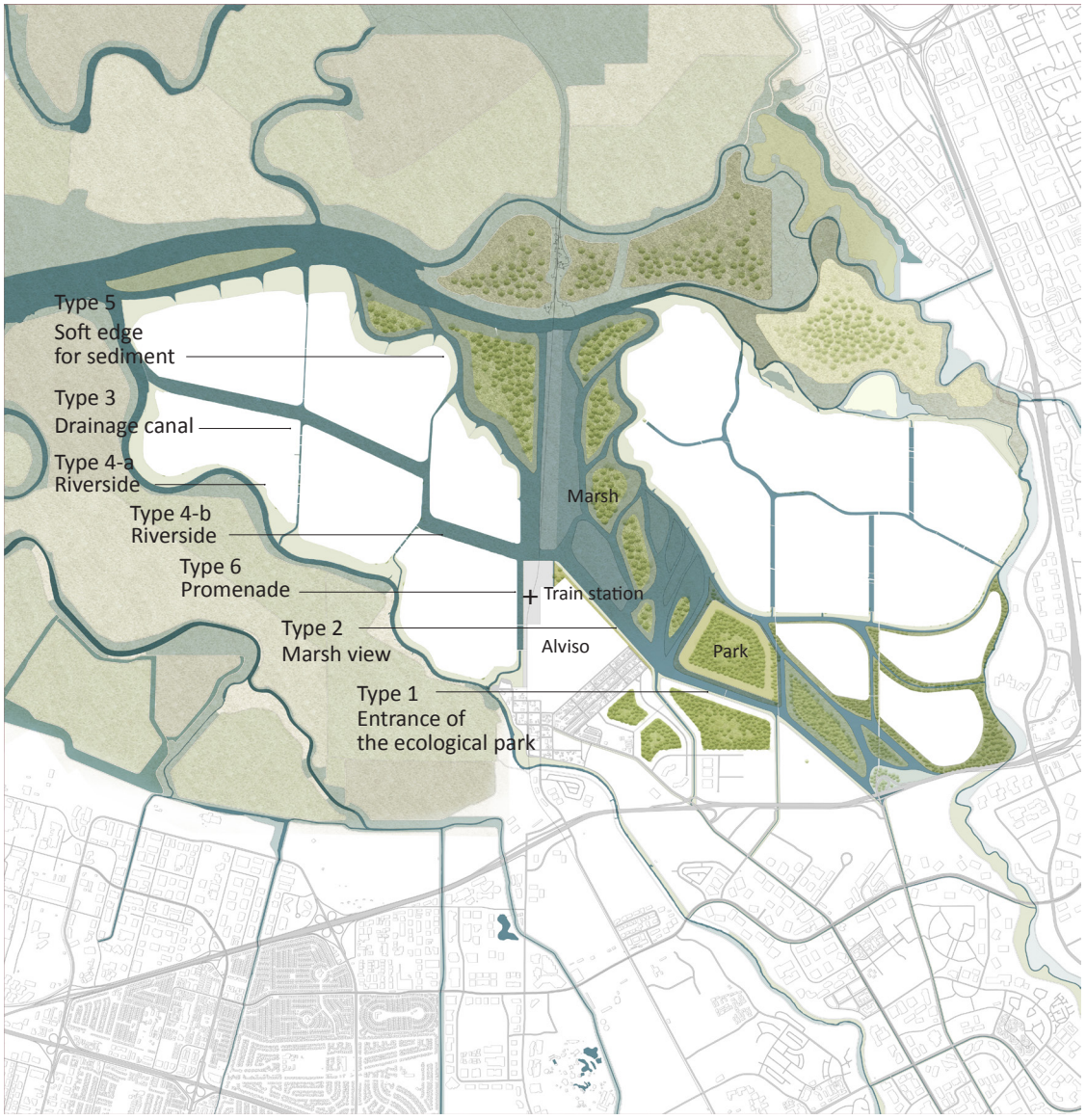


Figure 7-26. Locations of six edge types

Entrance of the ecological park

Water way

Type	Width	Depth
River	wide(>15m)	deep(>5m)
marsh	various	medium(>2m,<5m)
drainage canal	narrow(<5m)	shallow(<2m)

View

Program of the edge oppsite
Housing
park
marsh
commercial/business

Edge

Material	Form
hard	slope
soft/hard	slope/no slope
soft(natural)	no slope

Proximity

The edge opposite	Infrastructure (Arterial)
close	close
irrelevant	irrelevant
far	far

Table 7-1.

The edge type 1 is the with the park in the marsh . Because of the natural pattern of water flow in the marsh the width of the water way can be various, and the depth of water will be generally shallow as the water table of the marsh is controlled at the mouth.

Ideally the area can be developed as mixed use area because of the location with the arterial. The design of the edge can be with both soft and hard materials because of the continuity of the park opposite. The slope of the edge will extend the edge toward park with natural materials while the semi-public space is designed for more the urban context to connect the different parts.

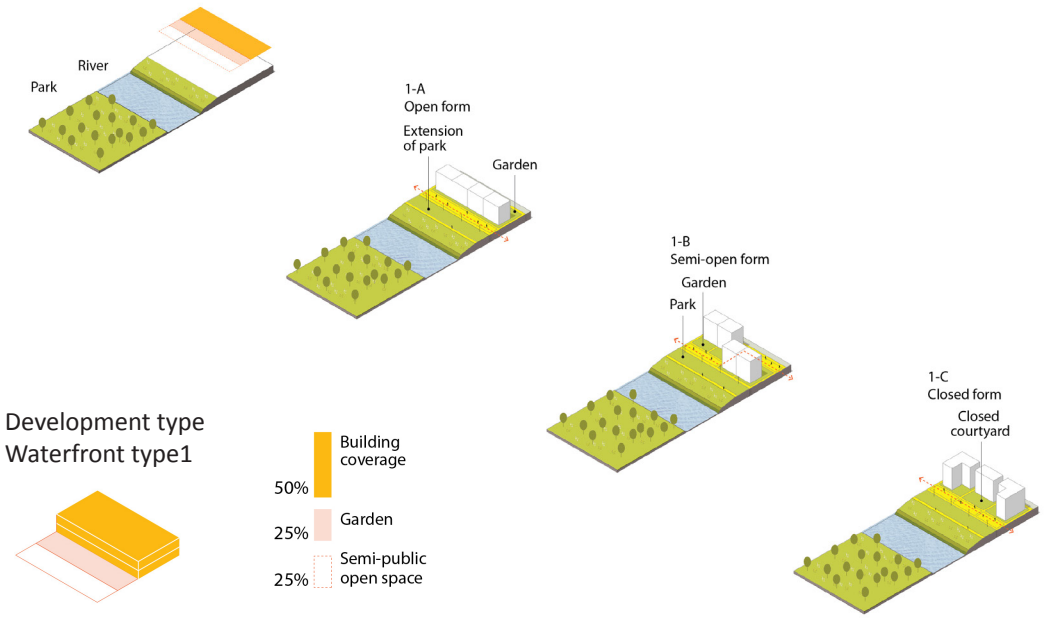
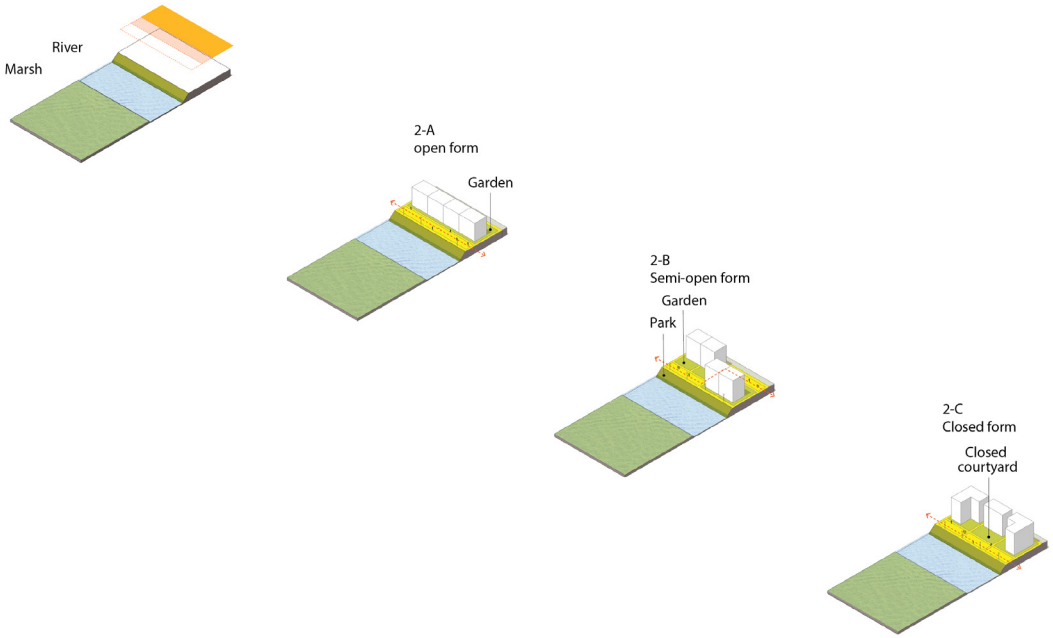
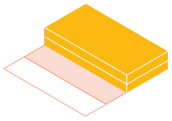


Figure 7-27. Edge type 1 with waterfront development type 1
Table 7-1. Criteria for the edge type 1 condition



Marsh view

Development type
Waterfront type1



Maximum

50% Building coverage

25% Garden

25% Semi-public open space

The edge type 2 is also with the marsh. It is on the extention of the type 1. Therefore, there is a good connection to the city center by the arterial. The area is also ideal for mixed use by the waterfront type 1. The design of the edge can more with hard material without slope to have water directly next to the edge.

Water way

Type	Width	Depth
River	wide(>15m)	deep(>5m)
marsh	various	medium(>2m,<5m)
drainage canal	narrow(<5m)	shallow(<2m)

View

Program of the edge oppsite
Housing
park
marsh
commercial/business

Edge

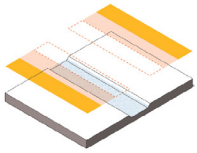
Material	Form
hard	slope
soft/hard	slope/no slope
soft(natural)	no slope

Proximity

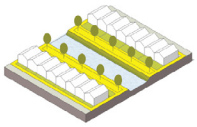
The edge opposite	Infrastructure (Arterial)
close	close
irrelevant	irrelevant
far	far

Table 7-2.

Figure 7-28. Edge type 2 with waterfront development type 1
Table 7-2. Criteria for the edge type 2 condition

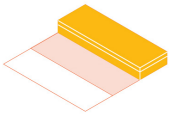


Drainage canal



The edge type 3 is with drainage canal inside of an island. In terms of the hierarchy of the water way, it is the lowest. For this reason, the width is narrow and the water depth is shallow.

Development type
Waterfront type 2



Medium

30% Building coverage

30% Garden

30% Semi-public open space

The advantage of the area is relatively quiet, which makes it suitable for housing area. More importantly, it is adequate for waterfront type2 because it is in between two paralell waterfront type 1 areas. it connects them in perpendicular , and as a result, it gives more options for development in the island, in terms of density.

Water way

Type	Width	Depth
River	wide(>15m)	deep(>5m)
marsh	various	medium(>2m,<5m)
drainage canal	narrow(<5m)	shallow(<2m)

View

Program of the edge oppsite

Housing
park
marsh
commercial/business

Edge

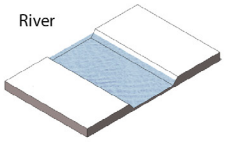
Material	Form
hard	slope
soft/hard	slope/no slope
soft(natural)	no slope

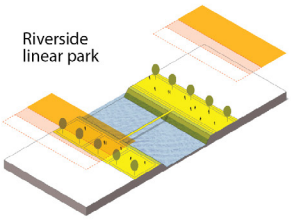
Proximity

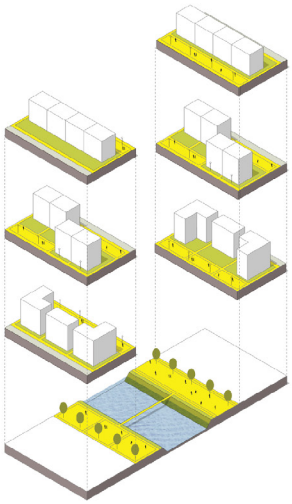
The edge opposite	Infrastructure (Arterial)
close	close
irrelevant	medium
far	far

Table 7-3.

Figure 7-29. Edge type 3 with waterfront development type 2
Table 7-3. Criteria for the edge type 3 condition



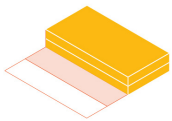


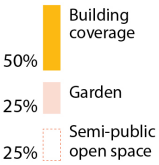


Riverside a

Development type

Waterfront type1





The edge type 4-a is with the downstream of the exisitng rivers. It can be developed with linear park next to mixed use area. The ground floor will be used for commercial programs while the first and the other floors area for offices or residential programs.
The proximity to the arterial is close and the edge can be designed with both soft and hard materials for the urban park.

Water way

Type	Width	Depth
River	wide(>15m)	deep(>5m)
marsh	various	medium(>2m,<5m)
drainage canal	narrow(<5m)	shallow(<2m)

View

Program of the edge oppsite
Housing
park
marsh
commercial/business

Edge

Material	Form
hard	slope
soft/hard	slope/no slope
soft(natural)	no slope

Proximity

The edge opposite	Infrastructure (Arterial)
close	close
irrelevant	irrelevant
far	far

Table 7-4

Figure 7-30. Edge type 4-a with waterfront development type 1
Table 7-4. Criteria for the edge type 4-a condition

Riverside b

Water way

Type	Width	Depth
River	wide(>15m)	deep(>5m)
marsh	various	medium(>2m,<5m)
drainage canal	narrow(<5m)	shallow(<2m)

View

Program of the edge oppsite
Housing
park
marsh
commercial/business

Edge

Material	Form
hard	slope
soft/hard	slope/no slope
soft(natural)	no slope

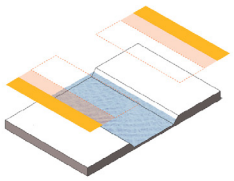
Proximity

The edge opposite	Infrastructure (Arterial)
close	close
irrelevant	medium
far	far

Table 7-5

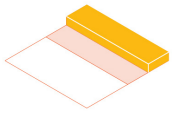
The edge type 4-b is a new river. It has slightly different conditions compared to the type 4-a. It is located in between two new islands, which is inside ot the area where the water level is controlled to maintain lower than the exisiting river.

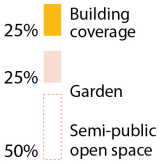
As it is in the middle of new islands, it has the quiet environment for housing. Besides, the width of the river is wide enough to protect the privacy of people living in those houses. It can be developed as up scale housing area.



Development type

Waterfront type3





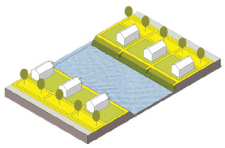
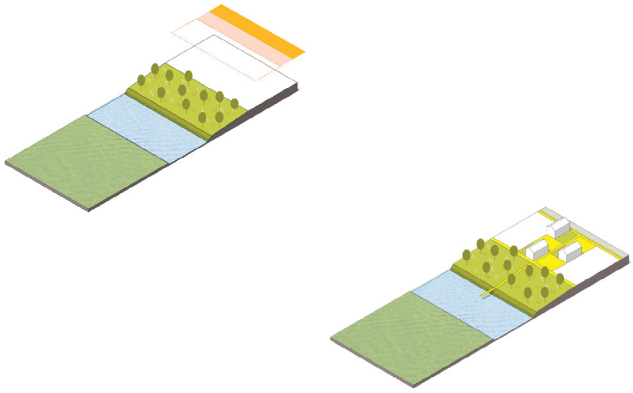


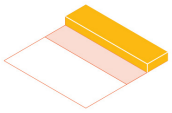
Figure 7-31. Edge type 4-b with waterfront development type 3
Table 7-5. Criteria for the edge type 4-b condition

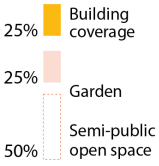


Soft edge for sediment

Development type

Waterfront type3





The edge type 5 is with marsh, facing the bay. It has the condition of rural area. As it is at the mouth of the river and the marsh, the shape of the edge can be more affected by water movement. because of this reason, the edge should reserve some space for the changes by erosion and sedimentation. It is recommanded to design the area with a long slope with natural materials . It can be developed with the waterfrotn type 3 for upscale housing, which is the lowest possible density for the waterfront.

Water way

Type	Width	Depth
River	wide(>15m)	deep(>5m)
marsh	various	medium(>2m,<5m)
drainage canal	narrow(<5m)	shallow(<2m)

View

Program of the edge oppsite
Housing
park
marsh
commercial/business

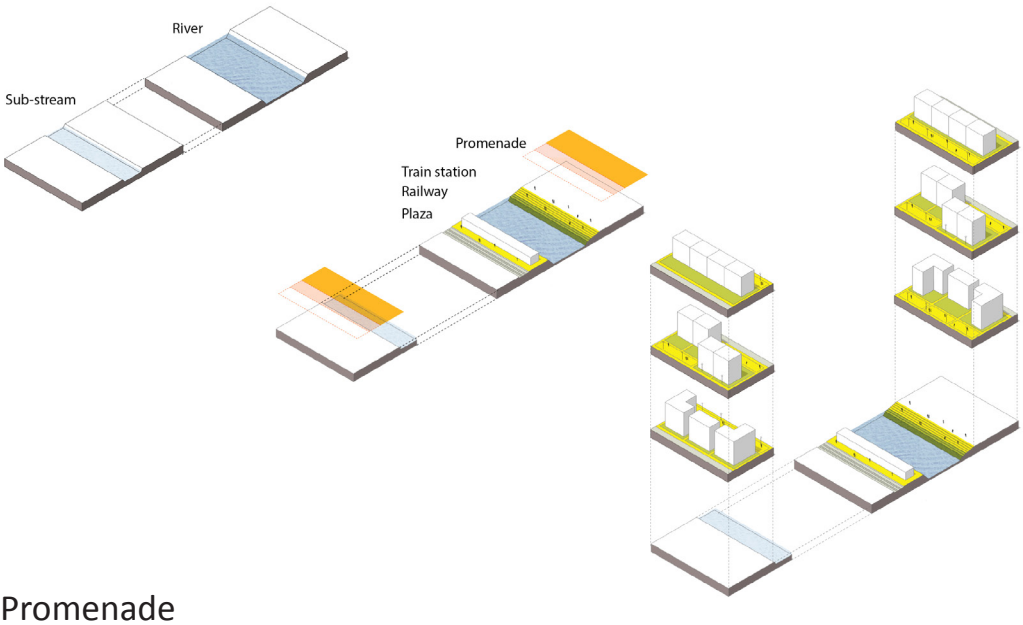
Edge

Material	Form
hard	slope
soft/hard	slope/no slope
soft(natural)	no slope

Proximity

The edge opposite	Infrastructure (Arterial)
close	close
irrelvant	medium
far	far

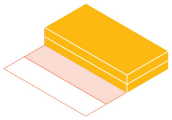
Figure 7-31. Edge type 5 with waterfront development type 3
Table 7-5. Criteria for the edge type 5 condition

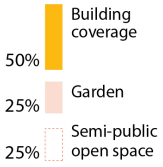


Promenade

Development type

Waterfront type1





The edge type 6 is with both river and drainage canal. It is an intersection of those two types of water way, created by the location where existing urban area and a new island meet. It is ideal to have the mixed use area with a new train station. It is basically the entrance of the entire new development area. Therefore, it is recommanded to design the edge with hard materials without slope for the urban context.

Water way

Type	Width	Depth
River	wide(>15m)	deep(>5m)
marsh	various	medium(>2m,<5m)
drainage canal	narrow(<5m)	shallow(<2m)

View

Program of the edge oppsite
Housing
park
marsh
commercial/business

Edge

Material	Form
hard	slope
soft/hard	slope/no slope
soft(natural)	no slope

Proximity

The edge opposite	Infrastructure (Arterial)
close	close
irrelevant	medium
far	far

Figure 7-31. Edge type 6 with waterfront development type 1
Table 7-5. Criteria for the edge type 6 condition

Variation of
Waterfront development

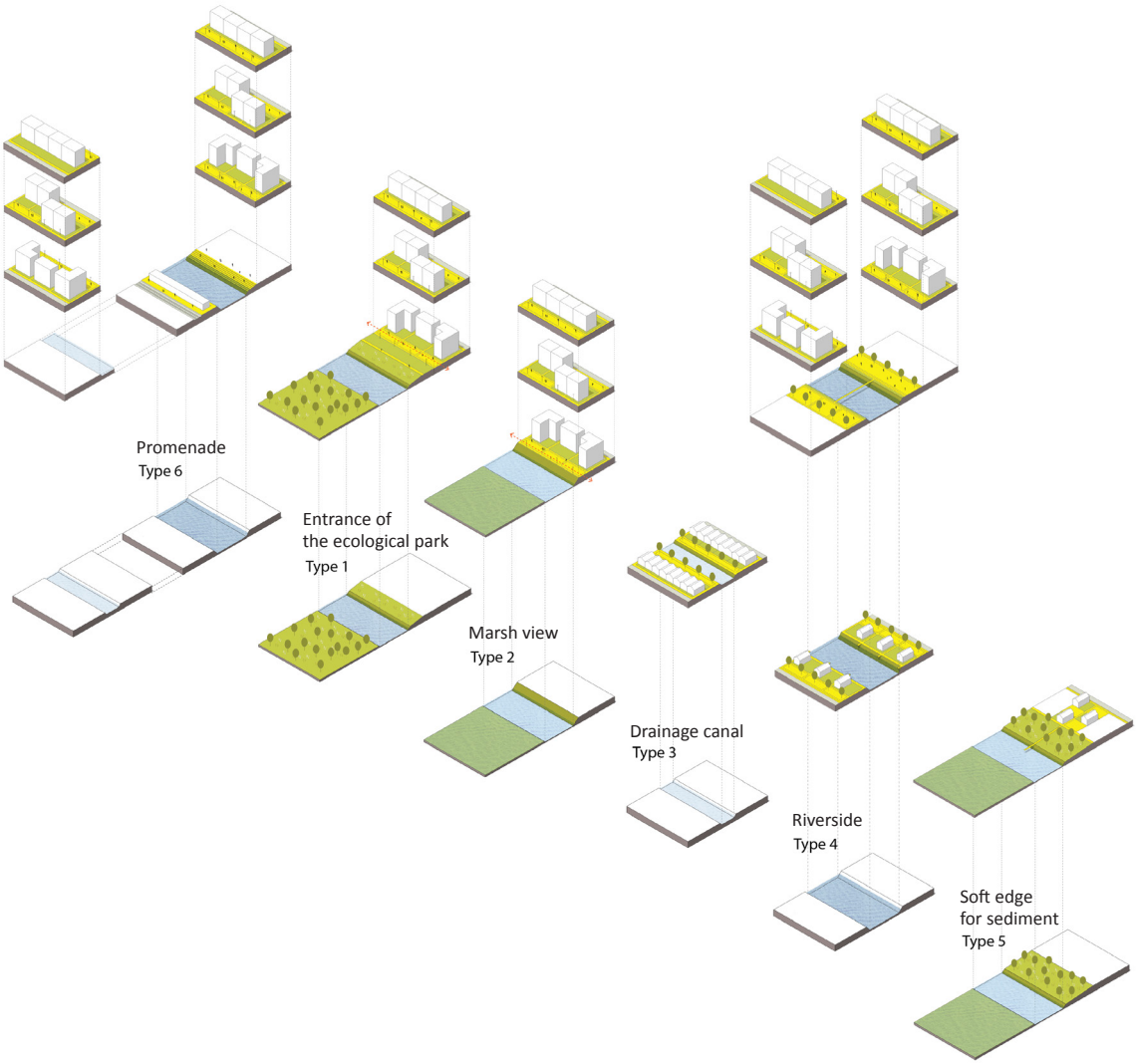


Figure 7-32. Variation of Waterfront development
on the edge of island

Edge development

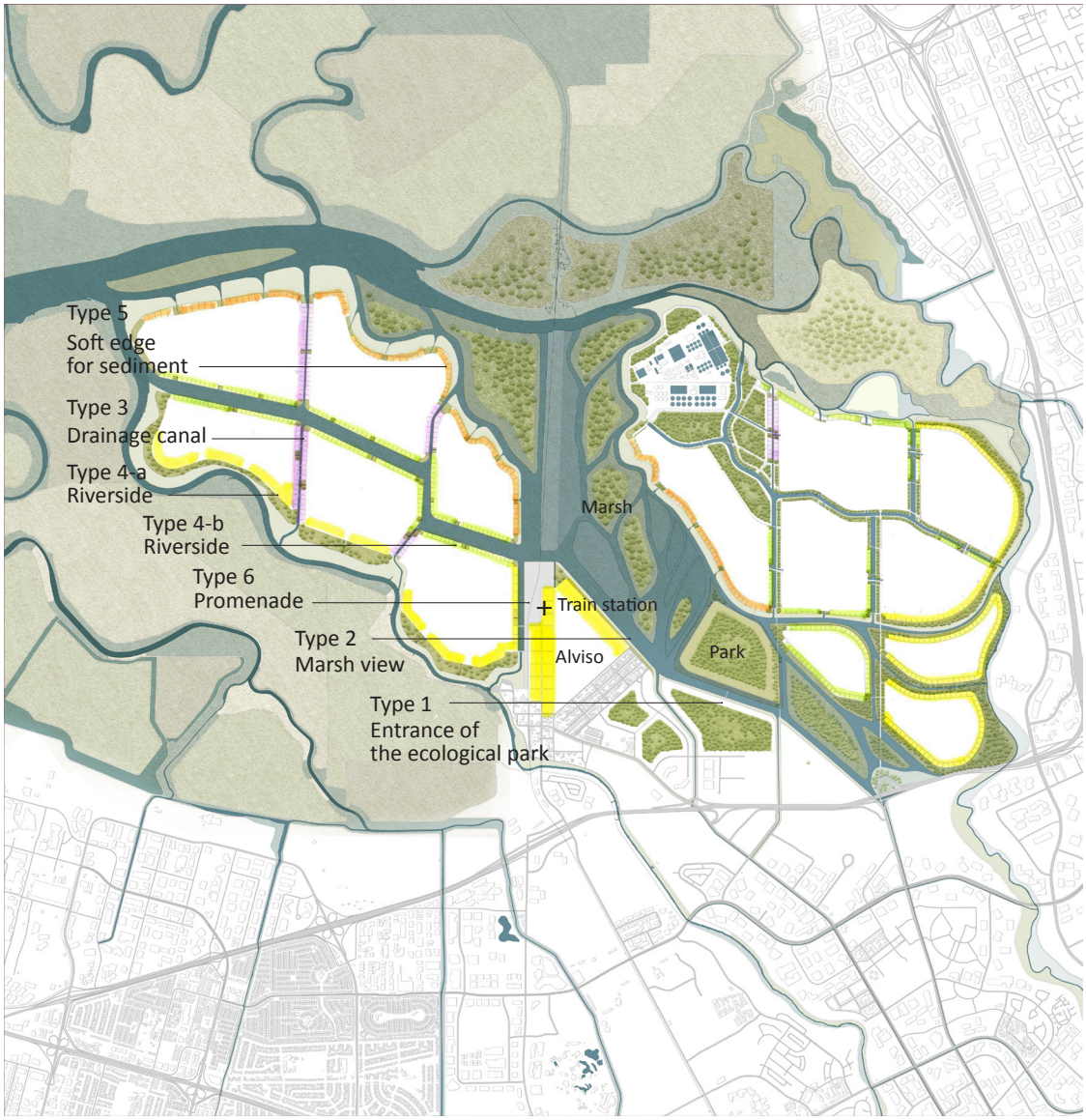


Figure 7-33. Edge development

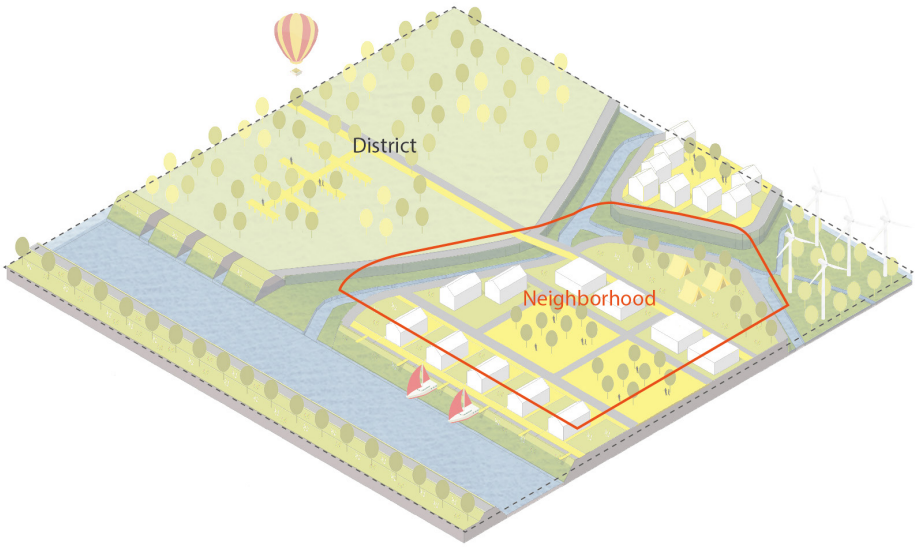


Figure 7-34. Neighborhood scale

Waterfront development

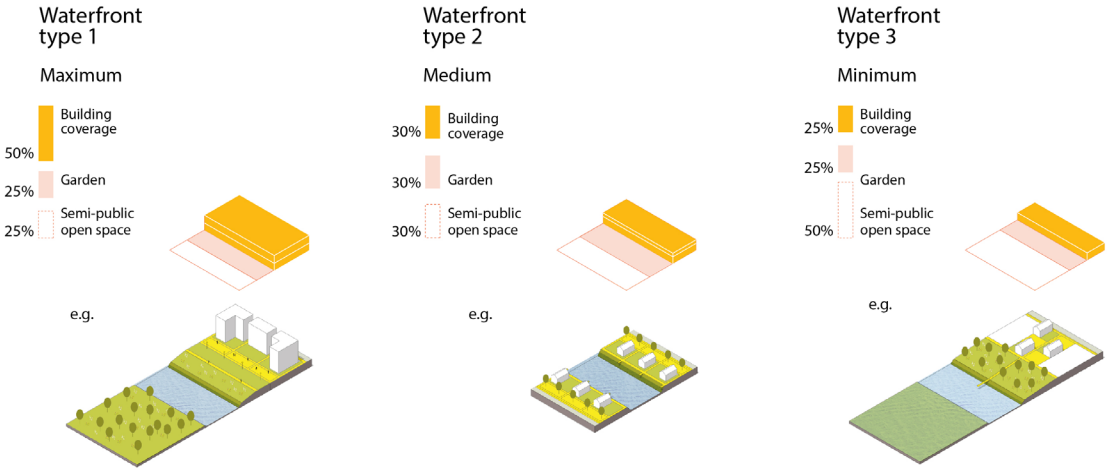
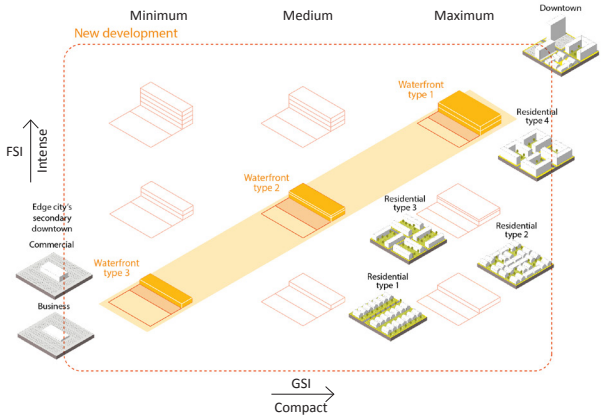


Figure 7-35



After the development of the edges is complete, it is important to define the way of developing the area, which is inside of the edge. It is about the rule of forming a neighborhood.l

In this case, three types of waterfront development are already given, which are the core structure of the new development. The further development can continue from there with the 6 development models around the waterfront types in the figure(left).

It is mainly proposed to fill the gap between the existing typologies, which is created by the industrial area without housing. For this reason, those development models are designed for diffent types of housing. The form of these 6 examples of new housing typologies are the modification of 4 exisiting housing typologies. It is aimed to have some gradual transition part between the exisiting area and new waterfront with new types of development.

Figure 7-35. Three types of waterfront development

New housing typologies
based on existing typologies

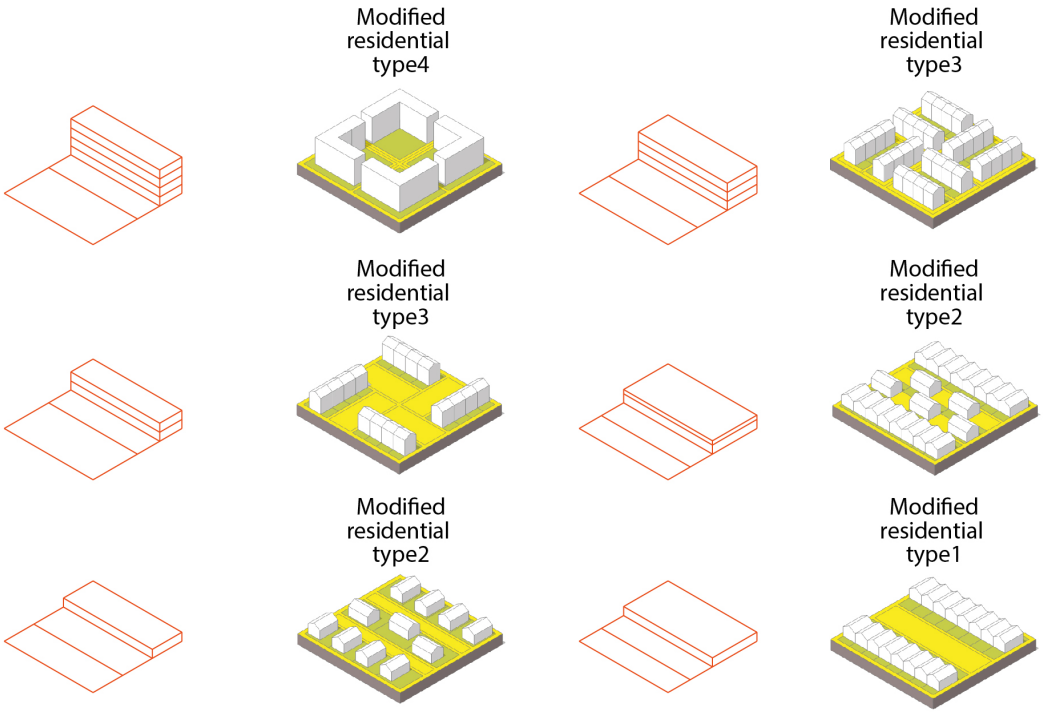


Figure 7-36.

Existing housing typologies

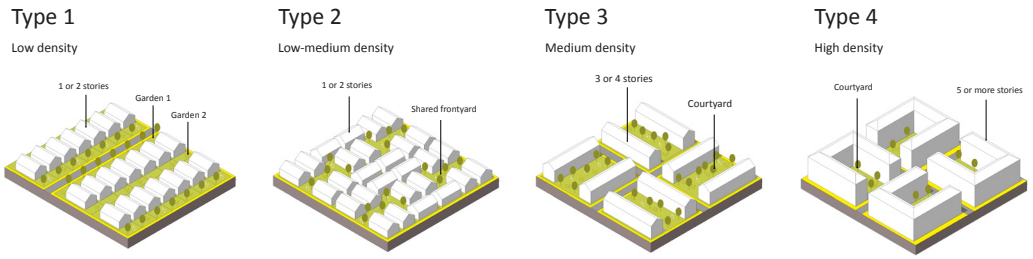


Figure 7-36. New housing typologies for densification based on existing typologies

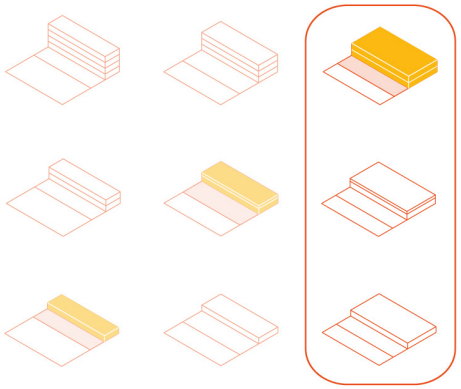
Neighborhood type1

This is a case of development between the waterfront type1 and the waterfront type 2. As the figure(right) describes, the first blocks behind the waterfront 1 can be a continuous part of the maximum development in terms of GSI, but the FSI can be gradually lower. In this case, the adequate typologies are the modified residential type 1 and 2.

To make a certain territory for a neighborhood, it also needs blocks for division. This is the block with local street. it is basically one example of developing the waterfornt type 1, but it is housing based on the residential type 3.

The other option of managing the blocks in the middle is making the area as open space. It is possible to have when there is no more demand for new development in this area, or when the residents want to use for open space until there is new development.

Possible development model



Logic of forming a neighborhood

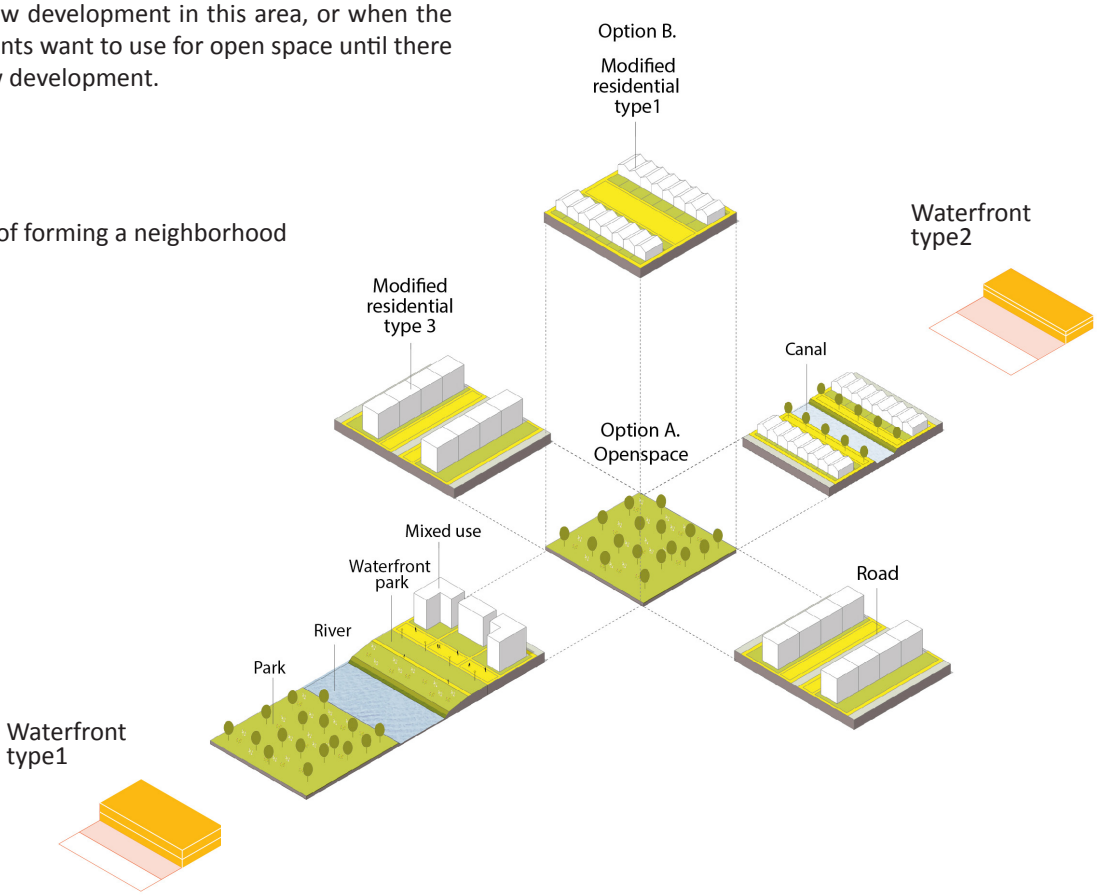
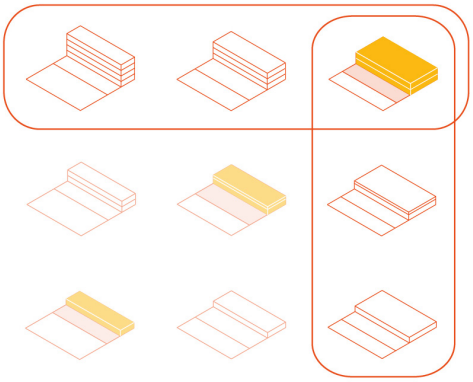


Figure 7-37. Possible development model for the neigbhorhood type1
Figure 7-38. Logic of forming the neighborhood type 1

Neighborhood type2

Possible development model



The neighborhood type 2 is the development that can come after the type 1.

In this case, the urban fabric of this development gets closer to the waterfront type 2, which has the bigger share of open space in a block. Therefore, new development of this neighborhood will have the models with bigger open space, but the FSI will stay as the maximum.

To make the area with gradual increase of density from the neighborhood type1, the modified residential type 2, 3 and 4 are recommanded. They can be developed in order to have natural transition.

Logic of forming a neighborhood

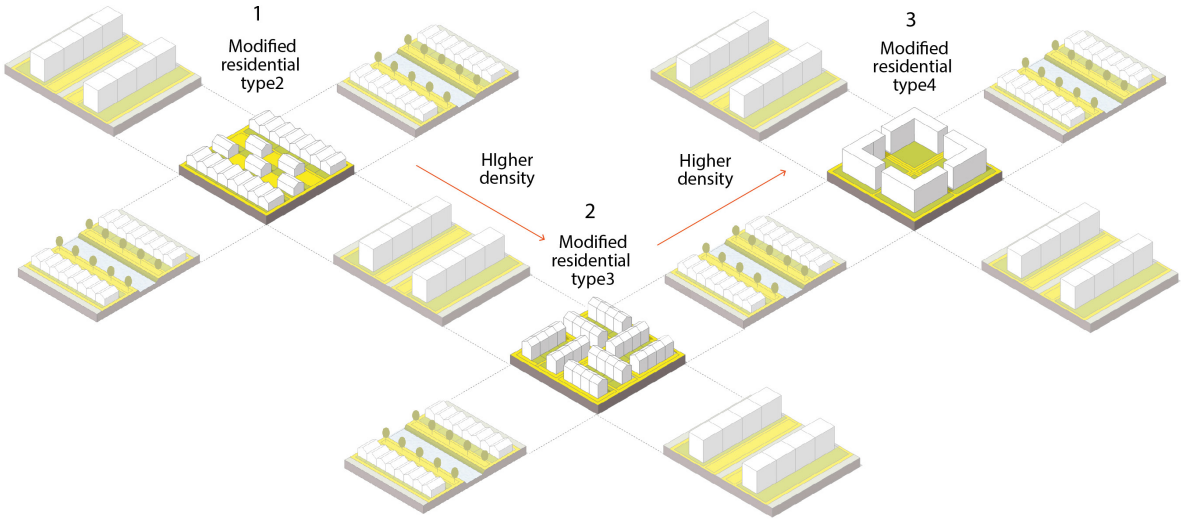
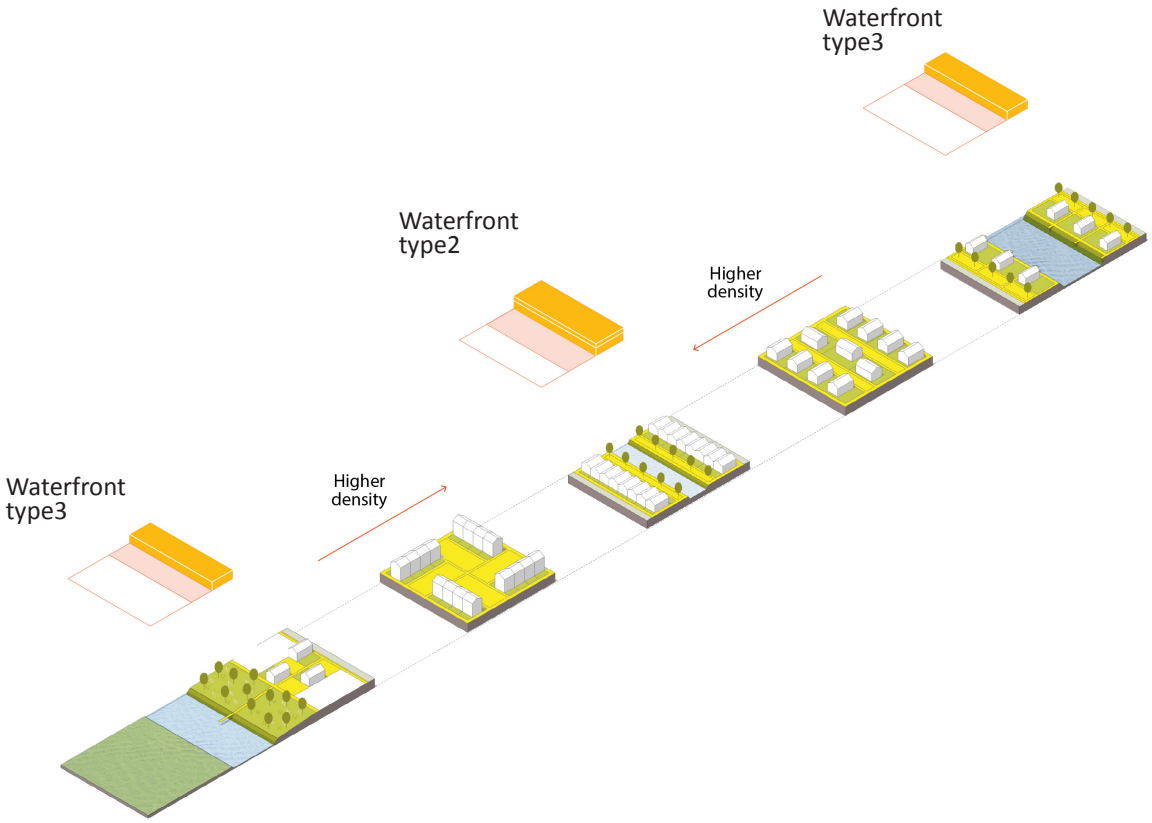


Figure 7-39. Possible development model for the neigbhorhood type2
Figure 7-40. Logic of forming the neighborhood type 2



Neighborhood type3

The neighborhood type 3 is for the area between the waterfront 2 and 3.

Basically, it is the neighborhood with the lowest density. For the transition from the higher density, which is the waterfront type2 with the residential type 1. The two models in the figure designed with modified residential type 2 and 3 are recommanded. There are similar to the types applied to the neighborhood type 1 and 2, but the FSI and GSI are adjusted for the low density

Possible development model

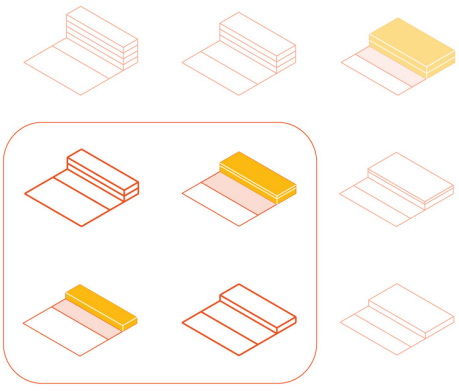


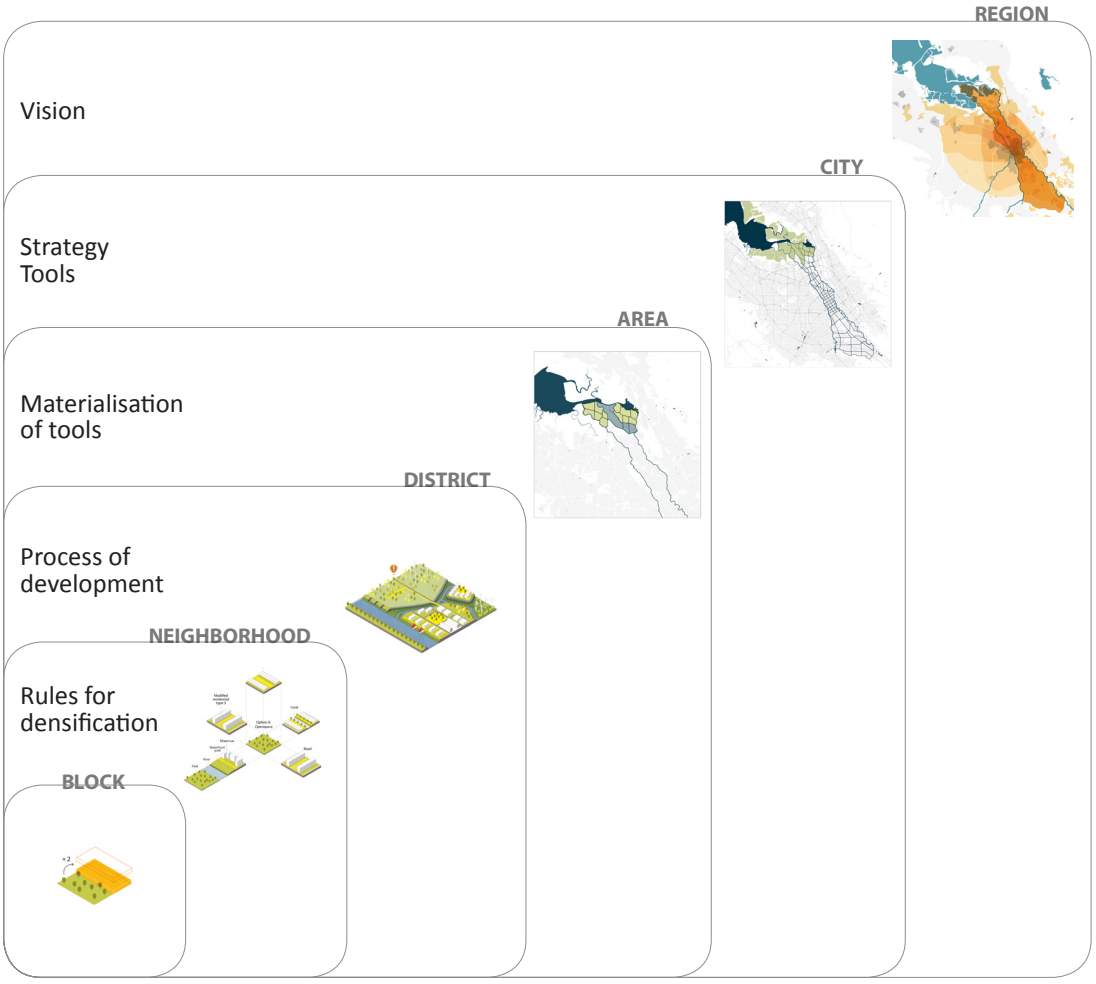
Figure 7-41. Logic of forming the neighborhood type 3
Figure 7-42. Possible development model
for the neigbhorhood type3

In summary, an island will consist of those 9 models of development. If you calculate the aggregation of the open space and the building intensity, they do not exceed the development rule of the block scale. Basically, the rules for development have the layered structure. As the figure(below) describes, the block scale rule defines the way of development for the neighborhood and the basic frame of devleoping the district, which influences on the composition of the marsh and the new development districts in the area scale. At the same time, the vision of regional scale, and the strategy of the city scale give the concept of the block scale development.

An example of urban design for the neighborhood scale demonstrates the ways of block development and densification.

In the plan, the waterfront on the edge of island is designed with promenade and mixed use buildings,which is the intial development of the island. If there is more demand of development, the development can continue from the promenade to the core of the island. The first neighborhood formed with the promenade follows the densification rule of neighborhood type 1.

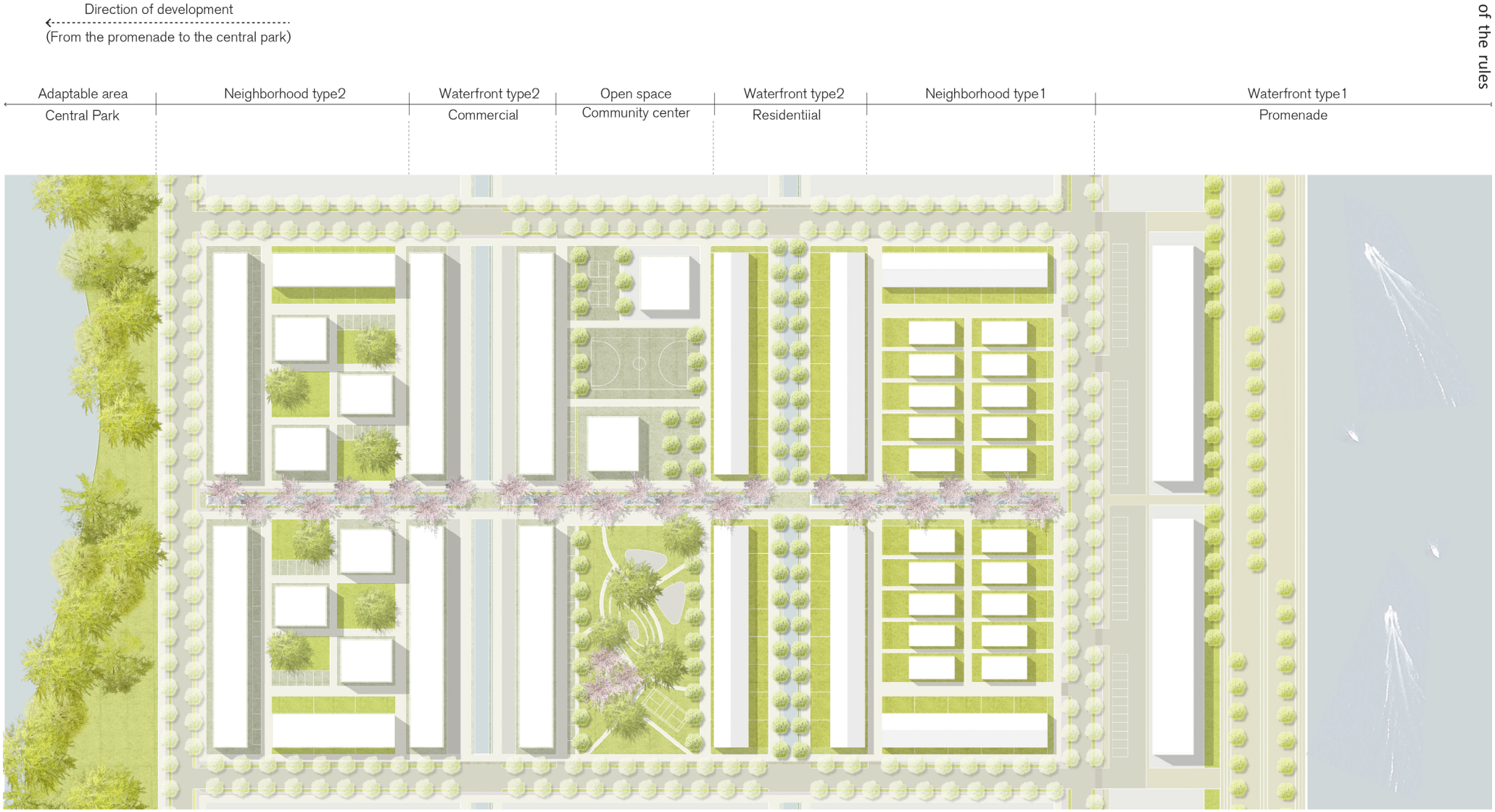
Depends on the size of the island, it may need more then two drainage canals between the edge and the central park in the core of the island. In that case, there will be development of waterfront type 2 for both canals and the area between them can be designed for public open space and one of those canal area can be commercial street while the other one is for housing. If there is more demand after that process, the neighborhood type2 can be the next step of desification.



Structure of the rules

Figure 7-43. Structure of the rules

Figure 7-44. Materialization of the rules in the neighborhood scale



Agricultural district

A2, C1, C2, C3, B1, B2 and B3 are more exposed to the condition of waterbody. Besides, B1, B2 and B3 are located in the area where the water flow from the river enter. This area can be either reserved for waterbody or developed with highly water-sensitive urban design. Meanwhile, A2, C1, C2 and C3 are suitable for agricultural land based on abundant fresh water resource in the area. Therefore, on the edges of this islands, there will be housing and the area inside of the housing ring can be used for agricultural purposes.

In the case of A2, C1, C2 and C3 have the irrigation system acrossing the land. At the intersections of the waterway, plots are reserved for locating agriculture related facilities. In terms of housing development, These districts can have two or three different types of housing development because of various conditions of waterfront the districts have. For instance, the area facing the marsh, edge type 5 and the riverside b area can be developed with the waterfront type 3 for upscale housing while the area along the drainage canal can have higher density of development, which is the waterfront type 2.

Urban district

The districts D and A3, A4, A5 and A6 have potential to be more urbanized because of the location that is on the extention of the exsiting urban fabric. The district A and D have the same logic for the design. There is the core of the island designed as a central park for business, and the area between the core and the edge have a drainage canal. The desification of for the district follow the rules for forming neighrhood.

For example, the district D (D1, D2 and D3) have the area of the riverside a type, which can be developed with the waterfront type 1. In this case, the area behind the edge to the drainage canal inside of the island can be developed with the neighborhood type 1, and then the area inside of the canal will be suitable for the neighbor-

However, there are also two different sides of the edge area. one of them are the area along the drainage canal between the sub-districts. It this case, the neighborhood type2 is directly suitable from the area behind the edge to the core.

The other side of the edge is with the riverside b, which is adequate condition for the waterfront type 3. For this reaosn, it is reconmanded that the area behind the edge to the inland drainage canal should have the neighborhood type 3. These design rules are also applied to the district A.

Spatial Link

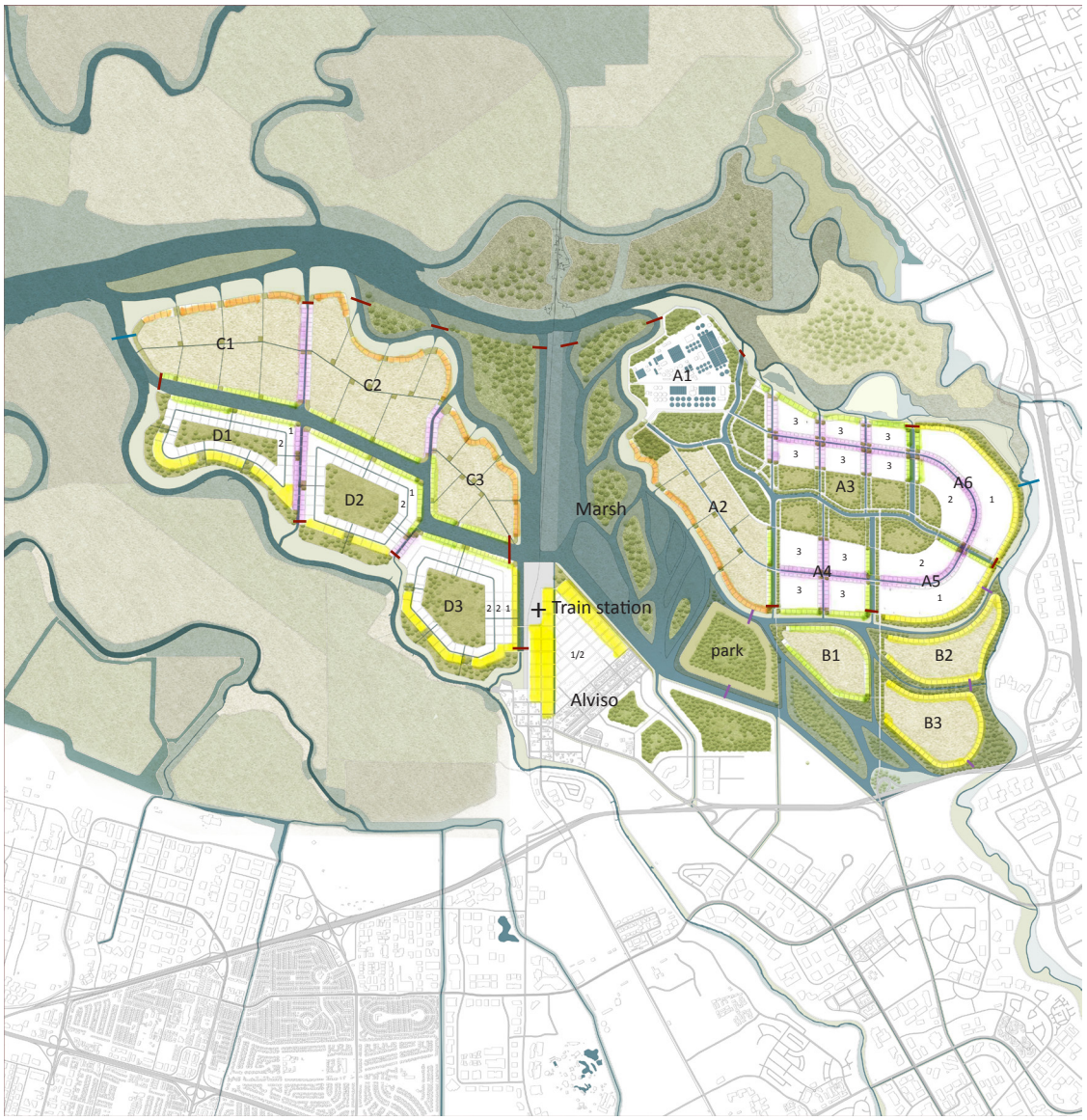
a. Extention of Alviso

The district E is a unique case of the area. It is basically the extenstion of the existing neighborhood, Alviso. By this area, the new development area will have a physical connection.Beside, there is a railway passing through the area, which can be developed with a new train station with promenade. It will have the flow of people coming to the area from the city as the entrance of the new development area.

b. Park

the park is another link between the exisitng urban area and the new development area. It is a kind of pivot connecting two divided parts by the water system. At the same time, it is also the entrance of the ecological park, and the gate to control the water level inside of the new development area,

Masterplan



Legend

A1-D3 Sub-district
1-3 neighborhood type

waterfront type
type 1
type2
type3

Levee type
type1
type2
type3

The area is structured by 5 differents districts, park and the marsh as the core of the water management system. The districts are sub-divided by the water infrasturcture, and the programs designed for each districts correspond to the water system.

Figure 7-45. Materialization of the rules in the area scale

Water management

In terms of water management system, the design proposal suggests three different types of dike system to control water level.

First, type 1 is the levee controlling the water level of the existing river. It is imperative to protect the exsiting urban area, such as, Alviso, from sea level rising.

Second, type 2 is about clustering the islands with the dike system. By this measure, the water level of new development area will be controlled before it is discharged to the river or the bay. Therefore, the water level inside of this dike system will maintain at a certain level through the year without extreme fluctuation.

Third, type c is the system controls the discharge of the river from upstream. Basically it is about stormwater flowing into the new development area while first two types focus on controlling water level affected by sea level rising.

When it comes to the district scale, it is about the process of draining water to maintain ground water level, combined with the way of managing stormwater simultaneously by proper ways of retention and detention facilities. More importantly, they have to work as an entity.

For example, D3 is structured by two different types of drainage canal and the central open space. When there is no rain, the drainage canals are functioning for stabilizing the land by controlling the groundwater level. However, when it rains, the system starts working as three different parts.

Water management in D3

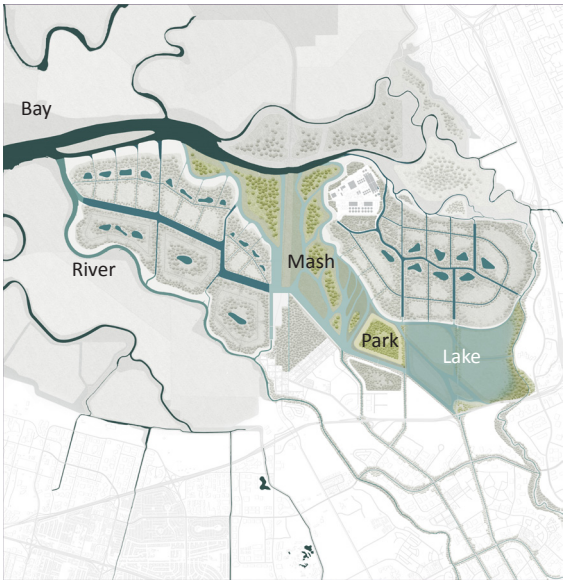
First, the runoff on the edge facing the marsh will be directly discharged to the marsh while the runoff generated on the area along the drainage canal a will flow into the canal a first, and then it will be discharged via the drainage canal b.

The central open space with office builidngs has sufficient amount of permeable surface ,and has room for retention or detention facilities. For this reason, the stromwater will be stored on the site until there is necessity of discharging water. In that case, it will be directly dis charged to the marsh or the river by the drainage canal b.

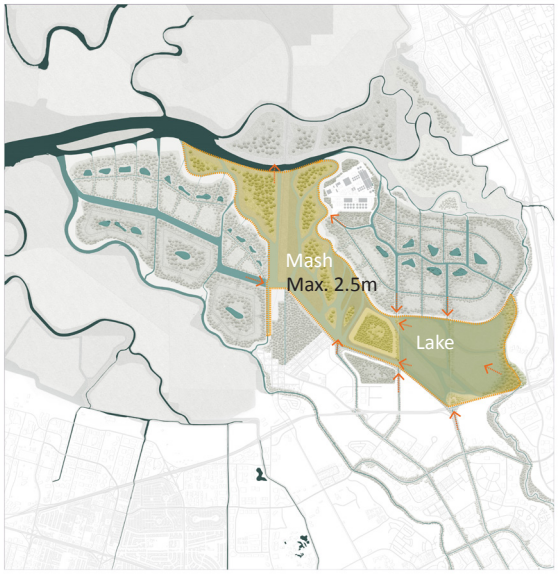
Figure 7-46. Water management in D3

Various waterlevels
by layered levee system

Different water levels by the layered levee system

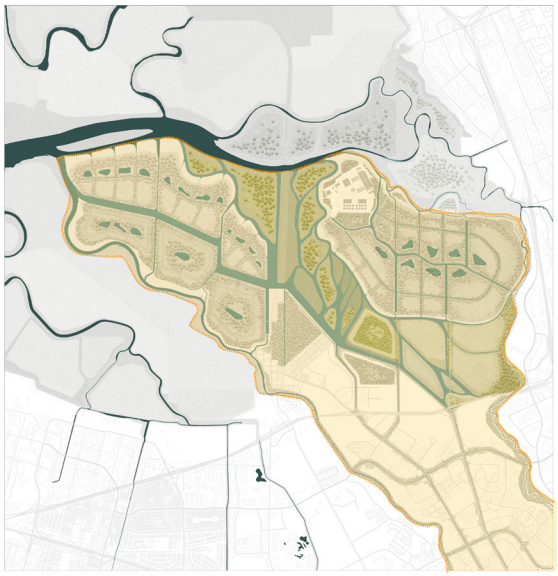


The area of water level below 2.5m

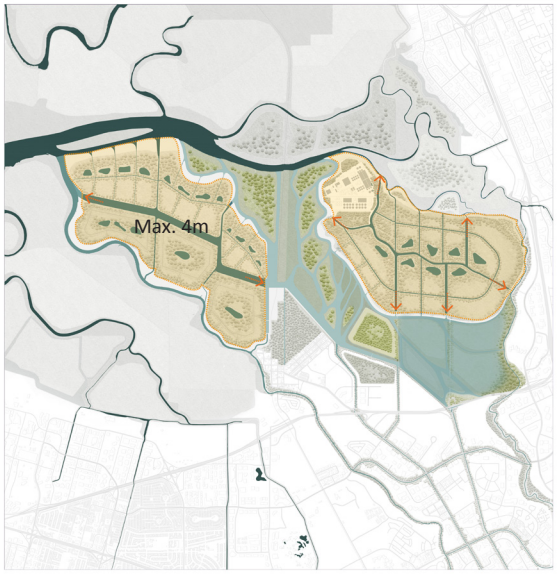


The core of water management system
in the new development area.

The area protected from 1.5m sea level rising



The islands with water level max. 4m



The water level of the islands will be higher than
the marsh area. It is for providing water-friendly
urban environment.

Figure 7-47. Water management by layered levees

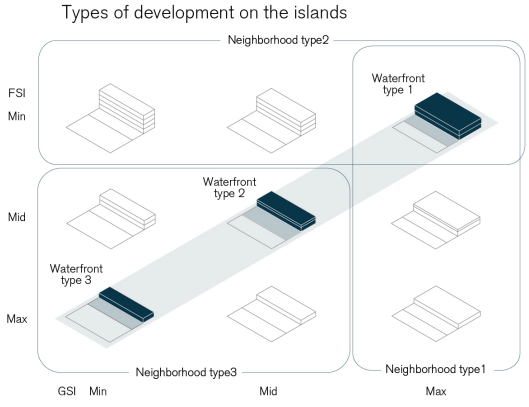
New development and adaptation

Depending on the location, the islands can be developed in two ways. The urban type is for the islands next to the main land while the rural type is for the island facing the bay.

The urban type has central park in the middle of the island. It is the adjustable area depending on the demand of new development on the island. In the case of the rural type, the agricultural land in the middle of the land plays the same role.

The new archipelago is designed to have higher ground level, which is minimum 2m higher than Alviso, for the sea level rising scenario.

For the safety of Alviso, the water level of the marsh area will be as the same as now. It will be maintained up to 2.5m while the water level of new island area will be up to 4m, which is for providing water-friendly environment of water-front development. It is possible by the layered levee system of the project.



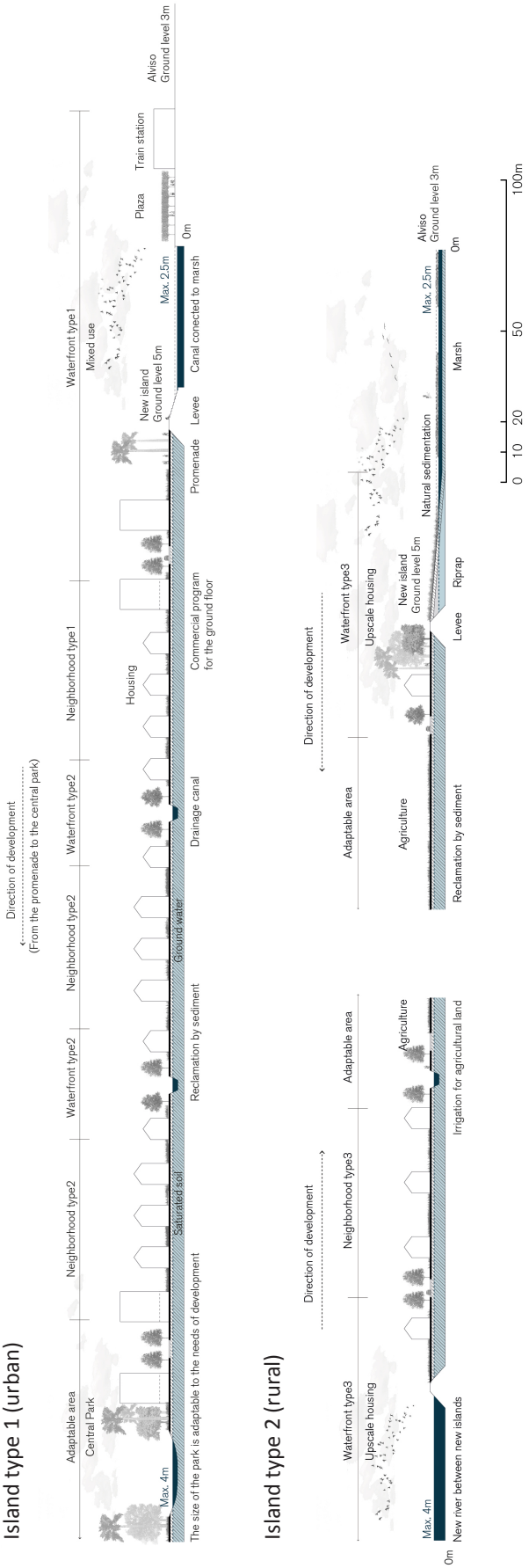


Figure 7-48. Types of development on the island
Figure 7-49. Island type1(Urban)
Figure 7-50. Island type2(Rural)

Regional plan

New urban core
by blue/green network

If the current San Jose airport will move out of the center, the place turn into new urban park until there is demands of new development in this area. In the meantime, Alviso will stay as it is now with improved flood protection system. It will be the node for new development on the new islands as it is the connection between the exisiting urban area and the new archipelago

As the web of this new infrastructure covers entire area between two river. The new or re-development along the exsiting rivers will spread throughout the basin. For the process of this transformation, existing centers will contribute to the process as the nodes of development. Aside of the downtown, the first secondary downtown and the edge city, the airport and Alviso will be the new nodes for bridging other centers.

Figure 8-1. plan of the city scale.

Re-development area

Existing condition

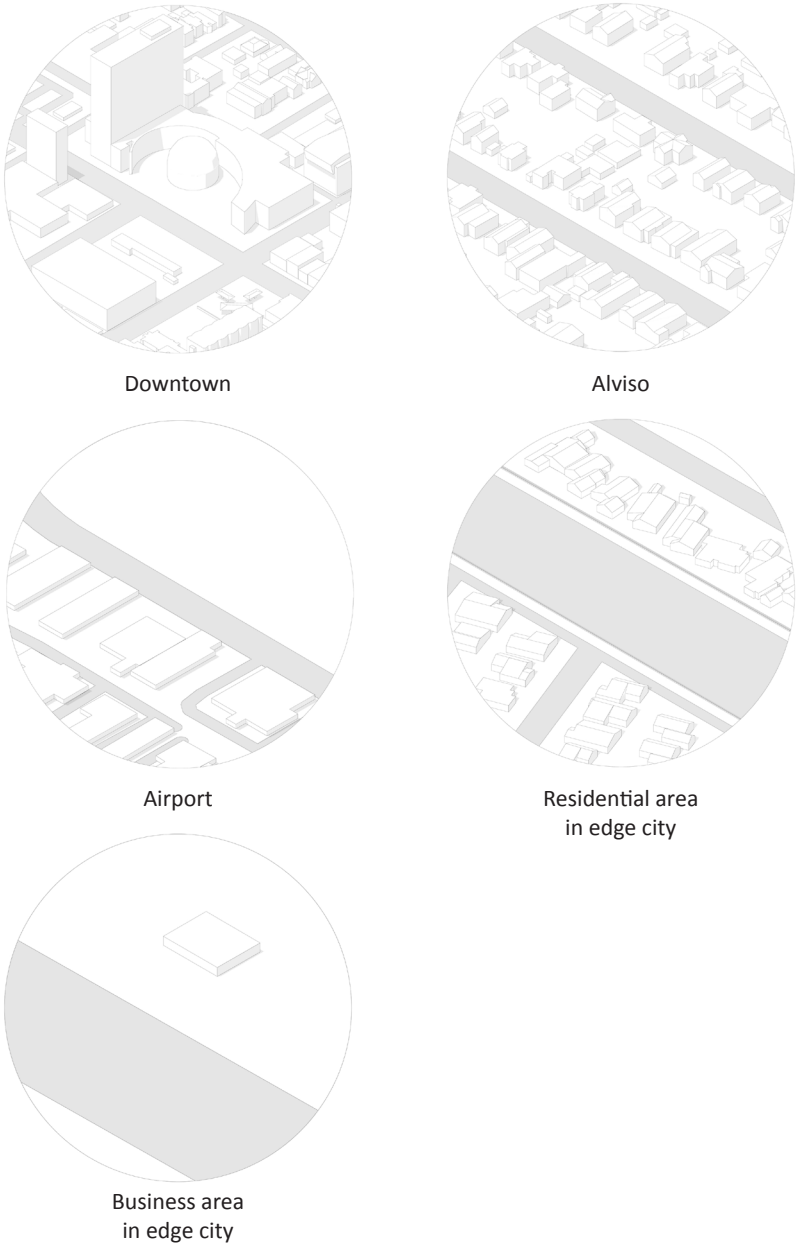


Figure 8-2.
Exisiting conditions of re-development area the proposal

Re-development area

After interventions

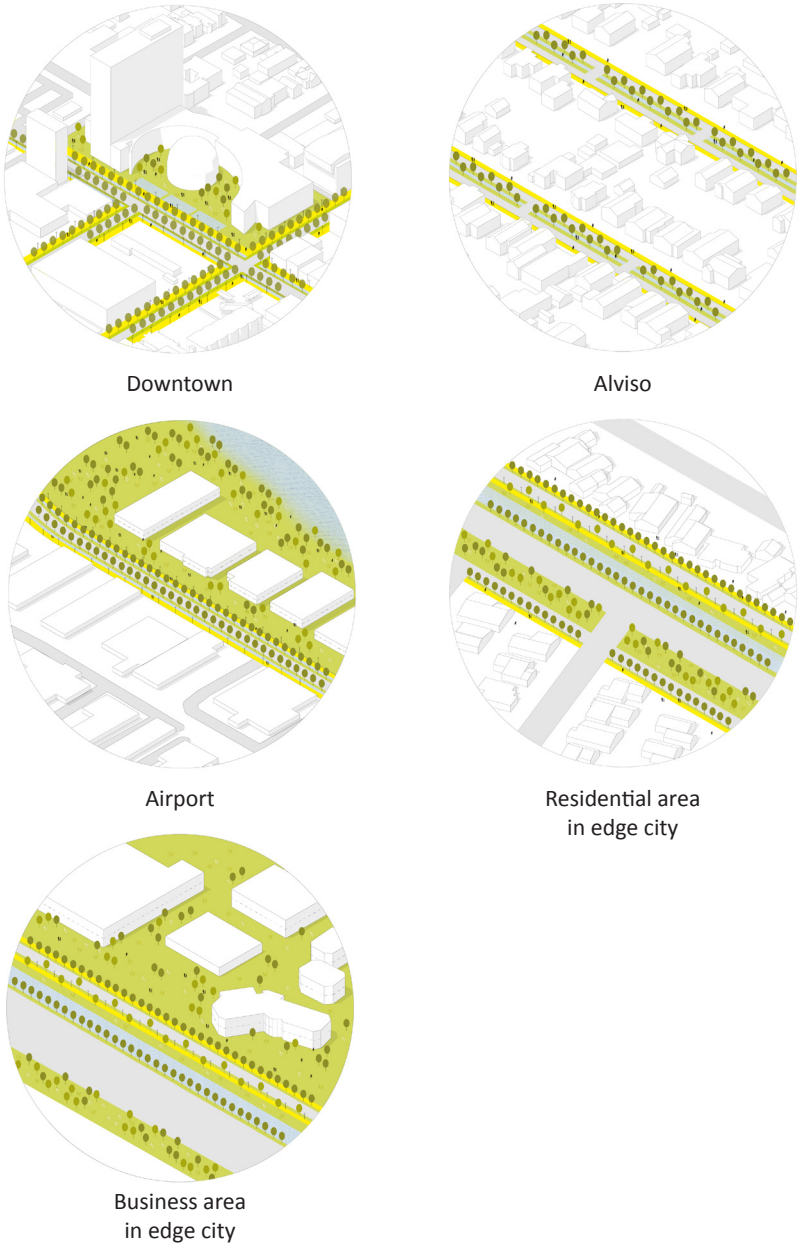


Figure 8-3.
New spatial conditions of re-development area
after the invterventions

Current view from the possible location of new island towards the marsh

Currently, the down stream of the region is filled with unactive salt ponds. If the area go through the process of making the new archipelago, some part will be sub-merged for a certain period. However, eventually the dynamics of landscape ecology will bring new spatial quality to the area by the time a new island is complete.

Figure 8-4.
Current view from the possible location of new island towards the marsh, Google street view (2017)

In the process of forming the islands

Figure 8-5.
view from the possible location of new island
towards the marsh in the process of forming islands

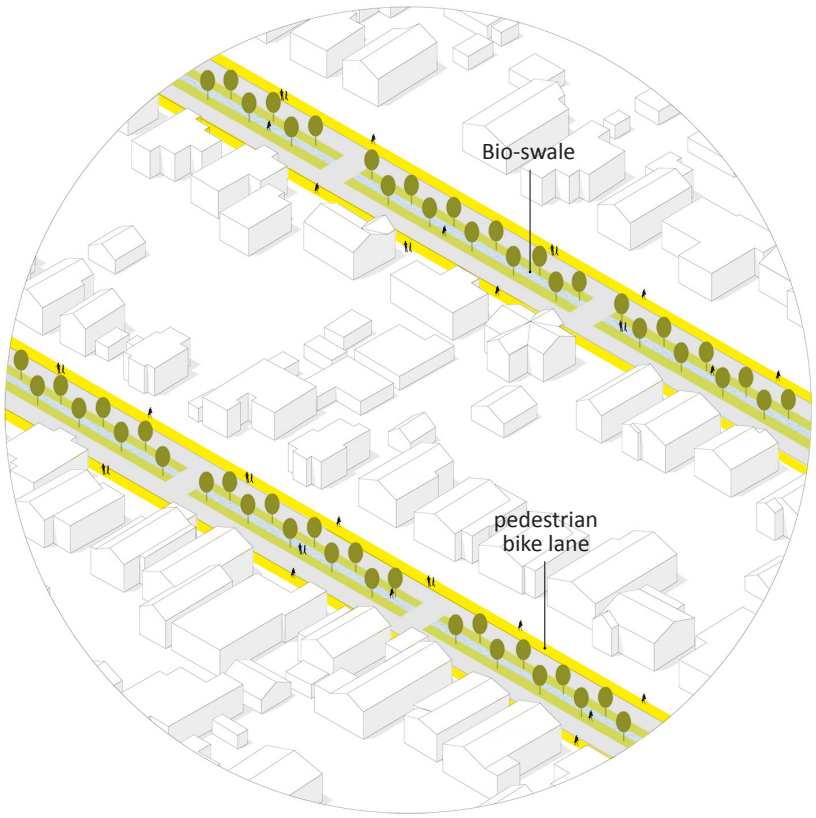
View from the new island towards the marsh

Figure 8-6.
view from the new island towards the marsh

Riverside

As the photo(top) shows the riverside in the down-stream is designed with high levee for flood protection. It disconnects the access from the residential area or offices to the river. In this situation, it is difficult to expect new development prompted by the benefit of riverside as public open space. However, if the new archipelago is constructed, the water level of the river will be under control. Thus, the levee of this area can be lower and the floodplain of the river could be combined with riverside park for dry season.

Figure 8-7.
Riverside,
Google street view (2017)
Figure 8-8.
Riverside after the interventions



Alviso will be safe from sea level rising but the neighborhood needs the improvement of drainage system in case of intensive rainfall. For this reason, the oversized road in the neighbohood can be combined with bio-swale. Since the town will be by a new waterbody. The runoff from the urbanized surface will be cleaned through the swale before it is discharged to the marsh and the lake.

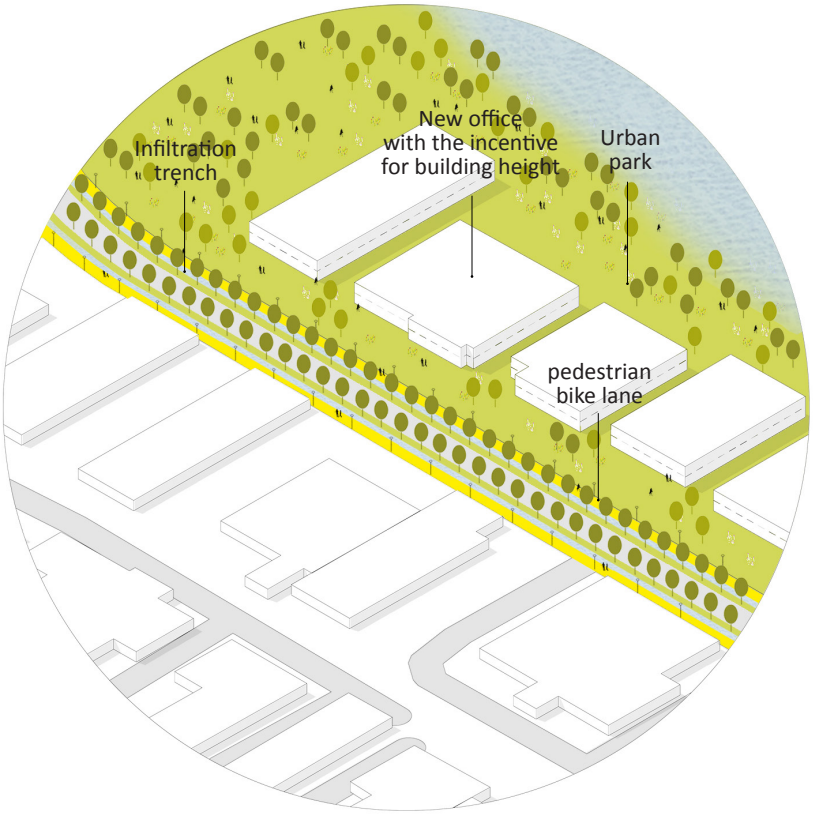
Figure 8-8.
Alviso after the interventions

Existing condition

Figure 8-9.
View of Alviso,
Google street view(2017)

After the intervention

Figure 8-10.
View of Alviso after the interventions



The airport is currently taking up enormous space in the core of the city, which is a major reason why there is territorial disconnection between the downtown and the edge city now. For this reason, this proposal suggests relocating the airport outside the city. Then the area can be re-developed as new urban park with new development, such as, housing and offices. This will fill the spatial gap between the downtown and the edge city.

Figure 8-11.
Airport after the interventions

Existing condition

Figure 8-12.
View of the airport,
Google street view(2017)

After the intervention

Figure 8-13.
View of the airport after the interventions

Residential area in the edge city

The residential area in the edge city are usually located next to inter-state highway. For this reason, they often built the high wall between the highway and the residential block. In this proposal, the circulation of inter-state highway will move out of the new urban core. Therefore, the width of the road can be reduced to have green buffer instead of the wall.

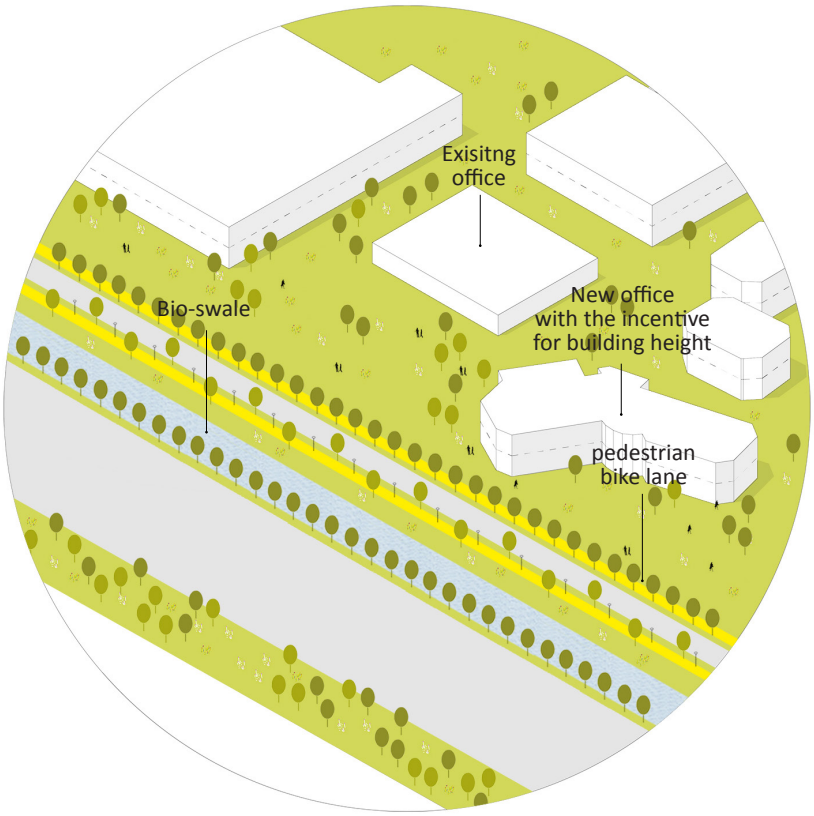
Figure 8-14.
Residential area in the edge city after the interventions

Existing condition

Figure 8-15.
View of residential area in the edge city,
Google street view(2017)

After the intervention

Figure 8-16.
View of residential area in the edge city after the interventions



The business area in the edge city is designed to have high accesibility from the downtown by highway system. Since, it is usually started from a single development, the area does not have cohesivness between buildings, and the density of the area is very low, which contribute the disconnection between the downtown and the edge city. Therefore, in this proposal, new development will be promoted for higher density. The tool for prompting the development will be the new blue/green infrastructure, providing public open space and the buffer for highway. For this new system, the width of the highway will be reduced.

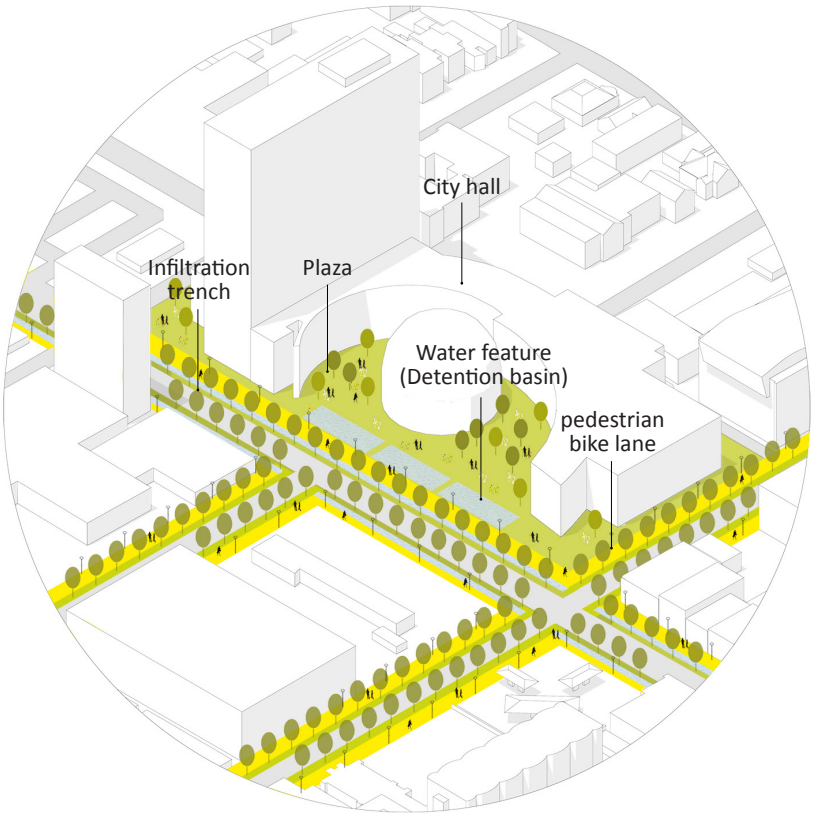
Figure 8-17.
Business area in the edge city after the interventions

Existing condition

Figure 8-18.
View of Business area in the edge city,
Google street view(2017)

After the intervention

Figure 8-19.
View of Business area in the edge city after the interventions



Considering highly urbanized condition, the implication of blue-green infrastructure in the downtown should be different from the down-stream area. As an example, this city hall area could have a plaza with permeable surface. By gentle slope of the ground the runoff can be collected in the water feature, which will function as a detention basin. If there is overflow from the water feature, it will flow into the infiltration trench along the street. it will take a place along the block by reducing the width of road. This can be designed with new bike lane.

Figure 8-20.
Downtown after the interventions

Existing condition

Figure 8-21.
View of Downtown,
Google street view(2017)

After the intervention

Figure 8-22.
View of Downtown after the interventions

The structure of
the design proposal

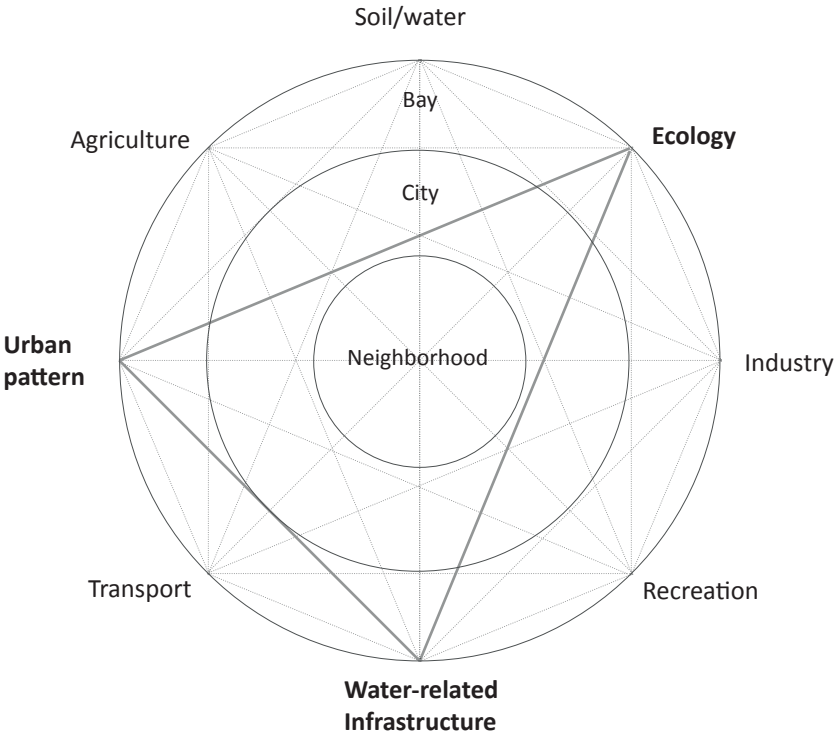


Figure 8-23.
Structure of the design proposal

Re-structuring the bay with the new design method

If the development of new urban core is successful in San Jose, the process can be also applied for other salt pond areas in the bay. If the entire possible sites in the plan are developed with the same method used for Alviso and San Jose. The whole southern part of San Francisco bay will be protected from sea level rising. As the design method of this paper emphasizes on making a new spine of development by utilizing river streams, the region will have the unprecedent pattern of occupation and its core.

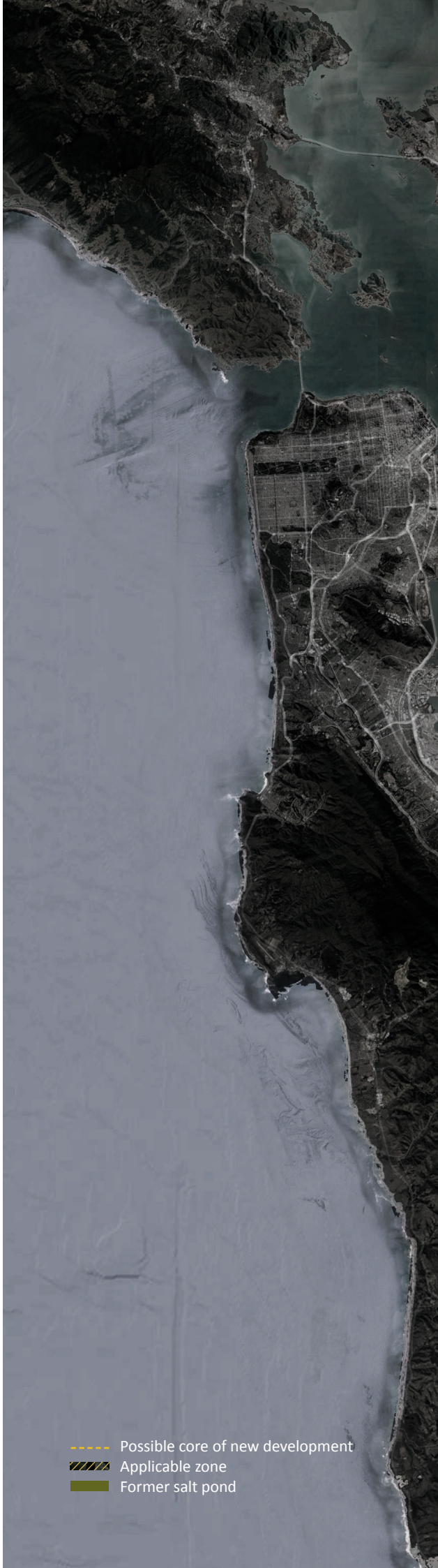


Figure 8-24.
Plan of the regional scalel

Implementation

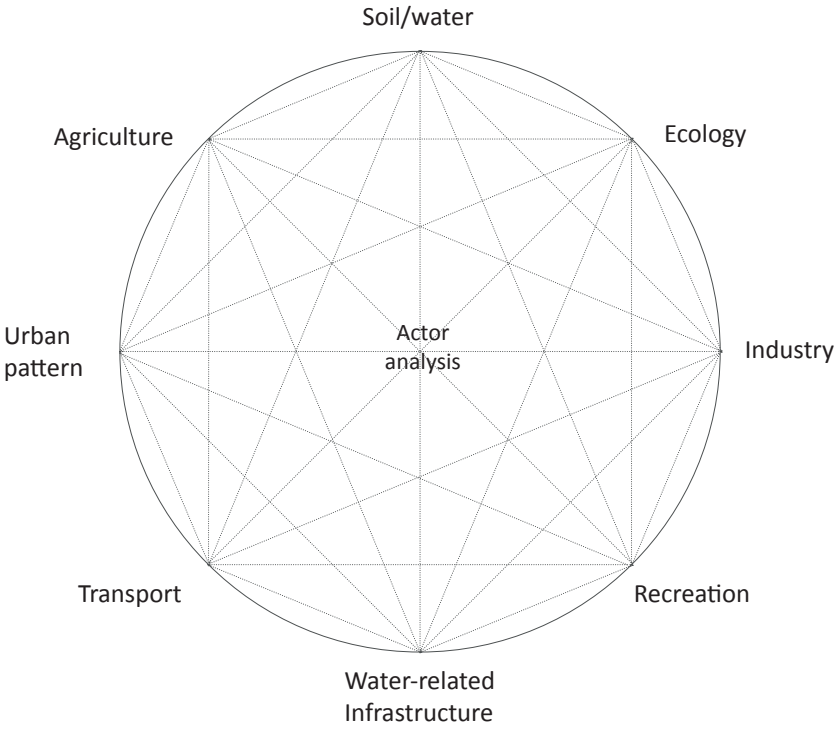


Figure 1-4.
Theoretical framework part 3: implementation,
Modified diagram of “Overview of actor analysis for the Southwest Delta”
Meyer, H. et al (2015)
New perspectives on urbanizing deltas:
a complex adaptive systems approach to planning and design, p122

List of possible stakeholders
for the proposal (up to the city scale)

Inhabitants (local communities)

Residents of Alviso
Alviso community

Land owners

Land owners of Alviso
Land owners of salt pond
Future land owners of new islands.

Developers

Google
Facebook
Cisco
Ebay
Silicon Valley Community Foundation
Silicon Valley Joint Venture
Sustainable Silicon Valley

Water board

City of San Jose
San José-Santa Clara Regional Wastewater Facility.
California state water resources control board

Municipality

City of San Jose

Federal/National governments

City/County Association of Governments of Santa Clara County (C/CAG)
County of Santa Clara Office of Emergency Services
County of Santa Clara Office of Sustainability
County of Santa Clara Office of the County Counsel
County of Santa Clara Parks Department
County of Santa Clara Public Works Department
County of San Clara Resource Conservation District
County Santa Clara Office of Sustainability

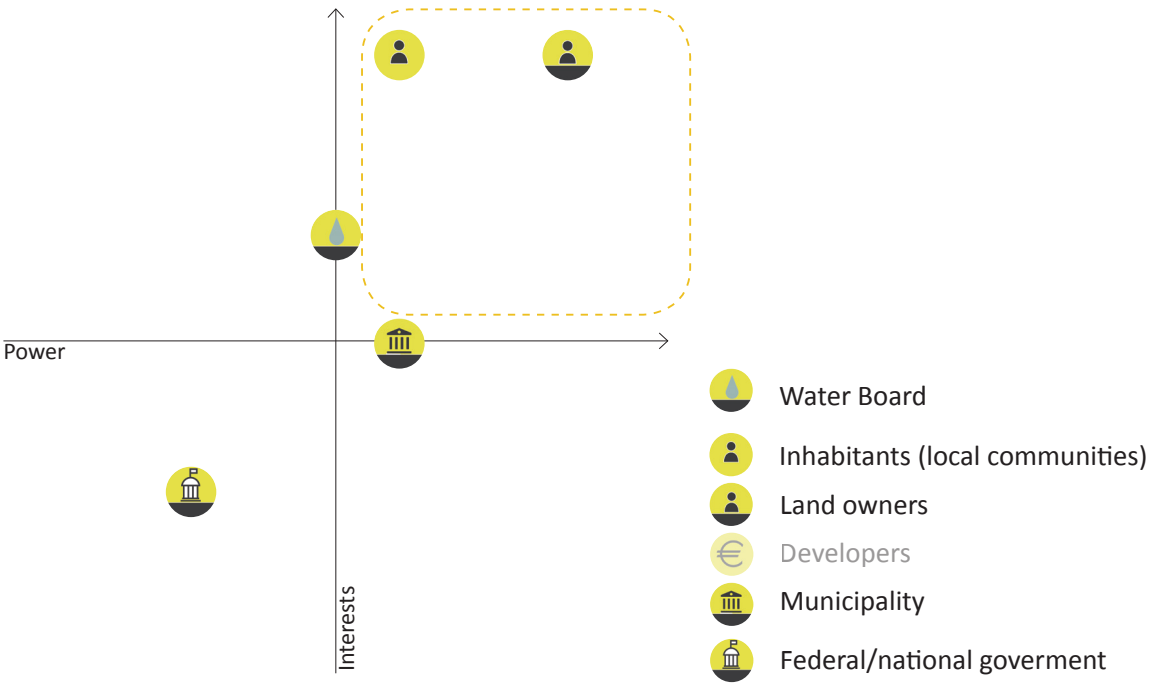
San Clara County Department of Public Works
Santa Clara County Economic Development Association
Santa Clara County Harbor District
Santa Clara County Transit
Santa Clara County Transportation Authority
Santa Clara County Union Community Alliance

San Francisco Bay Conservation and Development Commission (BCDC)
South Bay Salt Pond Restoration Project
San Francisco Estuary Institute (SFEI)
San Francisco Bay Area Planning and Urban Research Association (SPUR)
Bay area clean water agencies
Silicon Valley Clean Water (SVCW)
Association of Bay Area Governments (ABAG)
Bay Area Rapid Transit (BART)
Bay Area Regional Collaborative (BARC)
Bay Localize
Bay Planning Coalition
Bayshore Sanitary District

California Coastal Commission
California Department of Fish and Wildlife
California Department of Transportation
California State Coastal Conservancy
California State Lands Commission

Environmental Risk & Financial Solutions (ER&FS)
Federal Emergency Management Agency (FEMA)
Greater Farallones National Marine Sanctuary (GFNMS)
National Oceanic and Atmospheric Administration (NOAA)
Metropolitan Transportation Commission (MTC)
United States Army Corps of Engineers (USACE)
United States Fish & Wildlife Service (FWS)
United States Geological Survey (USGS)

Figure 9-1.
Exsiting condition of Neighborhood (Alviso)



In spite of the endless stakeholder list of governments, private sectors are often more influencial on urban development than public sectors in the US because the owner's right over their own property is usually prior than any other purpose in most cases. For this reason, when something needs to be done for regional scale, the stakeholders on a project can be countless as the list of stakeholders shows. The interests of those private sector are always related to how much economic benefit they can gain from the project.

The diagram of this page is the simplfied version of current situation in Alviso. Since the area is vunernable to sea level rising. The individual inhabitants and the community's biggest interest is the safety of the town. As the neighborhood already have experienced severe flood many times, they are aware of the problem, and they want to improve the water-related infrastructure in the area.

The major problem is that is the concern of only the residents and land owners. The municipality is also aware of the issue but there has not been enough money for this area as this neighborhood consists of mostly low-income households.

Based on this circumstance, the situation of new development heading towards this town is actually a good oppurtunity for solving the flood problem. It is a matter of how to guide new development in a way of protecting both the characterisitcs and the territory of Alviso. That means it needs a new way of development, and plans to promote new development in this area in the scenario of sea level rising.

For this reason, the proposal of this papaer has not only providing a plan for protecting the area from flood, but it also has multiple scales of interest to create the collective interest on the area. It makes the flood issue is not just a problem of the neighborhood. It becomes the interests of everybody who potentially involve in the plan.

Dynamics between possible stakeholders
in the proposal

Figure 9-2.
Dynamics between stakeholders in different scale

In the regional scale, the proposal suggests a way of re-structuring the urban area with blue-green infrastructure. As it shows a new direction of urban management for the future, it can draw attention of policy makers in the level of federal, national goverment as well as the municipalities and the water board in this region.

In the city scale, the vision of new urban core can be a possible future plan for the city of San Jose as they face the migration of Silicon valley.

When it comes to the area scale, it is about creating entirely new area for development. Therefore, the stakeholder who might show high interest is developer. In their case, they also have powerful influence on the process of development. The Influence of developer will reach smaller scales. it will across the district, the neighborhood and the block scale. In those cases, landowners will be as influencial as developers.

Afterall, the key of making the plan successful is upon the decision of developers and landowners in the block scale. When they actually make a decision to develop a plot with open space, which is minimum 50% of land, the propotion between built environment and open space integrated with blue-green infrastrucutre will be also balanced in the regional scale.

Based on the plan for regional and city scale, the area will be more than ever adequate for new development. For this reason, giving incentive in term of building height to developer and landowners will make them easier to decide about the propotion of built enviroment in the land because they can get benefit from the higher economic value of their property in the future.

In the process of development, the inhabitants do not have much power to control the big frame of development. However, their interest will be protected by layers of interests. Basically, the improtance of neighborhood cannot be neglected as it is a part of whole scheme.

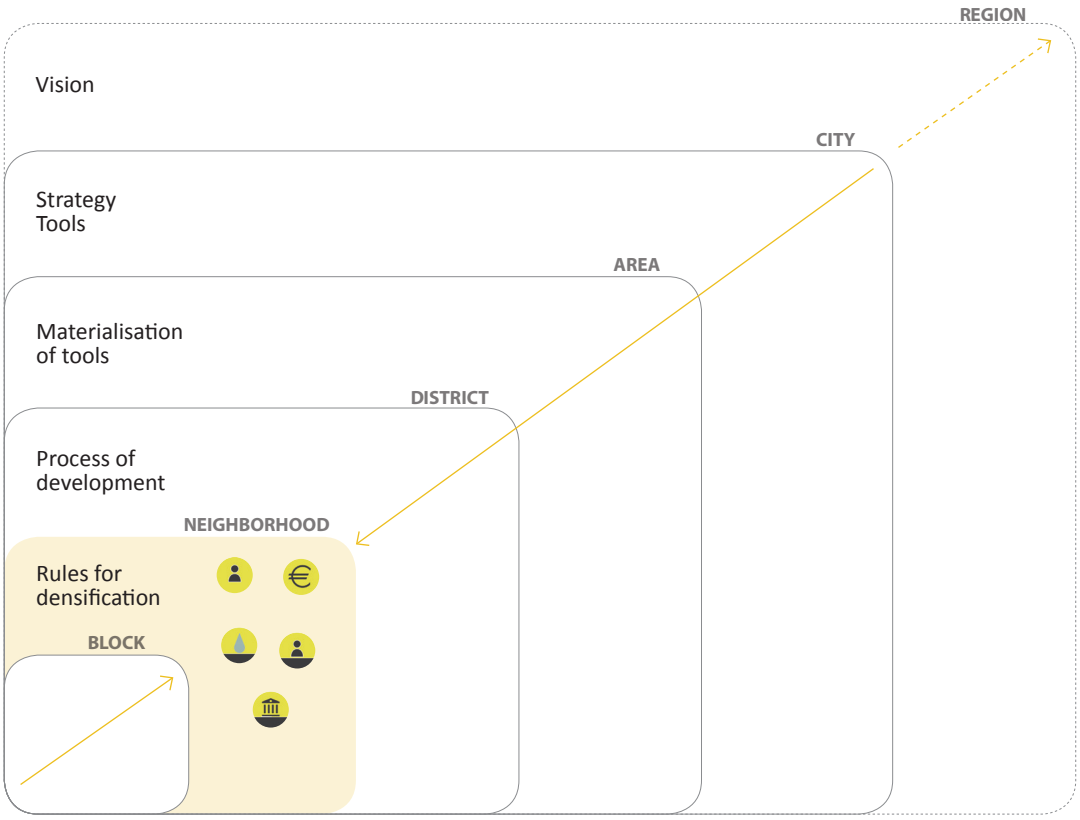
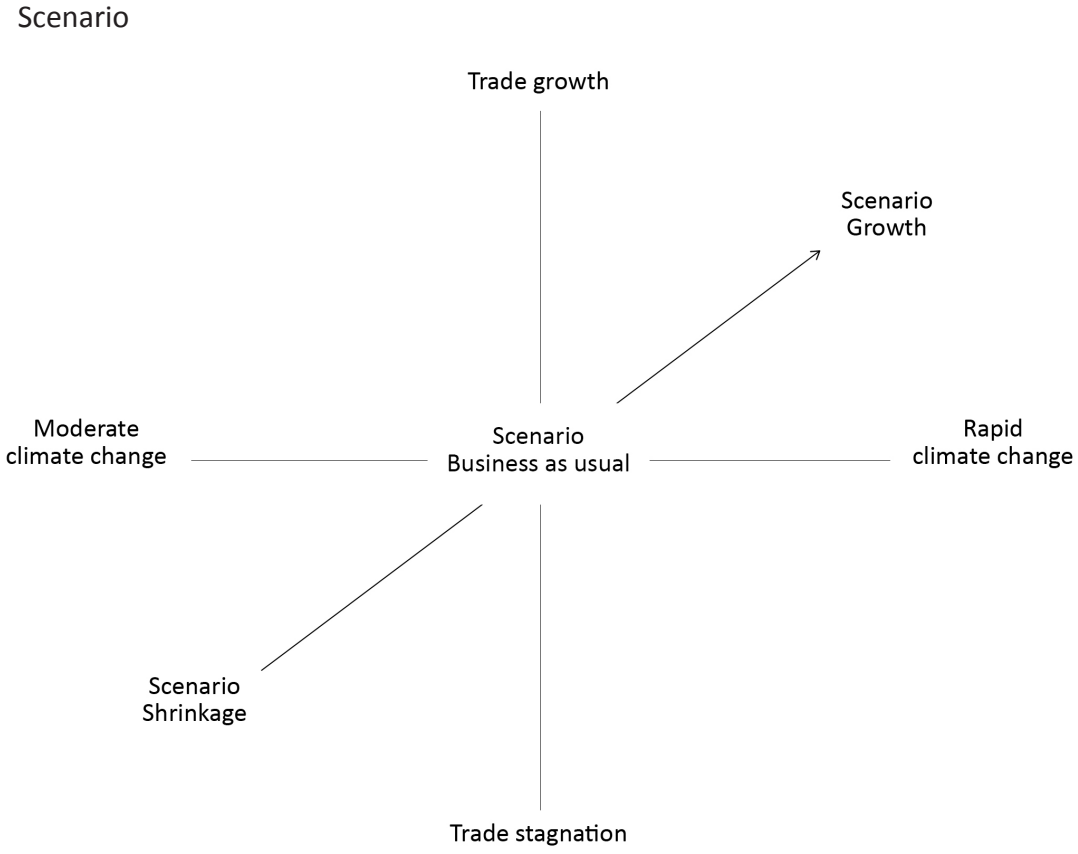


Figure 9-3. Interests in the neighborhood across the scales



To test the process of implementation, three diffrent scenario is applied for the plan. The area scale is chosen for the test as it is the scale where all potiential stakeholder will have high interest on the process of development.

This scales shows the changes of dynamics between the stakeholders and the results in the plan clearer than other scales.

Figure 9-4.
Graph of three scenarios

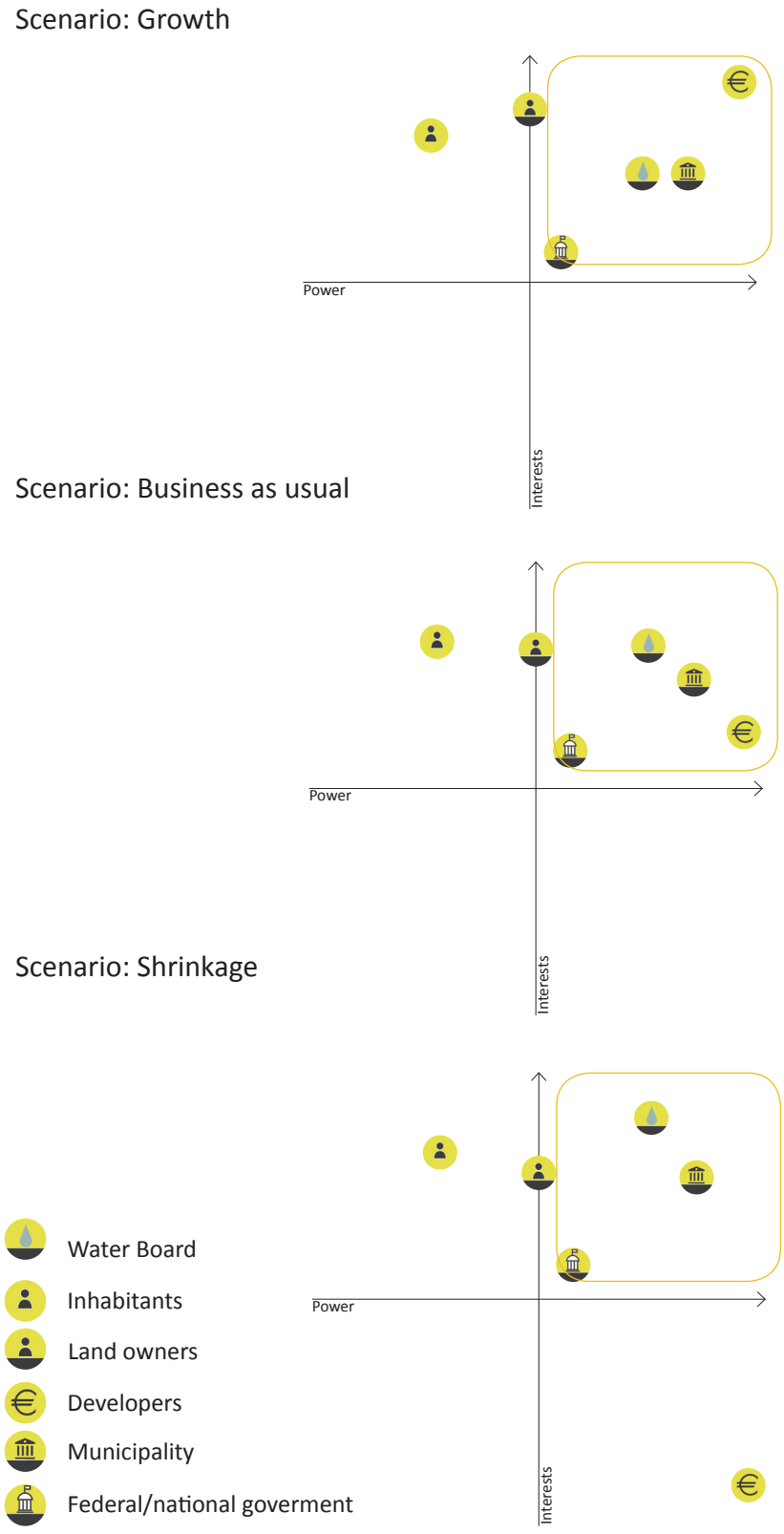
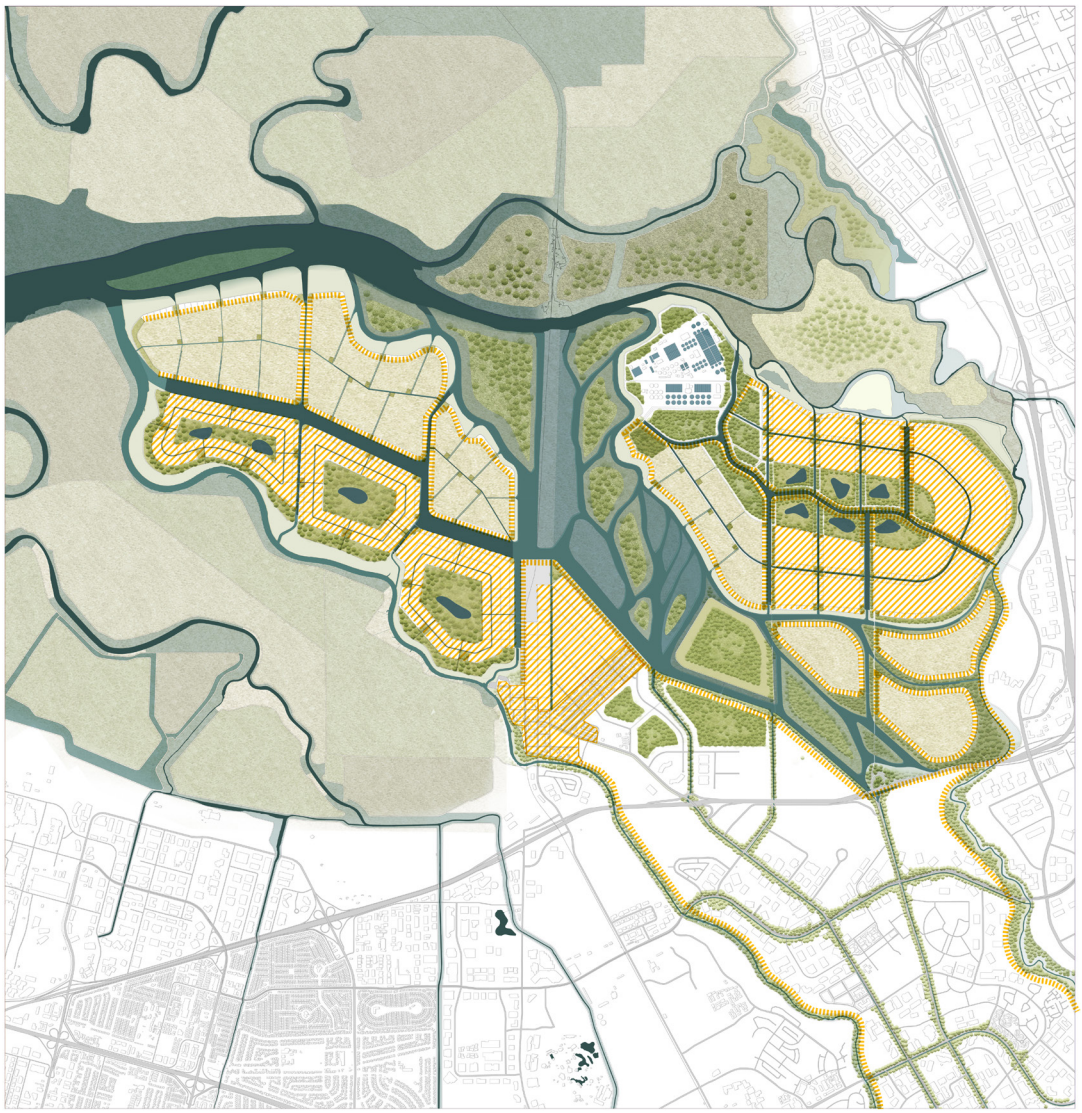


Figure 9-5.
Stakeholders of the area scale in three scenarios

Scenario: Growth



Trend

In this case, the growth of the silicon valley will accelarate the trend of “push out”, which is the final stage of a big edge city’s life cycle. It requires more available land, and a new way of managing density for the scarcity of the land.

At the same time, rapid climate change will threat both the exisitng urban area and the new development area.

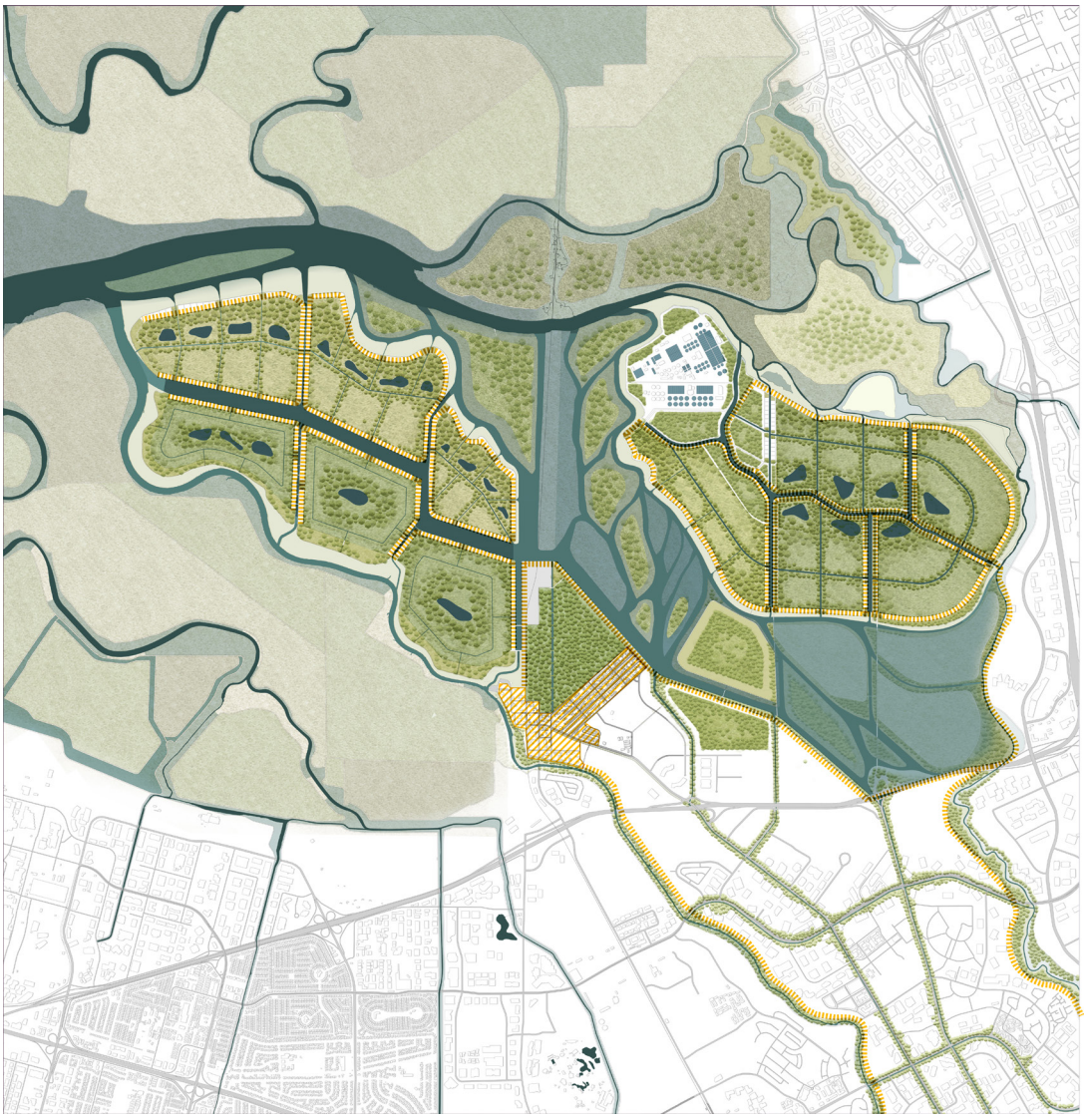
Implication

The entire area will be fully developed.
In this case, it is not just about providing more housing for the silicon valley, It is an option to have a new type of centrality because there are multiple centers designed for the area.

Basically, it is the proposal based on “decentralized Reconcentration”

Figure 9-6.
Possible plan for the “growth” scenario

Scenario: Business as usual



Trend

In the scenario of business as usual, the area will continuously need more housing, which is the current agenda of the silicon valley. There will be also the threat that the silicon valley, which is influencing the economy of the city.

At the same time there will be also the threat of sea level rising and flood.

Implication

The area does not need to be fully developed. It only needs to provide more space for various types of housing. At the same time, the land should be safe from flood. For this reason, the edges of the islands will be developed for housing on the blue/green infrastructure.

However, having mixed use area on the edge is still important to re-connect the different city centers, which will have an influence on preventing the loss of an entire city center by the migration of the silicon valley.

Figure 9-7.
Possible plan for the “business as usual” scenario

Scenario: Shrinkage

Trend

The shrinkage scenario is the situation that the economy of the silicon valley stopped booming. Possibly there is a shift in terms of the type of economy in the bay area as it happened several times through the history.

However, there will be still moderate threat of climate change accompanied with sea level rising.

Implication

In this case, the most important task for the area is building blue/green infrastructure by clustering new islands. Basically, the salt ponds will turn into a big ecological park, which will control sea level. At the same time, the cluster of the new islands will protect the urbanised are from storm surge. If there is new vacant area appeared in the exisiting urban area, byt the shrinkage, that can be a part of the blue and green network.

Figure 9-8.
Possible plan for the “shrinkage” scenario

The project started from an initial finding that urban structure of the bay area is highly responsive to the change of economy.

The phenomenon derive from the design principle applied for most cities in the US. They perceived city as a growth machine, and the planners and designers firmly believed that the economic development of city can continue when the spatial structure of city has a strong connection with transport system. For a long time it was not only crucial for frieght but it also influenced on the flow of information for business.

However, the advance of infomation technology broke the symbiotic relationship between city structure and transport system. For this reason, edge cities are facing a new urban transformation to keep up with the change of economy. Yet there is no new design method or new structuring element that can replace the highway oriented design.

Last decades, the idea of Landscape urbanism have been discussed in the field of planning and design. It seems to be a possible option for the new urban transformation. Nevertheless, it does not provide an actual design method. For this reason, this paper focus on developing a design method based on landscape urbanism for a complex case.

The case is not only facing the issue of urban transformation, but it also has flood problem derived from sea level rising. There is a neighborhood called Alviso, which is completely exposed to the threat but this is not merely the problem of the small town. It is influencing the economy of the region as it affects Silicon valley.

For this reason, the design method should be able to manage the new urban transformation of edge city with both flood protection and management of development pressure from silicon valley.

In the process of developing the design method, Spacematrix was used to materialize the concept of Landscape urbanism. It is from the point of view that the quantitative part is lacking in Landscape urbanism while they emphasize too much on the new idea for design. Basically, the landscape urbanism tends to neglect the part, which is essential for materialization.

However, that does not mean that landscape urbanism is only benefiting from Spacematix. On the contrary to landscape urbanism, spacematrix is only about the quantitative part. It does not have a certain point of view towards design process. For this reason, it is usually either used for analysis process or the moment when the final product of design has to be tested. Basically, it never been considered as a tool for design process. For this reason, the paper attempts to create synergy by the marriage between Landscape urbanism and spacematrix, leading to a new design method of landscape urbanism.

As a consequence, the vision for re-structuring the urban spatial structure was delivered from the idea of filling the density gap with the new development along blue-green infrastructure, which becomes the spine of new urban core of San Jose. The important part of this proposal is it is developed with multiple layers of development rule in different scales. The rule for block across neighborhood, district, area, city and it finally reaches the regional scale. Basically the vision derived from landscape urbanism is materialized by the development rule for block from spacematrix.

The vision of the region helps to visualize the prospection of urban transformation, which is the conclusion of 3x3x3 analysis. It shows what will be the next shape of city in the layers of occupation, nature and infrastructure. The most noticeable part is these three layers resemble each other. In other words, there is no clear separation between them as it was in the previous periods. The structure of nature becomes infrastructure and the occupation follows those structures.

Reflection

A way of connecting Landscape urbanism to the quantitative measure is found in this paper. However, it is still conceptual as it concetrates on planning urban spatial sturucture of entire city than actual design proposal in a small scale. Especially the concept of bridging the downtown of San Jose and the edge city by density control is more diagrammatic than actual regulations for development. For this reason, the method should be tested more thoroughly in a small scale design assignment. After this method is validated by the test, the policy making to control the layers of development rule can be more studied.

In Fact, this paper did not sufficiently include the influence of stakeholders in the process of development. Considering, the dynamics between stakeholders often decides the fate of the project in reality, the stakeholder analysis and scenarios should be more elraborate than this paper describes. This needs to be studied more in future.

Figure 9-9.
Influence of the rule for the block scale

Figure 9-10.
Occupation in agricultural period

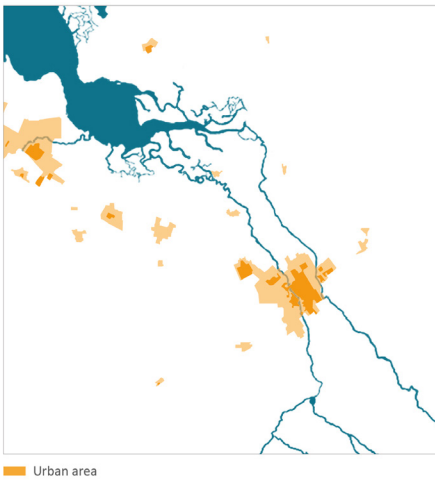


Figure 9-11.
Occupation in industrialization

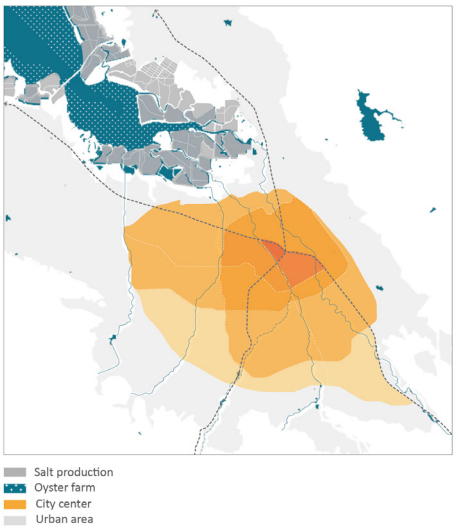


Figure 9-12
Occupation in Post-industrialization

Prospect occupation
in Post-post-industrialization

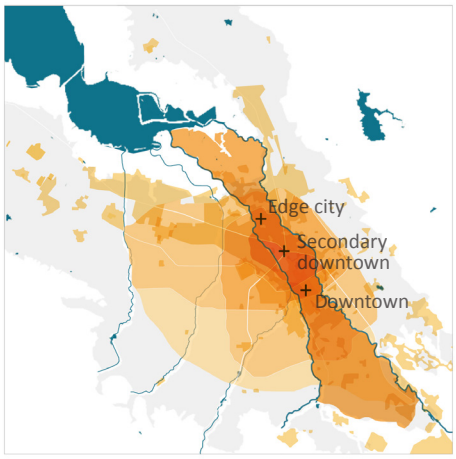


Figure 9-13

Infrastructure
in Post-post-industrialization

Figure 9-14

Nature
in Post-post-industrialization

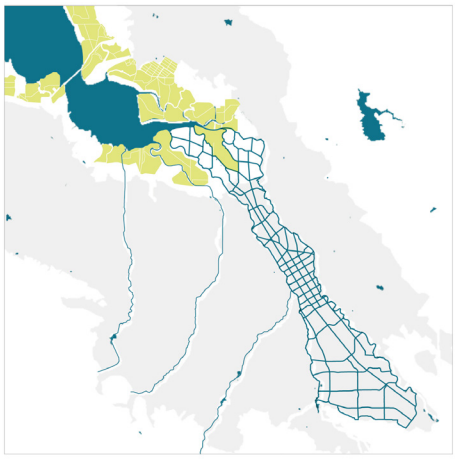


Figure 9-15

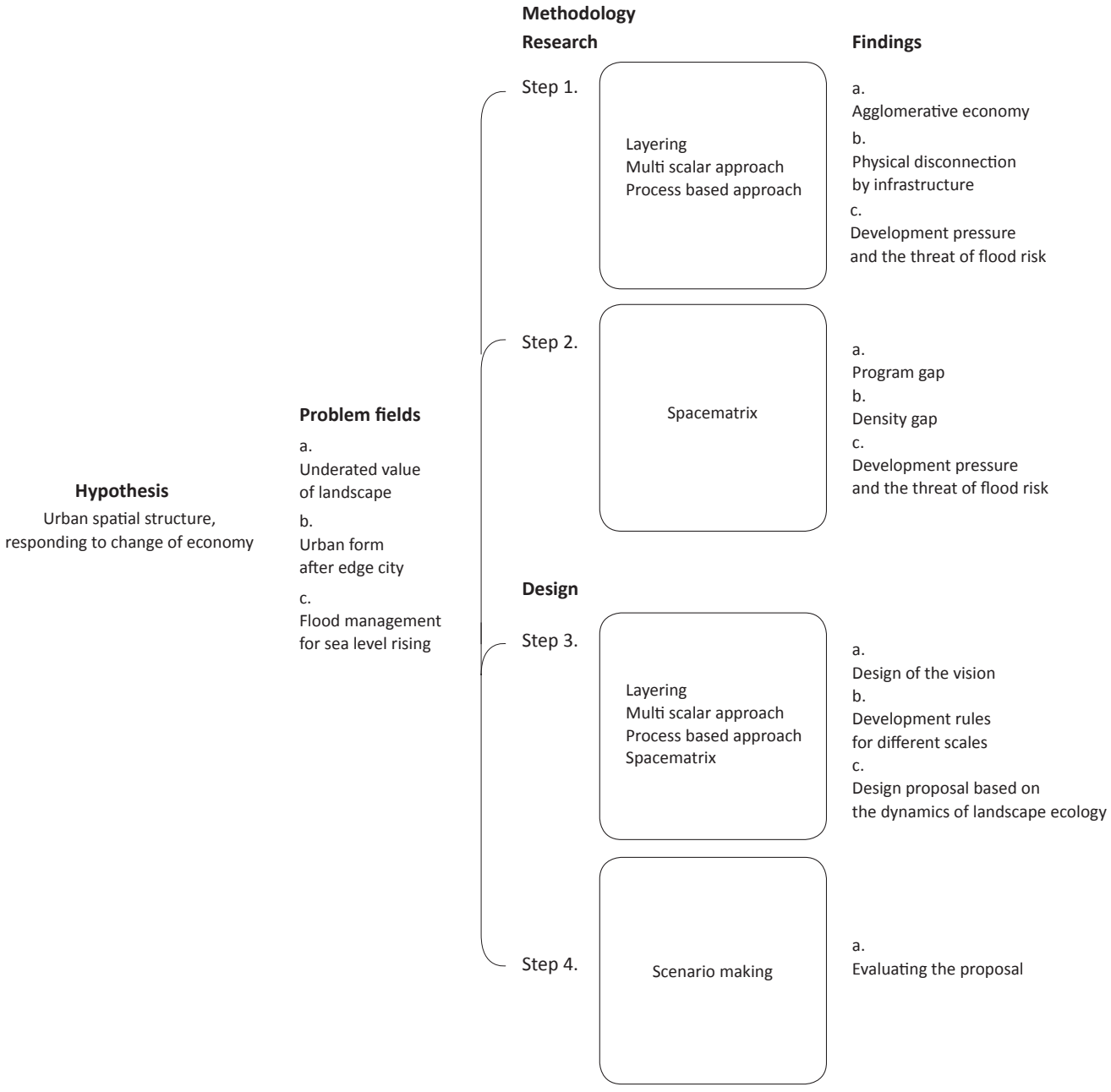


Figure 9-16. Evaluation

Time planning

Figure 9-17. Evaluation

References

Book

Burrill, R. and Rogers, L(2006) Alviso, San Jose. Arcadia Publishing, California

Bosselmann, P.(2008) Urban transformation: understanding City Design and Form, Island Press, Washington, DC

Castells, M. (1989) The Informational City. Cambridge, MA: Blackwell.

Garreau, J. (1991) Edge City: Life on the New Frontier. NY: Doubleday.

Lang, R. E. (2003) Edgeless Cities: Exploring the Elusive Metropolis. Washington, D.C.:
Brookings Institution Press.

McDonald, J. F., McMilan, D.P.(2011) Urban economics and real estate theory and policy. Wiley&sons.

Meyer, H., Bregt, A.,Dammers, E., and Edelenbos, J.(2015) New perspectives on urbanizing deltas:
a complex adaptive systems approach to planning and design, MUST Publishers, Amersfoort.

Pont, M. B., and Haupt, P. (2010)
Spacematrix. NAI Publishers, Rotterdam

Scott, A. J. (1988) Metropolis: From the division of labor to urban form, Berkeley:U. California press.

Scott, M. (1959) The San francisco bay area: a metropolis in perspective, University of California Press.

Warner S.B.(1978) Streetcar Suburbs: The Process of Growth in Boston, 1870 - 1900, Harvard University Press.

Journal Article

Anas, A., Arnott, R., and Small, K.A.(1998) Urban Spatial Structure. Journal of Economic
Literature 36: 1426-64.

Anderson, N. B., and Bogart, W. T. (2001) The structure of sprawl: Identifying and characterizing employment centers in polycentric metropolitan areas. American Journal of Economics
and Sociology 60, no. 1: 147-69.

Clark, T. N., Lloyd, R., Wong, K. K.., and Jain, P. (2002). Amenities drive urban growth. Journal of urban affairs, 24(5), 493-515.

Corner, J. (2010). Landscape Urbanism in the Field. Topos, no. 71, pp. 25-29.

Fales, R. L. and Moses, L. N (1972) Land-use theory and the spatial structure of the nineteenth-century city. Papers in Regional Science, vol28:1, pp 49-82.

Field, A.J.(1992) The Magnetic telegraph, price and quantity data and the new management of capital. Journal of Economic History, 52:2, pp401-13

Florida,R.(2002). the rise of the creative class: and how it is transforming work, leisure, community, and everyday life. New York: Basic books.

Forstall, R. L., and Greene, R. P. (1997) Defining job concentrations: The Los Angeles case. Urban Geography 18, no. 8: 705-39.

Freestone, R., and Murphy, P. (1998) Metropolitan restructuring and suburban employment centers: Cross-cultural perspectives on the Australian experience. Journal of American Planning Association 64, no. 3: 286-97.

Gordon, P., and Richardson, H. W. (1996) Beyond polycentricity: the dispersed metropolis, Los Angeles, 1970-1990, Journal of American Planning Association 62, no. 3.

Hartshorn, T.A., and Muller, P.O. (1989) Suburban Downtowns and the Transformation of Metropolitan Atlanta's Business Landscape. Urban Geography 10(4):375-395.

Logan, J. R., Moloth, H. L.(2007). Urban fortunes: the political economy of place. Berkeley, CA:University of California press.

Moses, L and Williamson, H. F. Jr. (1967) "the location of economic activity in cities," Amer. Econ. Rev., 57:2, pp. 211-22.

Muller, P. O. (1997) The suburban transformation of the globalizing American city. Annals of the American Academy of Political and Social Science 551: 44-58.

Sassen, S.(2001). The global city: New York, London, Tokyo. Princeton, NJ:Princeton university press.

Scott, A. J. (1990) The technopoles of Southern California. Environment and Planning A 22: 1575-605.

Smith, J.W., and Floyd, M.F. (2013) The urban growth machine, central place theory and access to open space, City, Culture and Society

Weller, R. (2007). Global theory, Local Practice-Landscape Urbanism and some Recent Design Projects at UWA. Kerb, vol. 15, pp.66-71

Waldheim, C. (2010). On landscape, Ecology and other Modifiers to Urbanism. Topos, no. 71, pp. 20-24.

Unpublished Materials

Kos, R.M and ACIP (2008) Alviso, California community assessment & urban design analysis, Urban & regional planning department of San Jose state University.

Lee, B.S.(2006) 'edge' or 'edgeless cities'?: Urban spatical structure in US metropolitan areas 1980 to 2000, School of Policy, Planning, and Development, University of Southern California.

National Oceanic and Atmospheric Administration (2012) Global Sea Level Rise Scenarios for the United States National Climate Assessment. NOAA Technical Report OAR CPO-1.

Mosier. P.(2001) A Brief History of Population Growth in the Greater San Francisco Bay Region. Geology and Natural History of the San Francisco Bay Area: A Field-trip Guidebook.

Thesis

Assargård, H. (2011) Landscape urbanism from a methodological perspective and a conceptual framework. Master's thesis, Landscape Planning Department of Urban and Rural Development Swedish University of Agricultural Sciences.

Loring, D.C.(1966) The History of Alviso, California, master's thesis, Stanford University.

Skansi, V. (2016) Landscape imagination: Ecology and Industry: Designing a transition for the Port of Rotterdam into a productive landscape Park, master's thesis, TU Delft.

Website

Booker, M.(2012) Visualizing San Francisco Bay's Forgotten Past
www.antspiderbee.net

Flood Control :Guadalupe River Park Conservancy
www.grpg.org/flood-control

Eco atlas
www.ecoatlas.org

www.spacemate.nl

How creeks meet the bay:
Current Sediment Dynamics
storymaps.sfei.org/flood-control-sediment

Surging seas: risk zone map
ss2.climatecentral.org

Future Tidal Marshes
Interactive Map, Point blue conservation science