

An abstract painting of a landscape. The top left corner is a vibrant green. The rest of the image is dominated by warm, earthy tones of beige, tan, and light brown, with intricate, vein-like patterns that suggest a topographical map or a network of waterways. In the upper right, there is a distinct grid pattern in shades of blue and brown, representing an urban layout. A prominent, winding river or path in a golden-brown hue flows from the bottom left towards the center right. The overall texture is rich and layered, with visible brushstrokes and a sense of depth.

FROM

BOUNDARY

TO

BORDER

Toward a
Resilient, Dynamic and Interactive Urban Edge
of Northwest Miami

Cai Huang
Mentors: Steffen Nijhuis & Marco Lub
Graduation Project, TU Delft
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ABSTRACT

On the northwest urban edge of Miami Dade County, the mining industry of the largest scale in Florida has existed for over 60 years. However, it is estimated to stop by 2050 as the reserves decline. As a consequence of limestone mining, more than 10,000 hectares of abandoned lakes will be left on the landscape. This project proposes land and water strategies to guide the future development of this post-mining lake area. It starts from the analysis on the existing hydrological, ecological, urban and mining conditions and define the existing situation as “boundary” that tends to establish static binary opposition between the urban and nature systems. Based on the site context, it proposes and explores “border” as a new urban edge condition that presents a dynamic interactive process in time. This process not only provides the possibility of regenerating potential of the post-mining area, but also increases resilience of the water system. What’s more, it creates conditions for the nature and urban systems to interact with each other and develop into an integrated whole.



Background image: site aerial view and site mapping

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This chapter introduces the motivation and research questions and clarifies some key notions.

The project initiates from a strong personal interest in the post-mining landscape. Curiosity into the landscape is the key to push the research forward. The problem is stated in the beginning to show a research direction. And the research objective is the goal to follow and also to help check the research progress. The methodology helps to organize a clearly defined framework to achieve the goal through answering questions. At last, through the illumination of relevance and scope, the whole project is reviewed.

CHAPTER I

INTRODUCTION

- from boundary to border

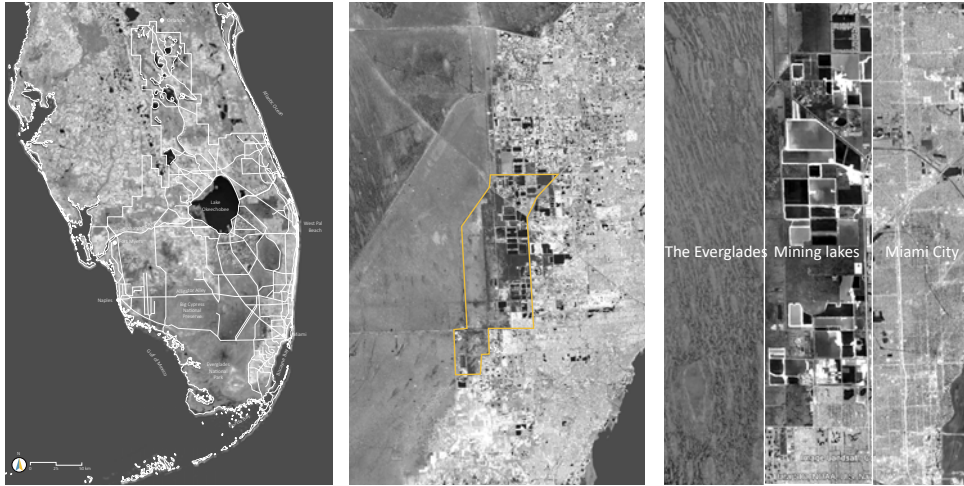
1. FASCINATION
2. PROBLEM STATEMENT
3. RESEARCH OBJECTIVE
4. METHODOLOGY
5. RELEVANCE AND SCOPE

1. FASCINATION

In the last decades, the urban fabric of Miami has rapidly expanded westward. One mile by one-mile grids filled with houses rapidly encroached on the land of the Everglades. On the northwest urban edge, exists a distinct landscape pattern that follows the urban grids planning system but is infilled with macro lakes. This area is called "the Lake Belt Area (LBA)". It contains 20,072 hectares of environmentally sensitive land, half of which is owned by the mining industry (South Florida Water Management District [SFWMD],2019).

The fascination on this project initiates from the magical pattern and impressive scales of the lake landscape in this area. It invokes my strong curiosity toward the processes involved in shaping the land. And the spectacular size of these lakes presents a sense of sublimity. A comparison of mining lakes, Miami urban area, and New York Central Park shows the scales.

pattern



Lake Belt Area
total: 20, 072 hectares

scale

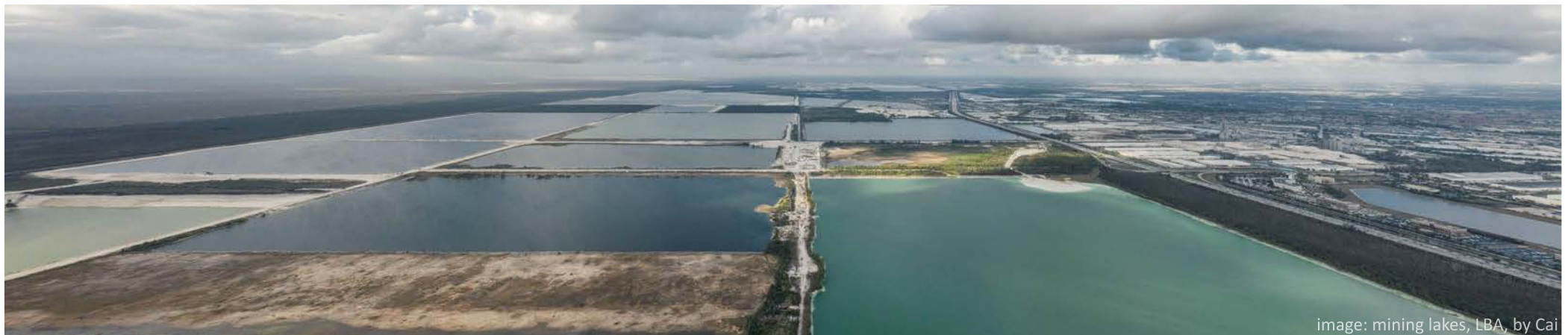
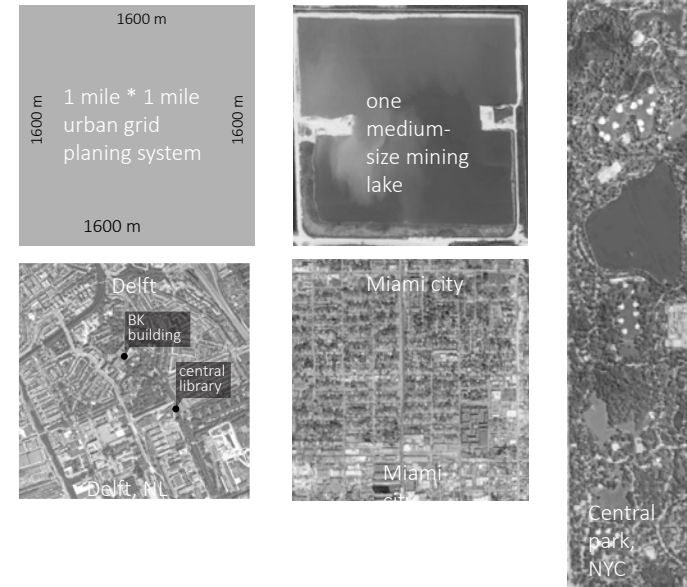
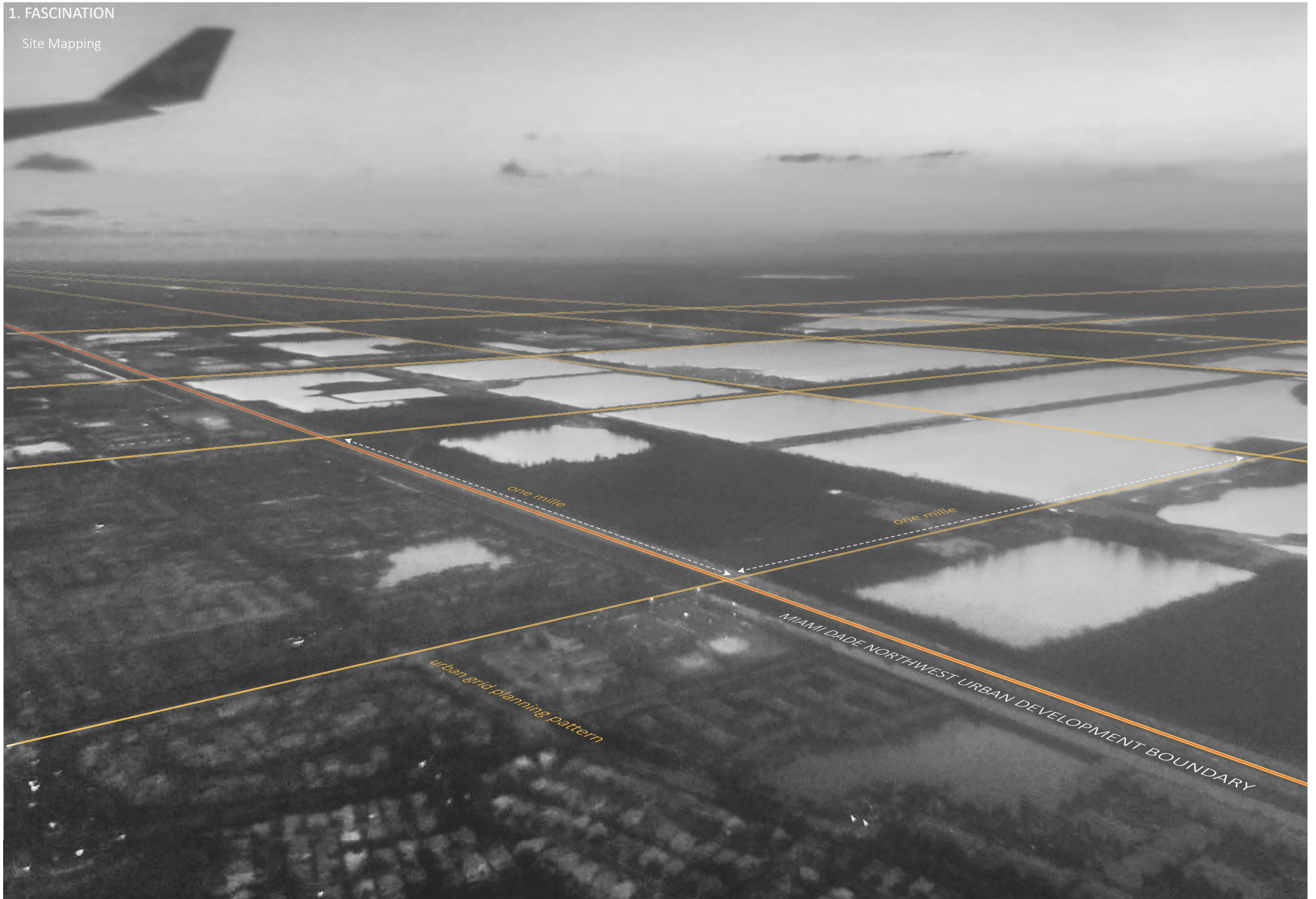


image: mining lakes, LBA, by Cai

1. FASCINATION

Site Mapping



2. PROBLEM STATEMENT

The mining industry has been shaping the landscape of the Lake Belt Area since the 1960s. It has provided a large amount of fundamental raw material for the construction of the city. However, what hides behind the expanding lakes is the limestone resource depletion after over sixty years of extraction. The mining industry will have to be stopped within thirty years. By then, over 10,000 hectares of abandoned lakes as deep as 24 meters will be left behind.

After the land productivity is almost exhausted by mining, new values will need to be injected into the landscape. Due to its location in between the sensitive Everglades ecosystem and the developing urban area. The future move away of mining also means more space for the urban process and the natural process. A new edge between the two systems is needed but it should not be a clear "boundary" anymore. Because the boundary establishes binary opposition and is not able to cope with future certainties.

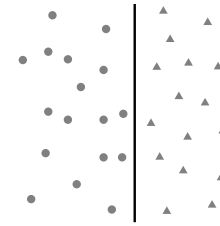
The existing urban boundary has isolated urban Miami and created tension and conflicts. As sea level rises, the problems will get more serious. It is time to change the situation. A new edge condition should be proposed. The decline of the mining industry in the Lake Belt is a good opportunity to transform the existing boundary to a new "border".

Boundary is distinguished from border here. Sennett (2008) first distinguishes the two edge conditions in "Public Realm" to illustrate open systems and closed systems. He explains:

...it is at the borderline where the work of natural selection is the most intense; time is productive of evolutionary change in this edge condition. The boundary establishes closure through inactivity, by things petering out, not happening; to say that the edge-as-border is a more open condition means it is more full of events in time.....(Sennett, 2008)

The statement of boundary and border also applies to the mining site and the context is extended from the perspective of landscape. The design assignment is to transform the relationship between nature and urbanism from boundary to border. What defines a border is that border allows for a dynamic interactive process, while boundary, in contrast, contributes to a static binary opposition. The definition describes a status over time. The northwest urban boundary of Miami clearly defines what belongs to urbanism and what is owned by nature in an oversimplified and crude way. But it says nothing about what can be shared by both.

BOUNDARY

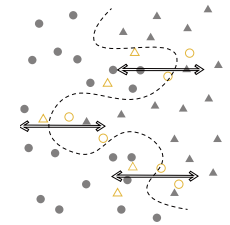


closed system;
over-determined form,
under strict control;
usually hard and static,
establishing tension and isolation.

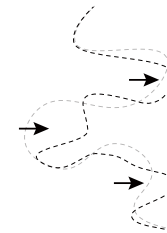


rely on control;
cannot modulate in response to
changing conditions.

BORDER



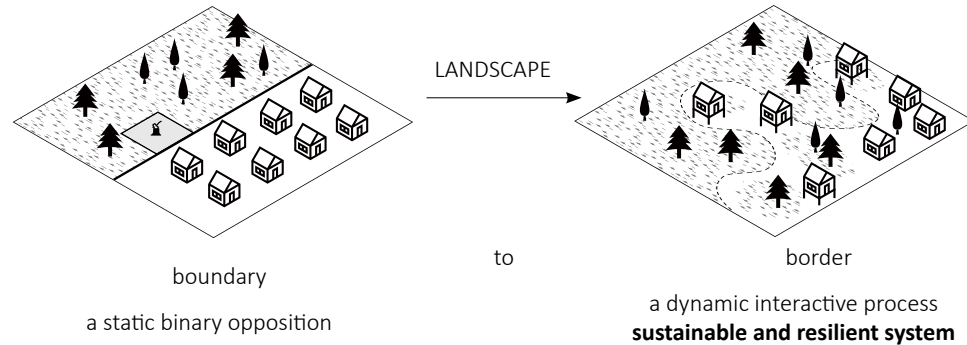
open system;
adaptive form,
with more freedom;
usually soft and permeable,
establishing selection and interaction.



manipulative;
can adjust to the changes.

3. RESEARCH OBJECTIVE

So, the research objective of this project is to explore the potentials of border as a dynamic interactive process through a landscape approach that employs urban and natural processes to create a more sustainable and resilient landscape on post-mining sites.



3.1 potentials of border

Border emphasizes the significance of dynamic changes in the process of time, which enables a good connection and interaction with the surrounding environment. This makes it responsive and evolving. The potential of border derives from its dynamics in this capacity to absorb and transform changes. Thus it contributes to a more sustainable and resilient system and comes with it, the ecological, social, economic and cultural benefits.

3.2 a landscape approach

The understanding of landscape is fundamental to this project. As the research area is located at the urban edge where presents a complex condition showing all kinds of artificial and natural traces. A viable approach is needed to help manipulators read and understand site and build an abstract model which is operative to explore the site potentials. Landscape is such an operative method (Mostafavi, 2004) that can integrate natural process and urban development into the unfolding of an artificial ecology (Najle, 2004). The potential of landscape is addressed in its multidisciplinary and catalytic performances. As an adhesive, landscape develops methods for effectively synthesizing constraints from different disciplines and domains of production into an operative framework (Mostafavi, 2004). As a catalyst, landscape invokes the functioning matrix of connective tissues that organized not only objects and spaces but also the dynamic processes and event that move through them (Wall, 1999).

Based on the understanding of landscape as adhesive and catalyst, approaches of landscape are utilized to explore the border potentials. And the meaning of landscape will be discussed more deeply in the theoretical background.

3.3 research questions

To achieve the research objective, there are mainly four questions to be answered:

How to **read** the boundary (a static binary opposition)?- chapter two

- Why it is a boundary?
- How did the boundary come into being and how does it interrelate with the processes?
- What is the problem with boundary?

How to **transform** boundary to border?- chapter three

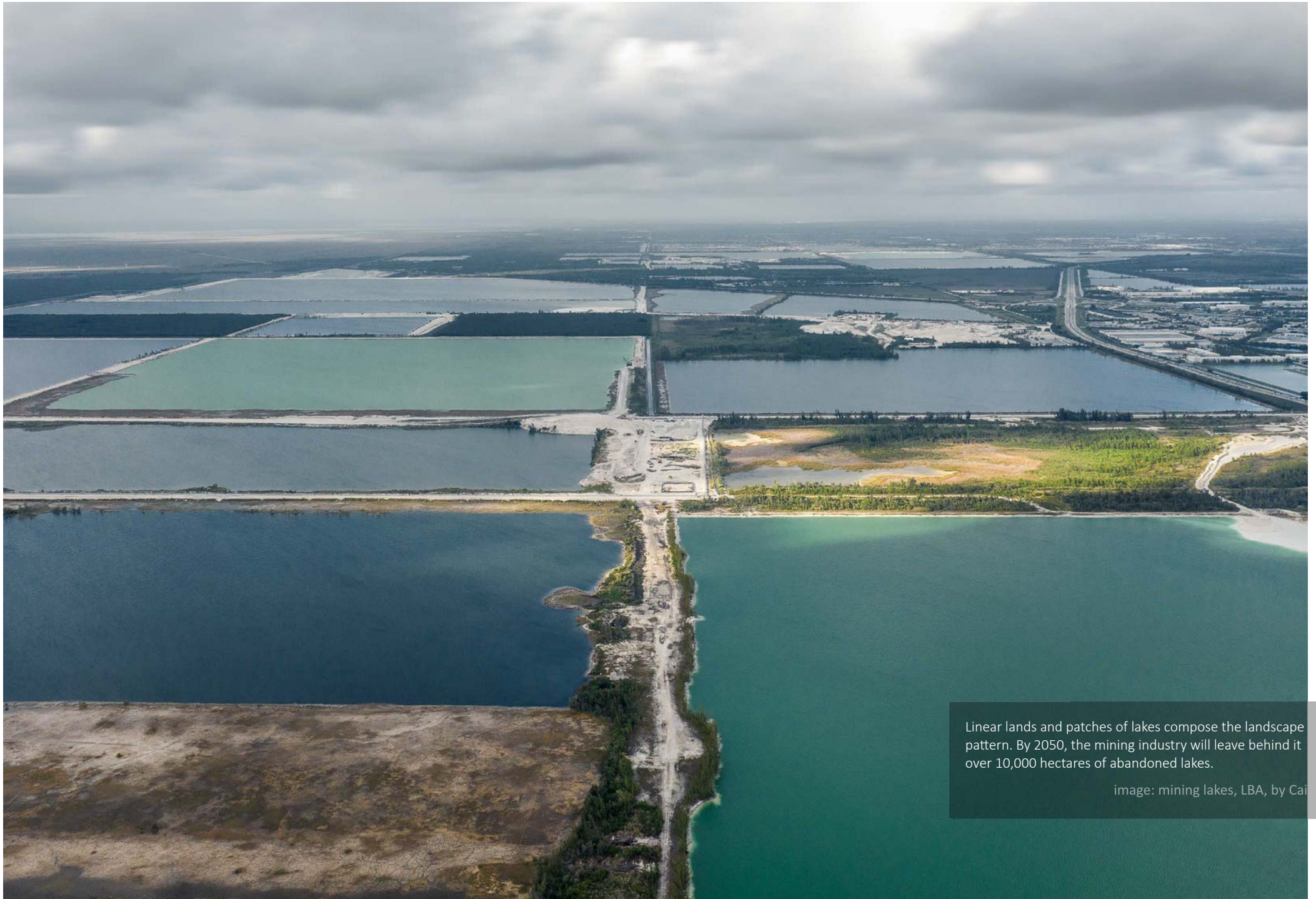
- What principles and strategies could be utilized to create border through landscape approaches?

what are the **potentials** of border (a dynamic interactive process)?- chapter four

- Could border benefit both nature and urban systems in facilitating ecological and urban development?
- Could border contribute to a more resilient system in absorbing changes?

Conclusion and Reflection - chapter five

- What are the conclusions?
- What can be learned from it?



Linear lands and patches of lakes compose the landscape pattern. By 2050, the mining industry will leave behind it over 10,000 hectares of abandoned lakes.

image: mining lakes, LBA, by Cai

4. METHODOLOGY

4.1 design research & research-by-design

Design research and research-by-design are applied to answer the research questions. Design research is design-oriented research which is performed to serve design. This implies that it is not only directed towards gaining knowledge but also focuses on the application of this knowledge and the capacity to understand and design spatial compositions and relationships across scales (Nijhuis & Bobbink, 2012). It is considered to be an indispensable step to research-by-design. Research-by-design implies that this type of design is considered to be a way of research that produces knowledge (creative designs) in a certain field. Research-by-design is a product of design research. They together constitute a heuristic approach for knowledge-based and creative design (Nijhuis & Bobbink, 2012).

The structure of this report follows design research and research-by-design which will be respectively illustrated in chapter two "analysis" and chapter four "design". Chapter three presents the principles and strategies that are a transitional part from a theoretical study to practical design. Although presented in separate chapters, they are interrelated and inseparable during working and thinking. There is no precedence between them. They move forward simultaneously.

4.2 landscape urbanism as a theoretical background

The understanding of landscape is essential to the process of the project and it is explored on the theory of 'landscape urbanism'.

For centuries, landscape is understood as a picturesque and pastoral image which is frequently used in painting and scenery describing. American Landscape theorist, J. B. Jackson (1984) first criticized this landscape definition and proposes that landscape is a composition of man-made spaces on the land.

Landscapes have a synthetic character. They are artificial systems superimposed on the land and do not function according to nature's rules. They are deliberately created to speed up or slow down nature's processes. (Jackson, 1984)

From then on, the meaning of landscape is no longer an image, but is involved with temporal process. Landscape is changing over time. After Jackson, many other scholars expanded and supplemented the meaning of landscape to be a changing medium (Waldheim, 2006), an operative field (Allen, 1997), a horizontal continuous urban surface (Wall, 1999)... These changes of landscape cognition: from a static image to a dynamic system; from object to field; from natural environment to cultural environment; from expression technique to operational mode emphasize the indeterminacy, process, and relationship in its implication (Zhai, 2018)

Landscape urbanism is a theory built upon the extended meaning of landscape. So far it has no clear definition but it is significant and helpful for it provides a perspective to describe, understand and construct the contemporary complex cities through landscape lenses. It implies more than a theoretical framework, but also a toolkit containing many practical techniques that will be touched in chapter three.

STRUCTURE

How to **read** the boundary (a static binary opposition)?

- analysis
- hydrology | ecology | urbanism | mining

How to **transform** boundary to border?

- Principles&strategies
- landscape as process | landscape as palimpsest | landscape as infrastructure
- site deconstruction and extraction | water strategy | land strategy

what are the **potentials** of border (a dynamic interactive process)?

- design
- conditions creating | ecological succession | sustainable urban development | water contribution

Reflection

METHODOLOGY

mapping (mainly as a process of finding)
literature study
field study

design research

case study

research-by-design

mapping (mainly as a process of founding)

4.3 mapping

Mapping which is distinguished from the act of map-making is a mental interpretation of the world and produces a large range of maps and map-like objects (Dorling & Fairbairn, 1997). Its meaning far exceeds the map artifact itself. Its potential lies in the mappers' operations and thinking process. It can be regarded as a means of communication that can occur between a cartographer and map reader or between a cartographer and maps. In the former situation, mapping functions as an expression technique. The mapper needs to decide the content and translate it to ensure the accurate information delivered. When it is concerned with communication between the mapper and maps, mapping refers to a performative process. Usually, the map *is first* employed as a means of "finding" and then as "founding" new projects, effectively re-working what already exists. Thus, the processes of mapping, together with their varied informational and semantic scope, are valued for both their revelatory and productive potential (Corner, 1999).

Mapping as a process of finding is based on the gathering and manipulation of existing data. Through a series of manipulative operations including selecting, deleting, adding, indexing and so on, specific hidden relations are revealed. These existing relatively objective and rational relationships can provide a logical basis for further design to make it more persuasive and feasible (Corner J, 1999).

Mapping as a process of founding produces new relations, or to say design. It is used *to create, develop and test spatial possibilities* (Nijhuis, 2016).

There are some certain mapping methods that are utilized in this project: layering and photography.

Layering is used to understand this mining land that has not been urbanized but belong to no wilderness, of which the landscape is deeply intervened by human behavior, and all kinds of artificial and natural traces are intertwined, presenting an overall chaotic surface. After initial analysis, four specific layers are extracted as the main driving forces on the landscape: hydrology, ecology, urbanism, and mining. Each of them corresponds to a set of processes that follows certain logic and rules and then interrelates with each other, together acting on the shaping of the surficial landscape. Only after they are extracted separately from the overall field can the inherent logic become more legible and readable. By superimposing and comparing, the relationships between layers are uncovered. These logics, rules, and interrelations are of great significance to further design. Layering is also used to generate designs. Three layers: ecological succession, urban penetration, and water contribution are created, each of which follows its own logic process, is changing over time under manipulation. The potential of border lies in the benefits of overlaying these layers. Instead of excluding each other, they co-exist, promote and bring new things together.

Photography is another important act of mapping in this project. It reveals information in vertical space. Compared to layering, photography shows the overview condition affected by all the driving forces, directly mapping the resulted temporal landscape in the specific context. It is more than a tool of recording that is otherwise no different from "tracing (Corner, 1999)". For each picture taken, the photographer needs to experience a series of creative and subjective actions such as framing, scaling, orientation, etc. These actions force the manipulator to start rethinking the current scene and try thorough more different perspectives and techniques. This process of observing and manipulating can reveal latent information and details. At the same time, it is an expressive technique to deliver ideas, atmospheres, and emotions. It ultimately establishes a series of spatial sequences with geographic information that are not visible on a two-dimensional map of the plane. On the basis of the above, aerial photography provides more various perspectives, creating maps of a more continuous but also thickened surface. This kind of mapping is especially useful in this isolated large-scale mining area to reveal crucial details that cannot be observed from other maps.

4.4

Case study is not a way of copying. Instead, it is a good way to extract general principles from the existing cases and then be utilized and transformed into specific strategies. It directly invokes design inspirations and shows design possibilities. This precedes further design and contributes to an initial idea on the basis of research. The cases mentioned in this project are studied within the framework of landscape urbanism, which will be discussed in chapter three.

Literature study is the main method in research. First, the study starts with the discipline theory on landscape urbanism. As the condition is complex involving with urban and natural systems. This theoretical background provides a perspective to read the environment and function as a lens through which we can have a look at future landscape cities. Books and articles on landscape urbanism as listed in the reference are studied. In the meantime, the literature of according design instruments is touched. For example, James Corner 's "Agency of Mapping"(1999) introduces mapping as a creative tool in research and design. Third, the literature study is an efficient way to gain knowledge from other disciplines including the history, geological and hydrological information of South Florida and Miami, which prepares for further research.

Field study is a necessary spatial experience for designers to get direct contact with the field. It makes the abstract scale and atmosphere perceivable which are significant for designers to do interventions. Comparing to desk analysis, field study reveals a lot of significant details of the site. In this project, two visits lasting a period of one month in total were paid to understand the site context and existing spatial form. The site visits are indispensable for research and design developing.

5. SCOPE & RELEVANCE

Neglected Edges

In Miami, people's attentions are drawn to the centers of the city and the Everglades. As for the edges in between, most people have no idea what is happening there. It seems that a simple boundary line can easily divide the two systems and avoid the conflicts, yet the opposite is true. The project intends to present people with the potentials of borders and appeal to people's cautions of making new boundaries. It starts with the idea of a new relationship between nature and urbanism and is eventually implemented into addressing practical urban and ecological problems.

Voices of Landscape Architects

During the project, a lot of future plans and interventions of this area are touched. The hydrological engineers see the potential of water storage and are planning to seal the lake walls to build impermeable reservoirs; the ecologists put forward good advice on how to restore the ecosystem back to before; the urban planners color the grids with yellow denoting that rural residentials are permitted to develop; the surrounding residents could hardly know the landscape inside the area, but they know what happens when they feel the house vibration caused by mining blasting and thus they resist it. Although various voices from different backgrounds are heard, few landscape architects are involved to say something for the future of this area. This project is proposed from the perspective of a landscape architect. It does not mean to provide a beautiful park for the city merely. It functions as a cohesive and catalyst to synthesize multidisciplinary values through landscape approaches to regenerate the potential of the site.

Into future

The boundary condition is not a problem for only Miami but also applies to many other cities. The edge is usually neglected. But it is the most sensitive area for the whole environment. The transformation from boundary to border makes a great difference for nature, urbanism and for people's attitudes toward them. Border should be a new edge condition for future cities.

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Geology, hydrology and soil distribution constitute the unique environment of South Florida. All kinds of flora and fauna composed of diverse species take up this land, survive and thrive here. Human habitation changes the natural process according to their own needs.

The landscape form today is a consequence that has been shaped by many forces. Water is the key driver in this integrated process that can be used to transform the surface. It connects and influences two of the most important systems: ecology and urbanism. Mining is a relatively independent system here, attached to the city, but operates in a completely different way. It dramatically changes the landscape of the site in its own way, therefore mining system is discussed separately here.

This understanding of the processes shaping the landscape over time prepares for the future design which can be used as an artificial intervention to manipulate these processes.

CHAPTER II

HOW TO READ THE BOUNDARY

- a static binary opposition

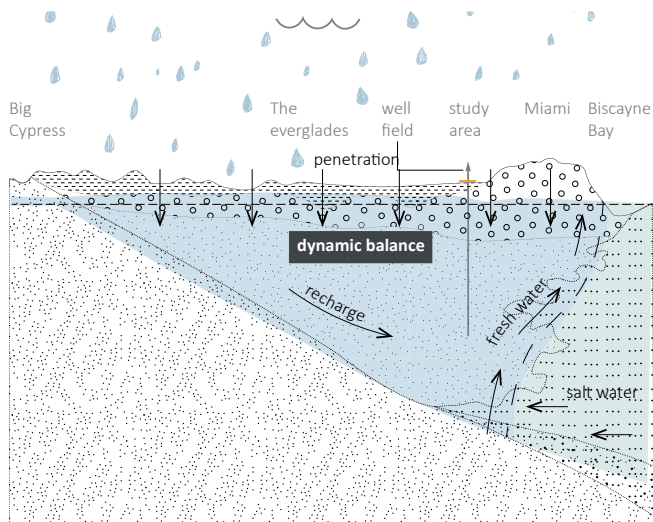
1. HYDROLOGY
2. ECOLOGY
3. URBANISM
4. MINING

- 
- The image is a painting of a wet mining dragline in a quarry. The scene is dominated by a teal and blue color palette, with a dark, stormy sky above and a brown, rocky quarry floor below. The dragline is the central focus, with its long boom and bucket extending into the air. The overall mood is industrial and atmospheric.
1. HYDROLOGY
 2. ECOLOGY
 3. URBANISM
 4. MINING

1. HYDROLOGY

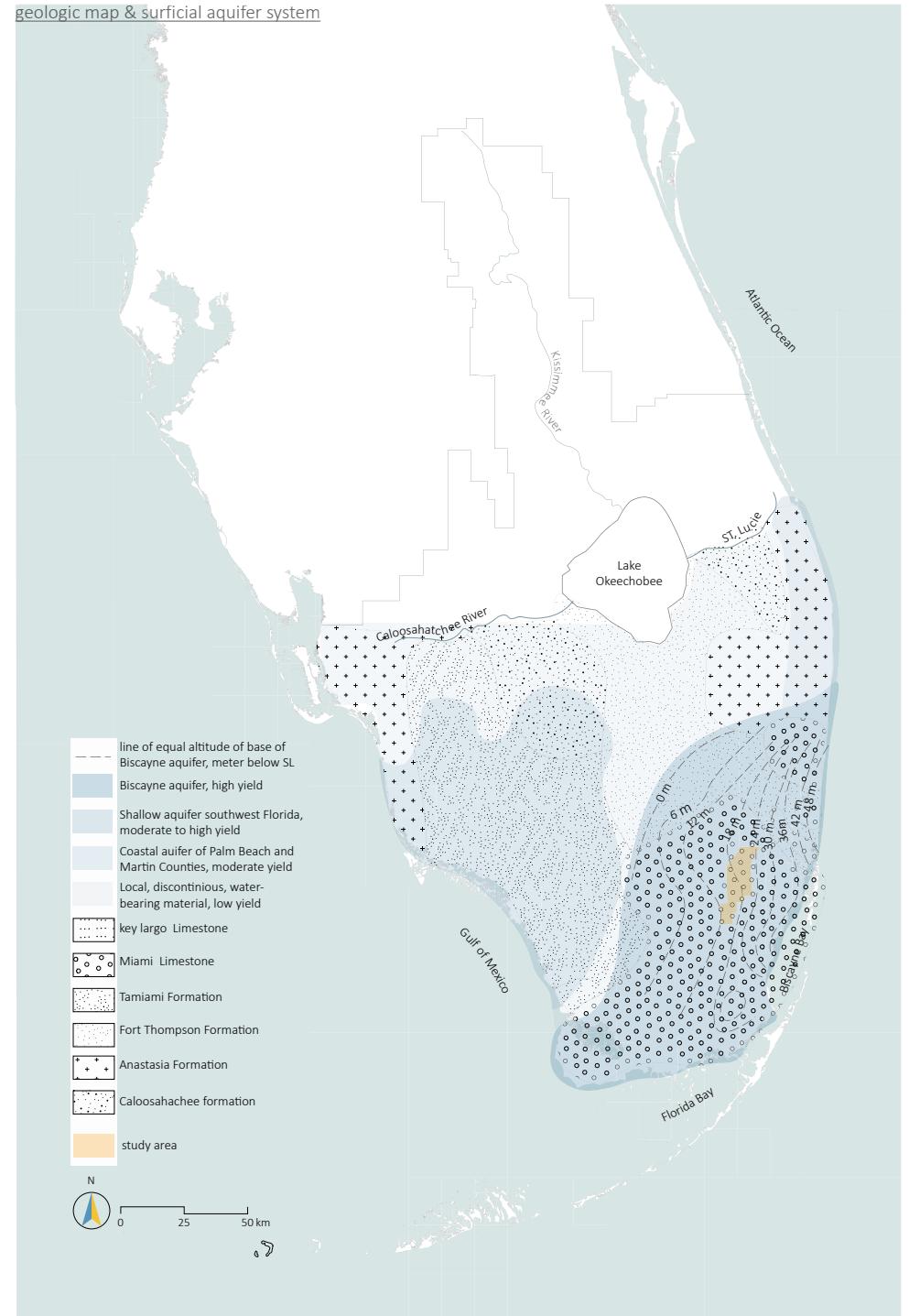
Porous Limestone: Framework Of The Surficial Aquifer System

South Florida sits on a porous plateau of karst limestone. This means the bedrock is permeable that water from upstream and precipitation can be absorbed and stored in this layer of limestone. It is also known as the surficial aquifer system.



The Biscayne aquifer that underlain Miami provides precious drinking water for the city and defends saltwater intrusion from the sea.

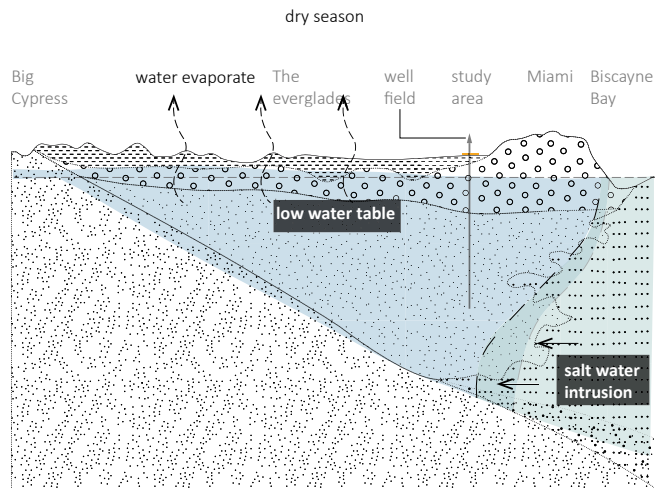
geologic map & surficial aquifer system



1. HYDROLOGY

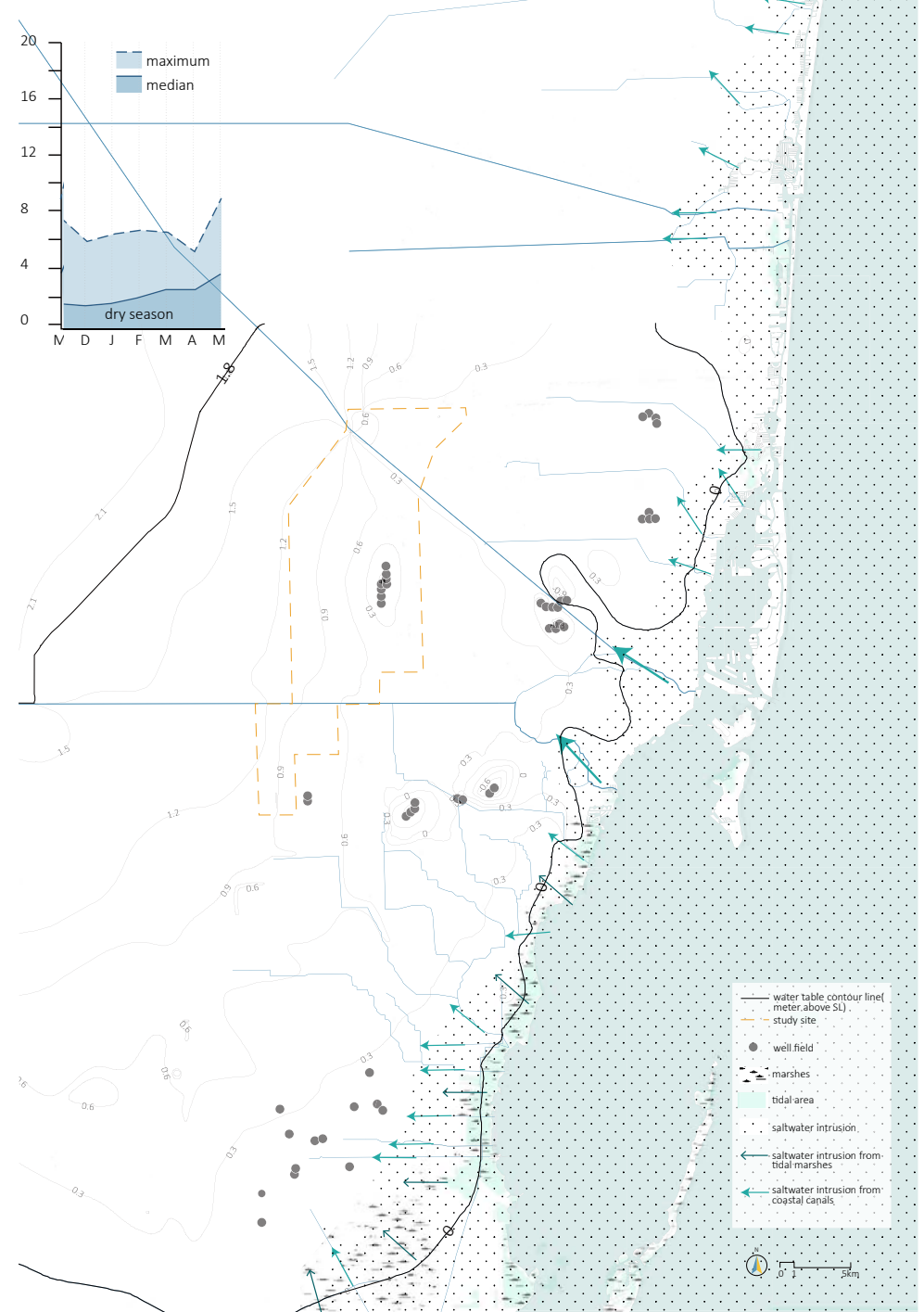
Water Level Fluctuation: Salt Water Intrusion And Urban Flooding

The porous bedrock makes Miami particularly sensitive to water level fluctuation.



During the dry season, the aquifer can not get enough water replenishment, and the inland water table drops, the salt water attacks the brackish interface from the bottom. Most of the city well fields from which the city extracts fresh drinking water, are located along the coast and are threatened by saltwater intrusion. The Northwest well fields in the study area are the most inland outside the city.

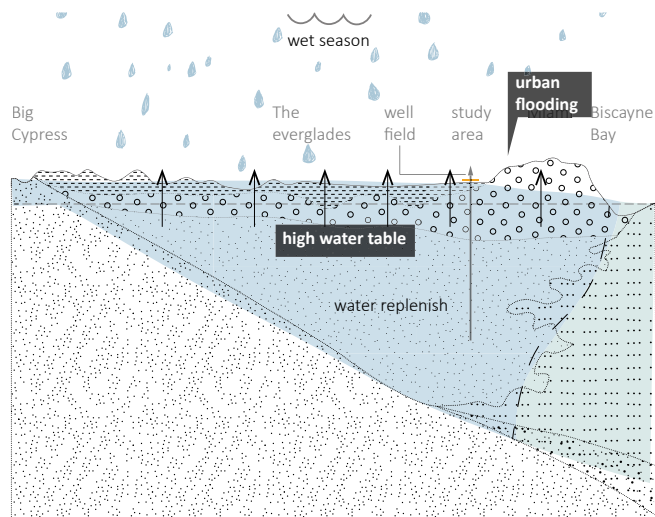
water table contour line(m) May, 2000-2009



1. HYDROLOGY

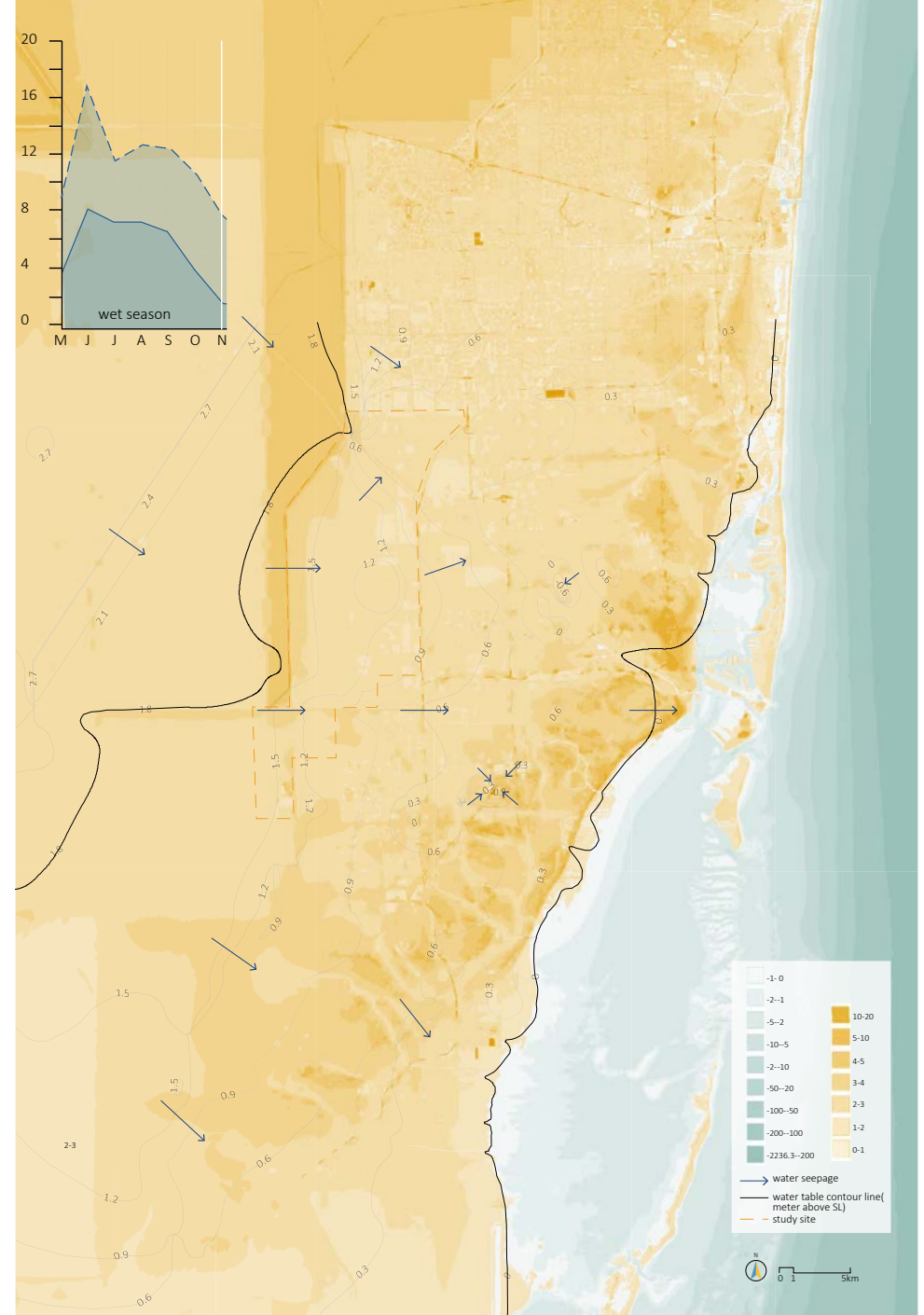
Water Level Fluctuation: Salt Water Intrusion And Urban Flooding

The porous bedrock makes Miami particularly sensitive to water level fluctuation.



During the wet season clearly defined by short but heavy rainfalls from May to October, the stormwater runoff accumulates on the streets and cannot be discharged in time because of the failure of the gravity-dependent drainage system caused by the high water table. When the water level is too high, water rises up from the ground. As most of the urban area is only one to two meter above mean sea level, the city is at high risk of flooding not only from the sky but also from the ground.

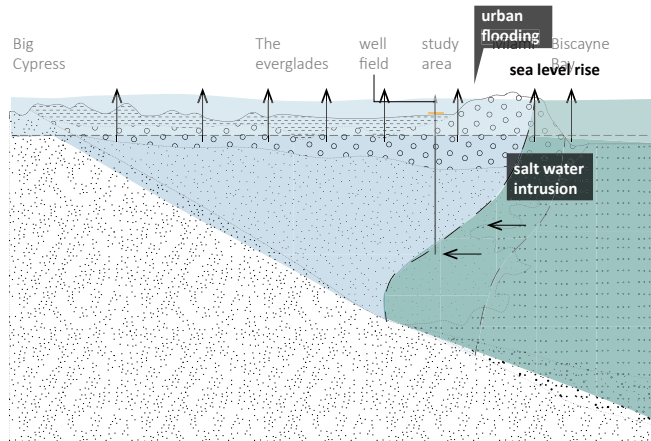
water table contour line(m) Oct, 2000-2009



1. HYDROLOGY

Sea Level Rise: Water Comes Up Anyway

As sea level rises, both the urban flooding and saltwater intrusion will be more serious. The porous limestone dooms the failure of those protection measures such as seawall. Water cannot be blocked unless the ground is completely sealed, which is obviously impossible. In other words, water will come up anyway.



During king tides (higher tides, usually occurring in the months of September, October and November), the aquifer water level could be high even there is no rain because the fresh water level must be kept 1 foot higher than the sea level to prevent too much salt water intrusion. So even in the sunny weather, the city may also be flooded. It is also called the sunny day flooding. Those low-lying neighborhoods did not flood even during high tides decades ago now flood because sea level rise.



image source: Miami NewTimes

0.76 meter higher by 2050

SEA LEVEL RISE

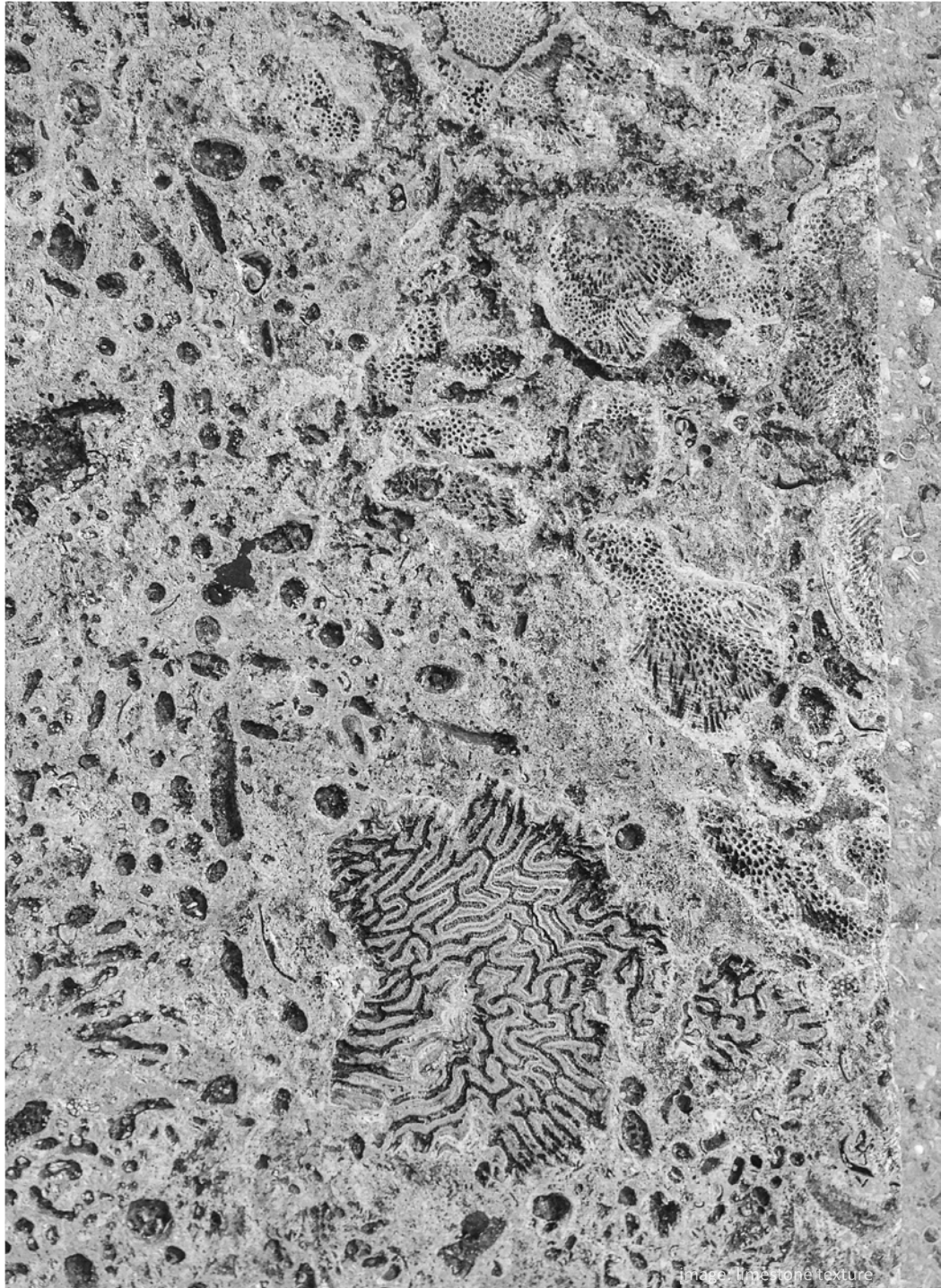
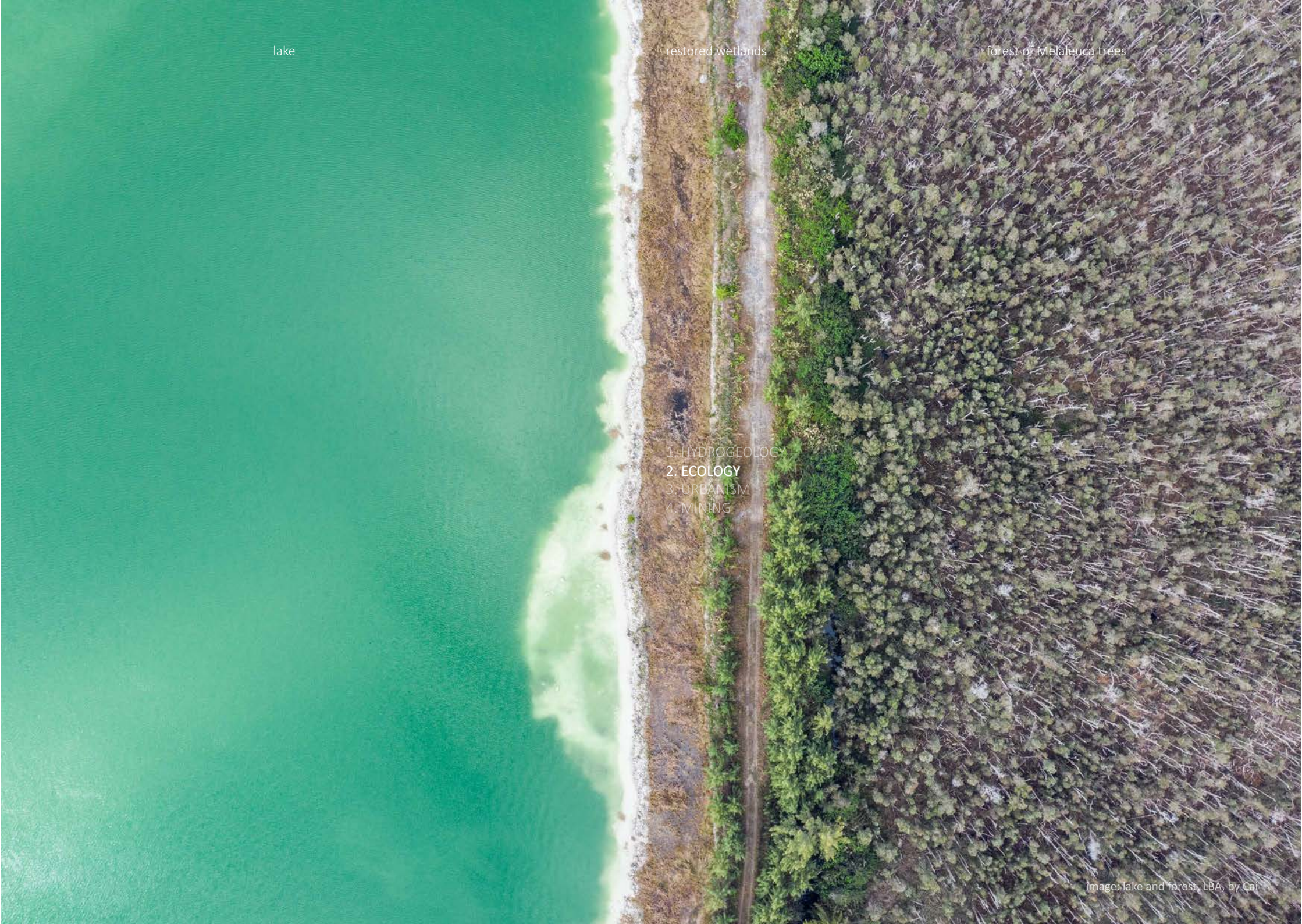


image: limestone texture

HYDROLOGY

The water strategy should be changed: we need to conserve more fresh water and we need to **adapt to** water. Besides, absolute artificial control is not always as reliable as thought, especially in the context of climate change. It presents a resistive attitude toward natural process and cannot adapt to or absorb changes, which makes it difficult to cope with the future uncertainties. The water system should be manipulated to accommodate natural process instead of going against it.



lake

restored wetlands

forest of Melaleuca trees

- 1. HYDROGEOLOGY
- 2. ECOLOGY**
- 3. URBANISM
- 4. MINING

2. ECOLOGY

Sheet Flow: River Of Grass

Water in south Florida once flowed from the Kissimmee River to Lake Okeechobee and southward over the low-lying lands. This shallow, slow-moving sheet of water covered almost 11,000 square miles of land (National Park Service, 2015) where flora and fauna survived and thrived; plant litter accumulated and decayed year after year; peat formed little by little. For thousands of years, the system evolved into a unique ecosystem that is known as "river of grass". The river of grass, together with cypress swamps, the estuarine mangrove forests, tropical hardwood hammocks, pine rockland, and the marine environment compose the integral biological infrastructure of South Florida ("Everglades", n.d.).

the Cypress Swamp



coastal mangroves

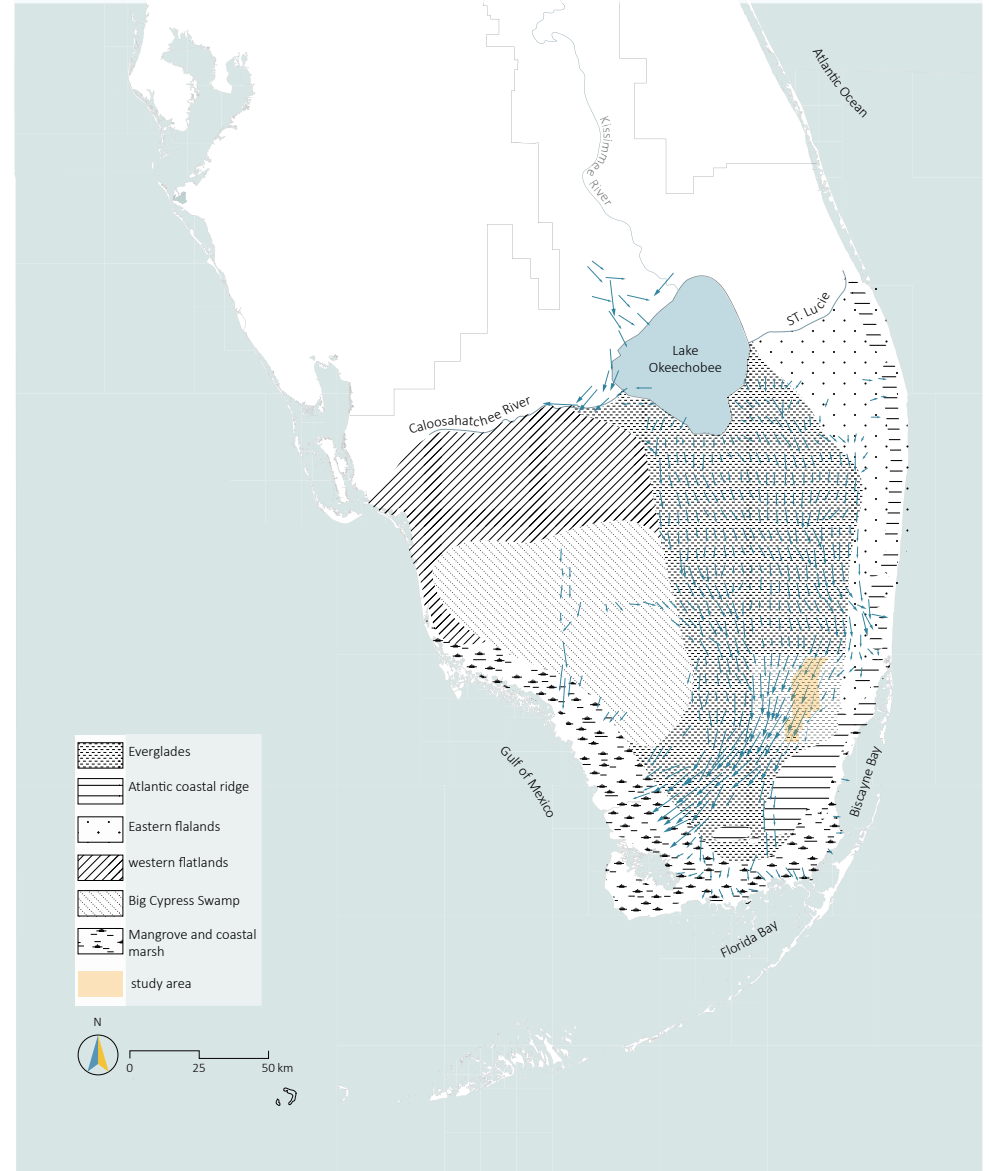
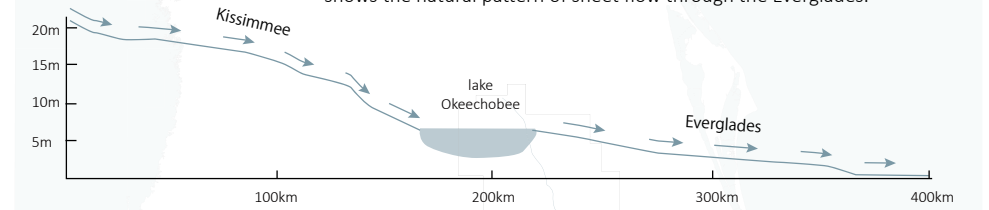


the Everglades



physiographic map & water flow

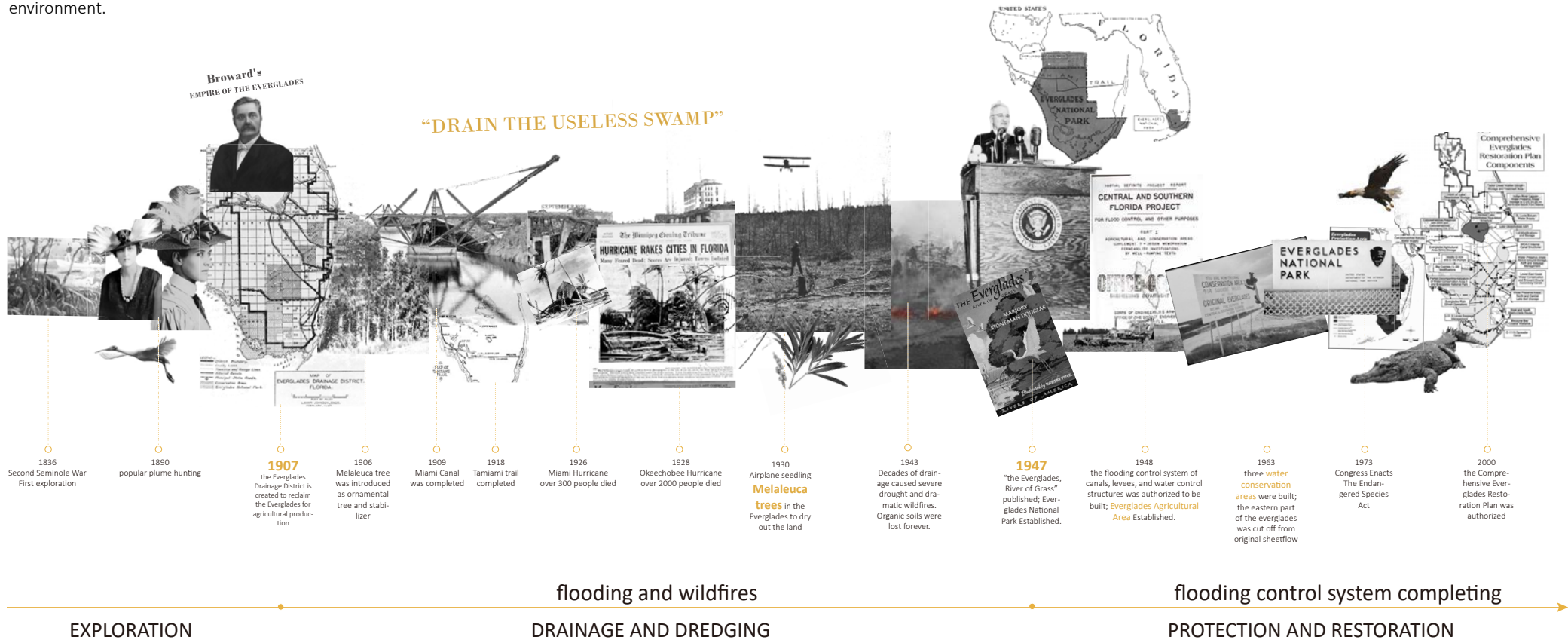
The section shows the mild elevation from the north to south. And this map shows the natural pattern of sheet flow through the Everglades.



2. ECOLOGY

Everglades History: Drain The Useless Swamp

Demands for land development caused a large scale of drainage and dredging to the Everglades in the last century. No one doubted it in the beginning because no one knew how the system worked. People's ignorance of the process of the Everglades system ultimately caused huge damage to the environment.



In the 19th century, the second Seminole War led to Americans' first exploration into the Everglades. The hunting of birds also became popular for the bird's feathers were at high prices as decorations on hats.

At the beginning of the 20th century, people were interested in the agricultural use of the Everglades and started to develop it. In 1904, Napoleon Bonaparte Broward, who was selected to be the governor at that time claimed to build the “Empire of the Everglades” through drainage. In that period, the swamp was considered useless. The large project of drainage began.

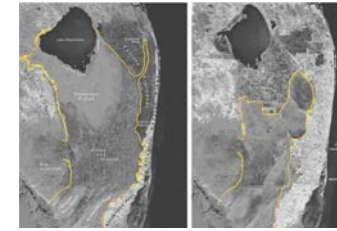
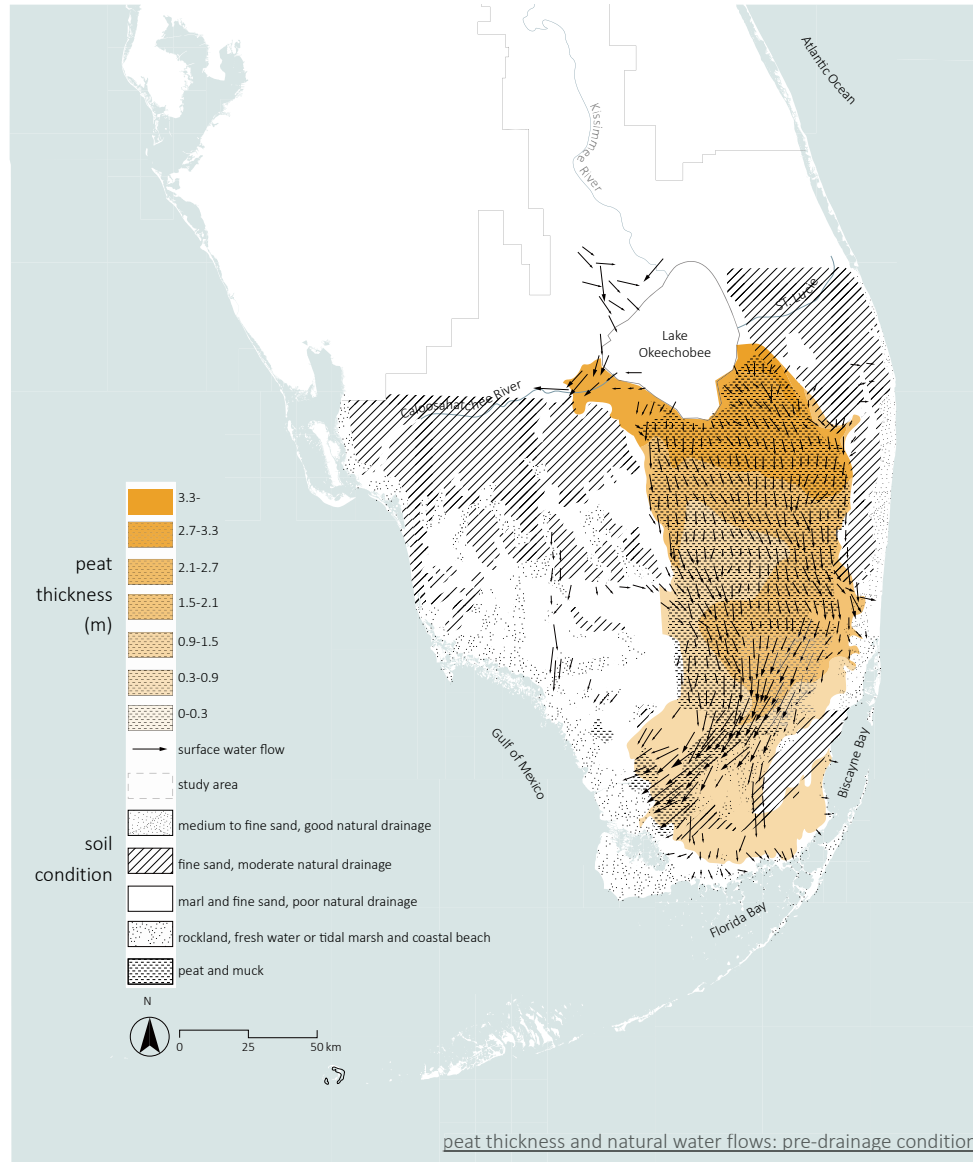
In 1926 and 1928, two hurricanes caused severe flooding and a large number of people died. Following decades of drainage. Following decades of drainage, in 1943, severe drought led to dramatic wildfires that a large amount of peat soil was lost forever. The melaleuca tree which was first introduced to South Florida from Australia in 1906 was originally planted as bank stabilizers and windbreaker but, in 1930, their seeds were spread by airplanes into the Everglades to consume excess water.

Most people at that time knew nothing about the mechanism of the Everglades system. It was not until 1956, when the book “The Everglades: River of Grass” by Marjory Stoneman Douglas was published, had more people learned about the Everglades system. In the same year, the Everglades National Park was established. After that, South Florida continued to complete the flooding control system and authorized several big projects on Everglades protection and restoration (Everglades Law Center, n.d.).

2. ECOLOGY

After Drainage: Water And Soil Condition Change

After over one hundred years of drainage, the artificial water management system resulted in the hydrologic fragmentation of the integral Everglades ecosystem and interrupted the seasonal fresh-water flow through the system. The normal breeding patterns of varied species were disrupted and their population declined dramatically.



40% of the **water** that originally flowed into the Everglades is now discharged directly via canals to the ocean or for other uses.

75% of **peat** has lost forever.

50% of the **natural habitat** was cut off from the Everglades.

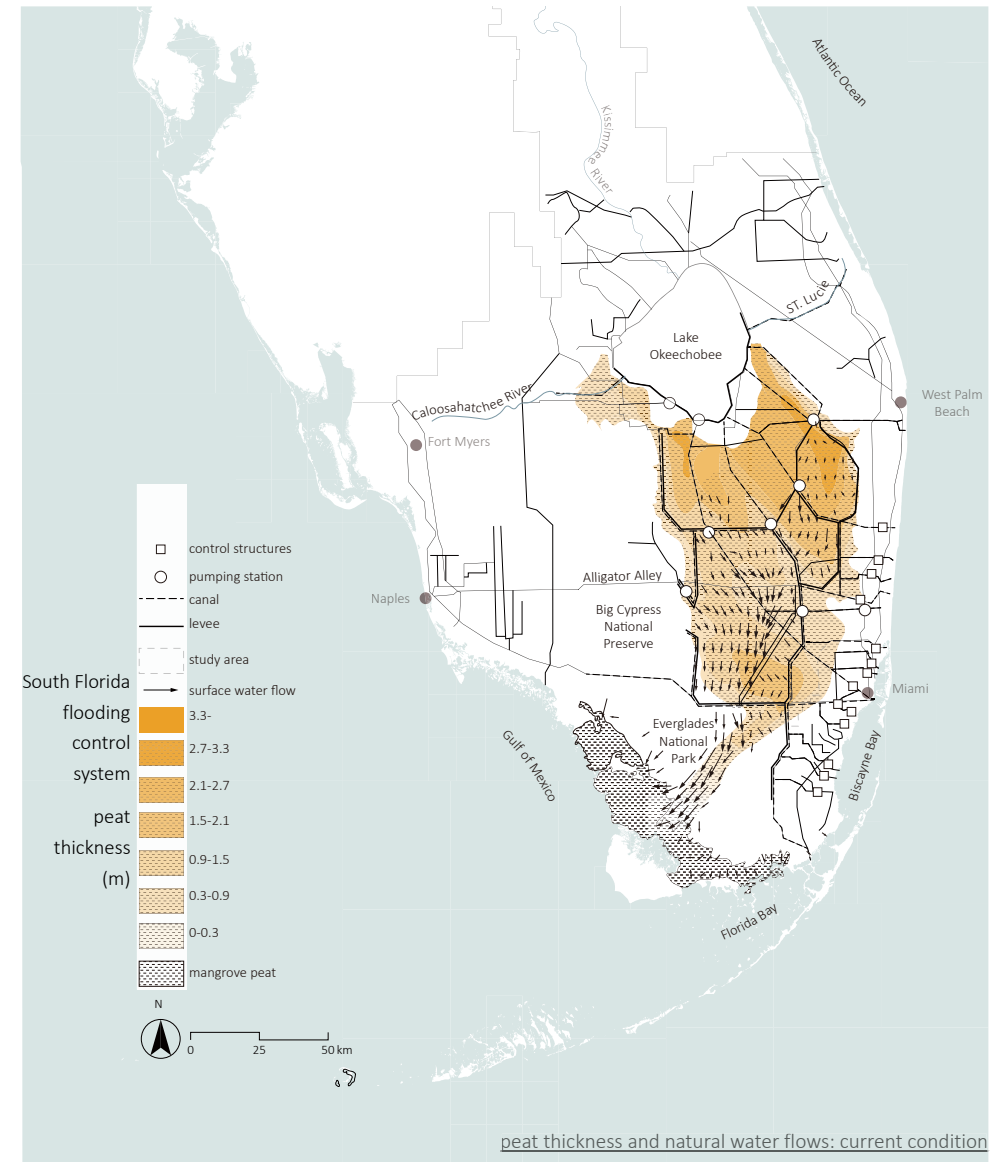


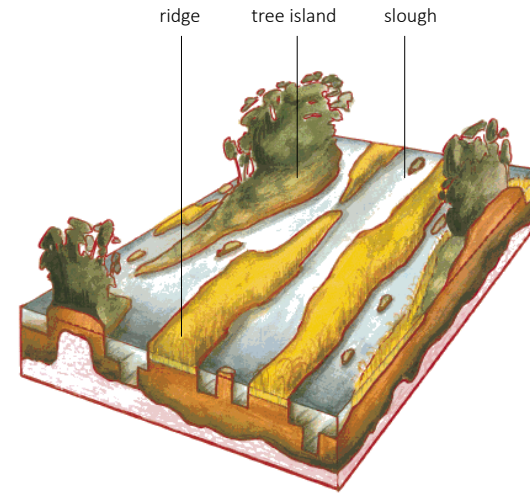
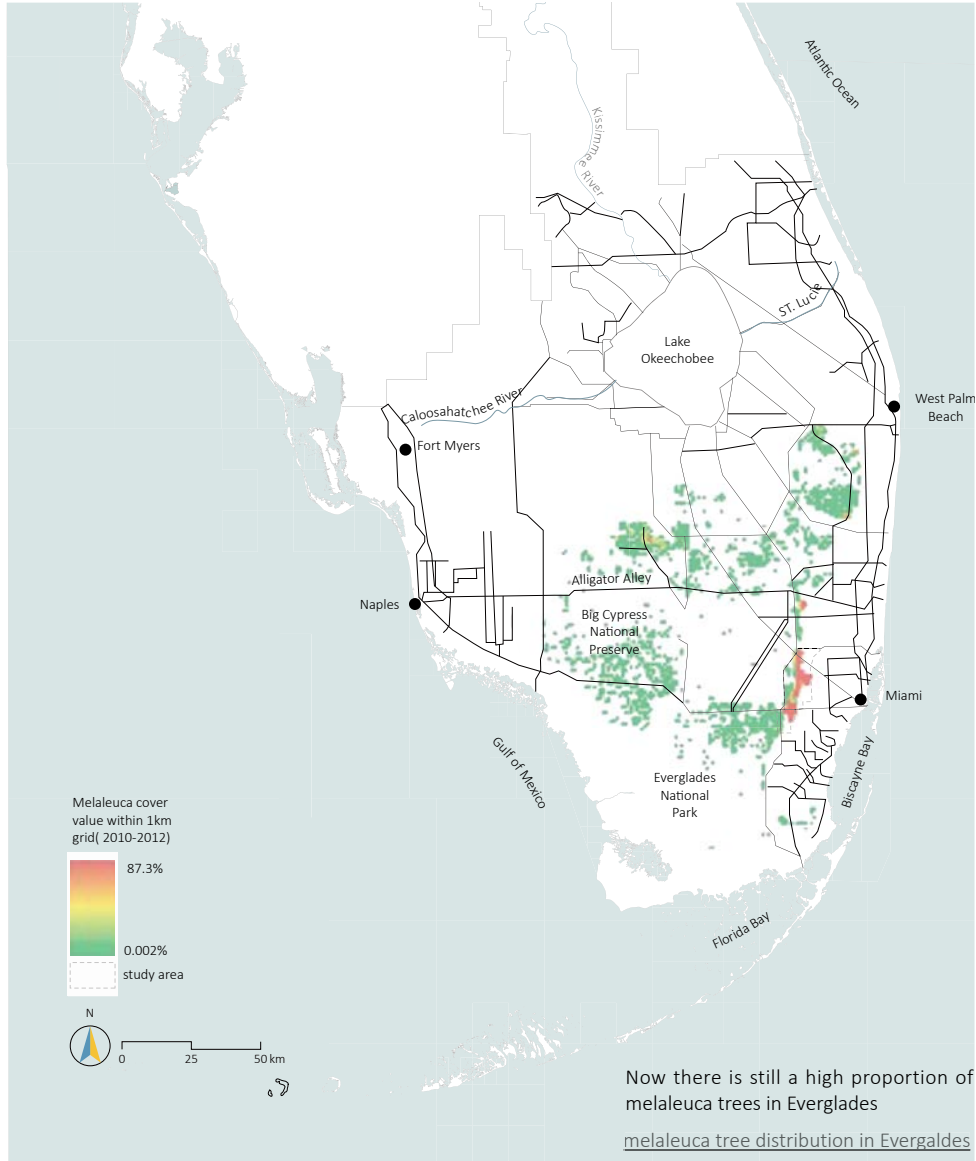


Image: East Coast Protective Levee
This levee stops the natural surface water flow into the mining area and the urban area. Vegetation types are different at both sides.

2. ECOLOGY

Invasive Trees and Degenerating Ecosystem

The ecosystem is degenerating. The seeds of Maleleuca trees spread in 1930 grew extremely fast and rapidly expanded. They have no natural enemies in South Florida, and their strong capacity of vitality and fertility makes it very difficult to remove them. The typical ridge and slough landscape has been changed. The tree islands, the patches of higher and thus dry grounds occupied by trees, providing important habitats for many birds, panthers, and other critters, disappeared and degraded (Mitch, 2016)



26% of the **natural lands** were encroached by invasive Maleleuca trees.

50% of the natural tree islands disappeared.

ridge and slough landscape

Source: Chris McVoy, 2003

TREE ISLAND

most **sensitive indicators** to hydrologic change

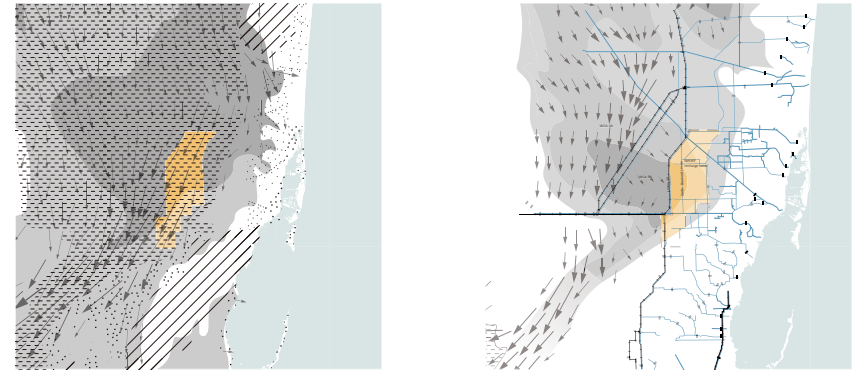
provides important **refuge and habitats** for vegetation and birds.



2. ECOLOGY

Lake-Belt Area

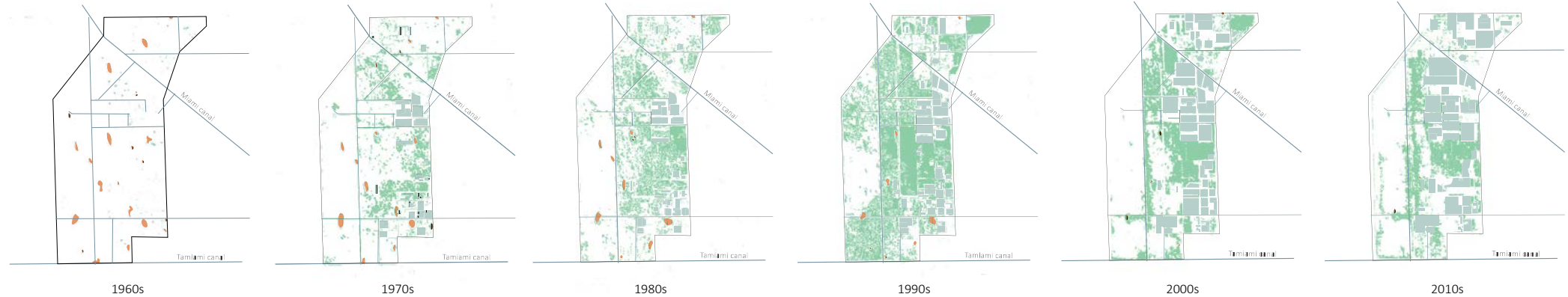
The majority of lands within the Lake Belt Area are wetlands that were once part of the historical Everglades watershed and were part of the Shark River Slough headwaters. Historically, Shark River Slough was a deep-water slough that collected flows from the eastern portion of The Everglades (United States Geological Survey [USGS], n.d.). However, a levee (East Coast Protective Levee) was constructed at the eastern edge of the Everglades to stop water from flowing east. And as a drought protection measure, shallow impoundments (Water Conservation Areas, WCA) were created in The Everglades to the west of the Lake Belt Area. Thus the water condition of the LBA has also been completely changed, the original ecosystem is gone, and the tree islands in this area disappeared. The forests of melaleuca trees are growing wildly

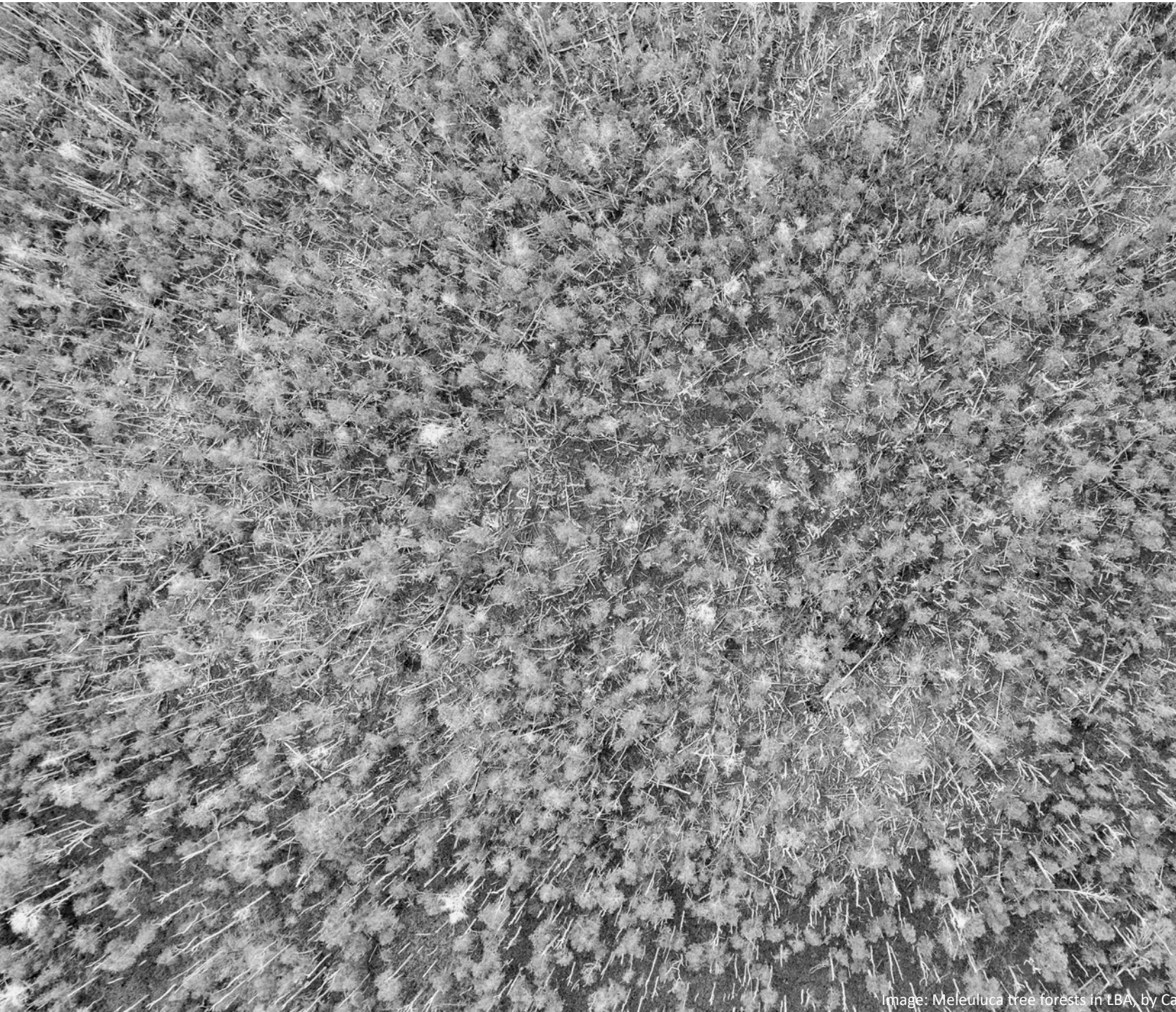


The two maps show the water and soil conditions before and after drainage. After drainage, the natural water flow has been blocked outside the protective levee.

land cover change

A sequence of maps shows the land cover changes over time on the site. Tree islands completely disappeared. Wetlands were occupied by forests of invasive species.





ECOLOGY

The artificial water management system has fragmented the original integral everglades ecosystem; natural water flow was cut off; the changed **hydropattern** causes the loss of peat and the **degradation** of the ecosystem. This degrading ecosystem is much more vulnerable to climate change and will ultimately threaten the survival of the city.



1. HYDROGEOLOGY
2. ECOLOGY
3. URBANISM
4. MINING

suburban sprawl

highway as urban boundary

mining area

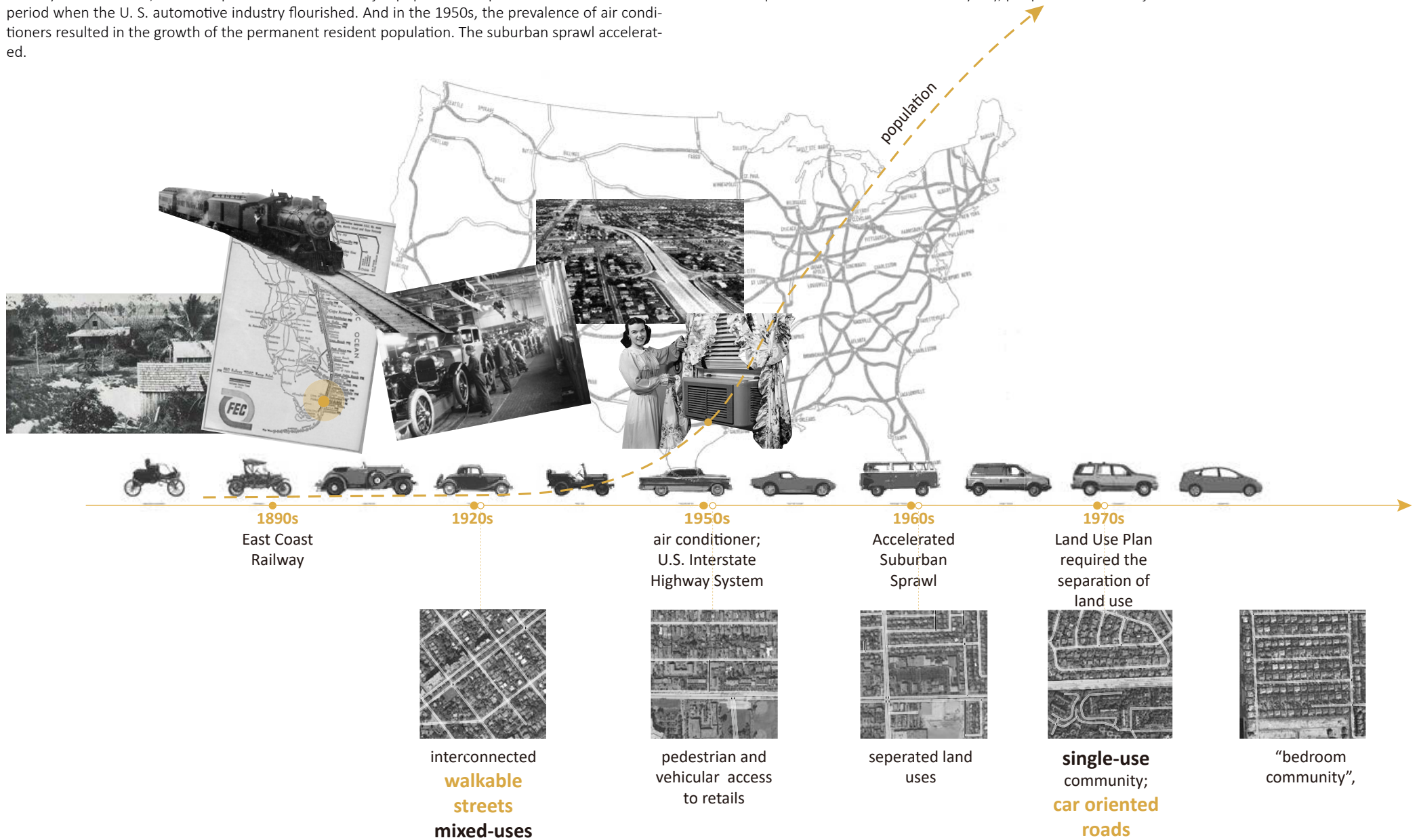
image: urban edge, Miami west, by Cai

3. URBANISM

Urban Development History

One hundred years ago, there were only a few small settlements living in Miami. At the end of the 20th Century, the small town began to develop because of the extension of the Florida East Coast Railway. In the 1920s, Miami experienced the first major population explosion. This was also the period when the U. S. automotive industry flourished. And in the 1950s, the prevalence of air conditioners resulted in the growth of the permanent resident population. The suburban sprawl accelerated.

This car dominant transportation altered the urban form. The roads were no longer walkable. A large number of single-use communities were created. It is called the "bedroom" community that only provides accommodation. Every day, people drive to their jobs and other services.



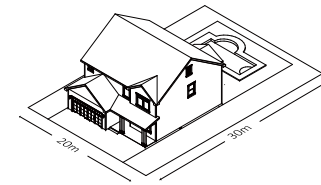
3. URBANISM



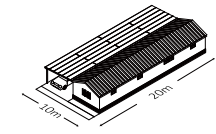
Urban Sprawl

Cars allow people to move out of the city center and live in the suburbs in their own house. This contributes to the crazy construction of suburban houses, and the city expanded horizontally in low-density, also known as the urban sprawl (a type of development characterized by expansive single-use communities which typically consist of a series of residential developments connected by a high-speed arterial road designed strictly for automobile use).

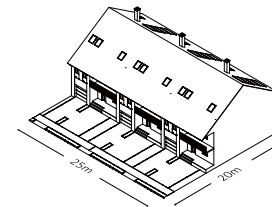
In Miami, 88% of the housing types now single-family. And most of the existing houses are built with cement, which means they rely heavily on the production of limestone. Houses in one community are identical because they were developed by the same entity. Windows are closed throughout the year because of air conditioners.



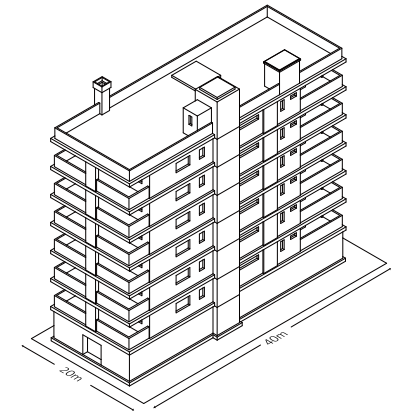
88%
single-family
600 m² /per family
cement,
steel and gravel



mobile home
200 m² /per family
metal, hardboard or
vinyl



multi-family
160 m² /per family
cement,
steel and gravel



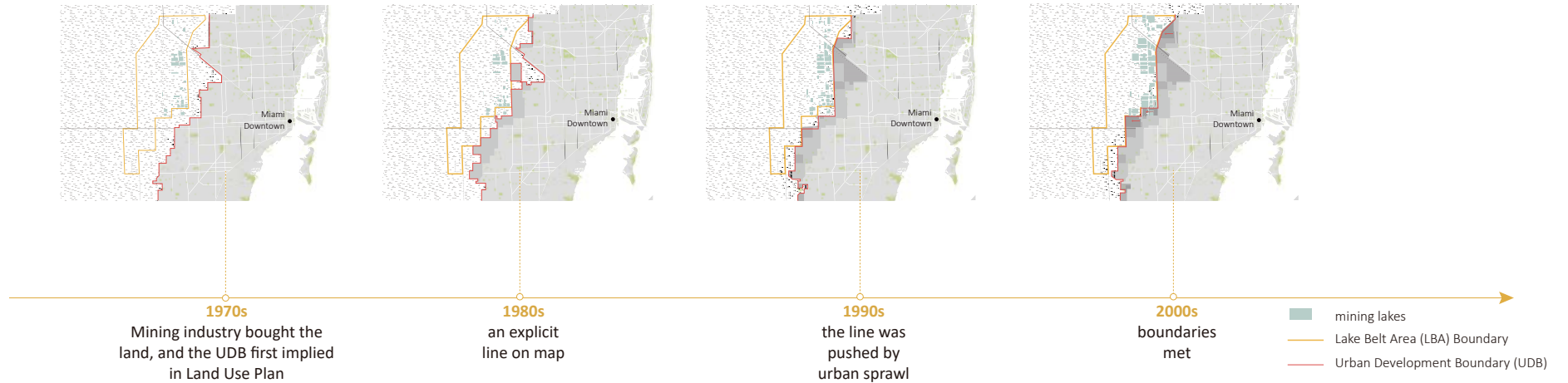
multi-family high density
133 m² /per family
cement,
steel and gravel

3. URBANISM

Boundary Formation

This series of maps shows the development of Miami and the changes of urban development boundary in the past fifty years.

In the future, as the Everglades is under strict protection, the UDB will not be attacked as easily as before; the city will have to focus on infill development. But, with the decline of the largest mining industry outside the UDB, will this tense line be held still?



During the 1960s and 1970s, the mining industry in north-central Miami-Dade County purchased large tracts of land, and in the mid-1970s, the Dade County designed this area (the early lake belt area) as open land use to prohibit the urban at the first attempt.

In 1983 the Urban Development Boundary (UDB) first appeared as a specific line on the map to contain the rapid urban sprawl.

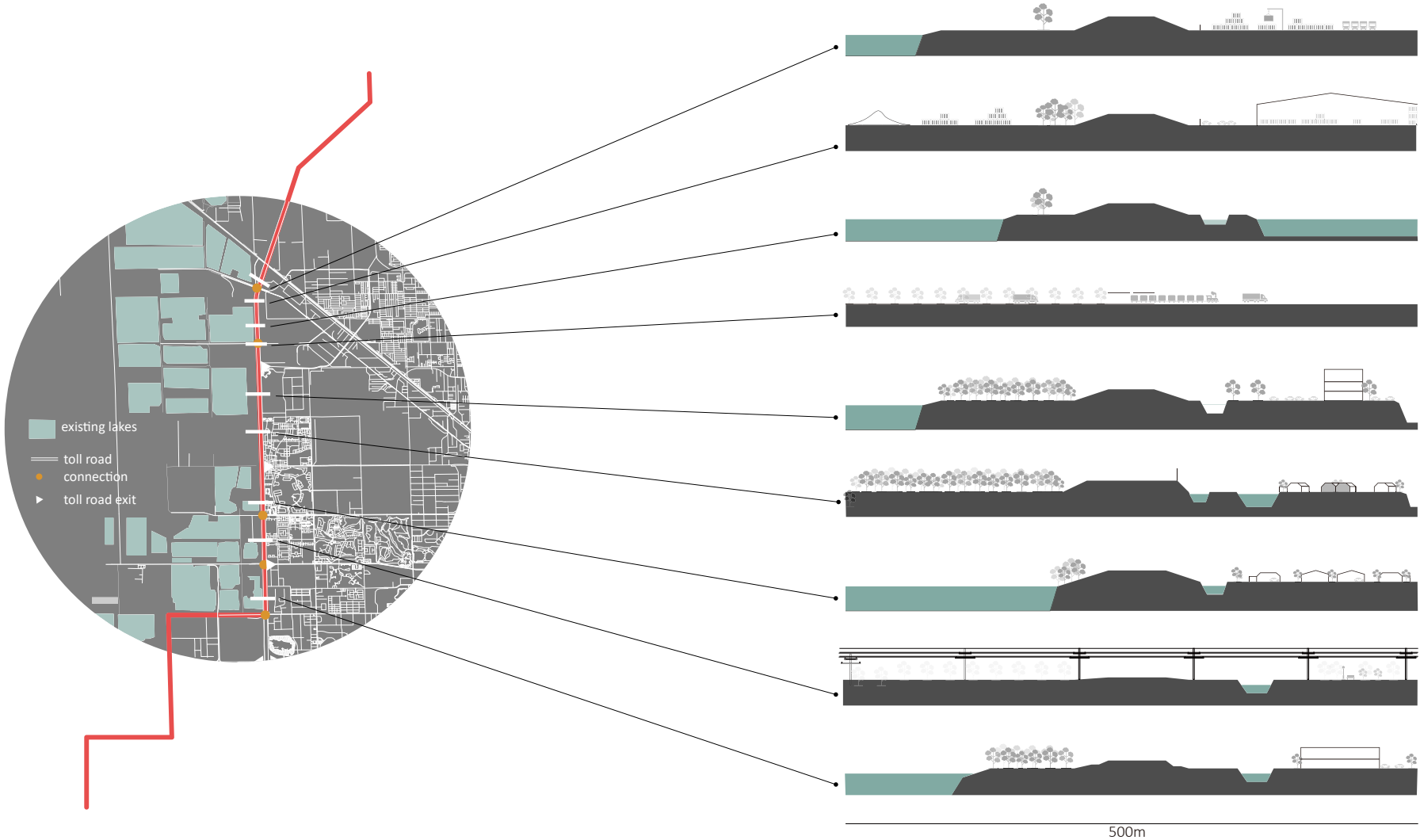
Over the past three decades, this line has been pushed by real estate development westward several times. Simultaneously the mining industry was also rapidly expanding to meet the high demand for construction material.

Until the two met in the end, the development of the northwestern part of the city was completely restricted. Today, the mining industry at the urban edge has become a barrier. (Historical Museum of South Florida, n.d.; "History of Miami", n.d.)

3. URBANISM

Boundary Formation

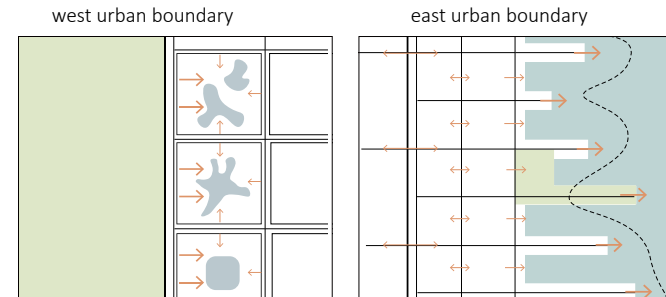
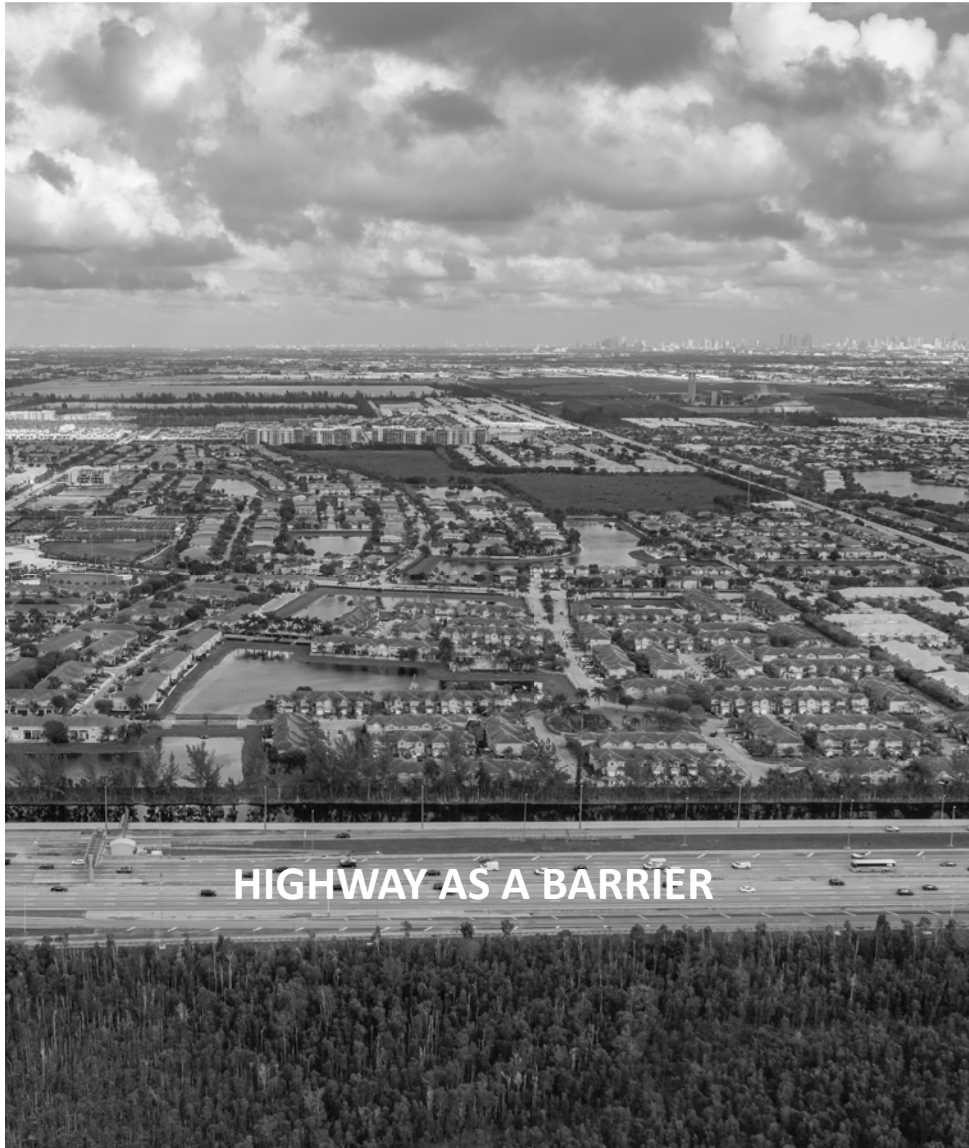
Now the political urban development boundary has met the boundary of the Mining area. And spatially it is defined by an elevated toll road. The profiles of the toll road are mapped to show the division of urban area and mining area. The only connections serve for the mining industry.



3. URBANISM

The Northwest Urban Edge

However, when this line prohibits urbanization through the complete separation of nature and urban life, the connection between urban people and the natural process has also been cut. Perception, appreciation or education on nature have been removed from people's daily lives. (Although the Everglades National Park is just outside the boundary, it takes an hour or more to reach the visitor center for most urban people; the small proportion of community's valuable public space is also dominated by sports fields and utility lawns).

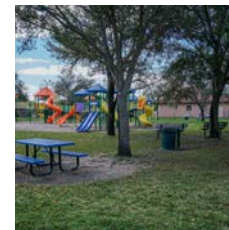


A comparison of the west and the east urban edge was made. Along the east edge, there are many public spaces that are shared by both natural and urban systems. These spaces also function as buffer areas accommodating sea flooding. The east urban edge is now transforming into border to absorb natural changes while the west remains to be a boundary

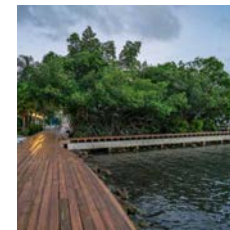
community public space in the west



community public space in the west



community public space in the east



city public space in the east



URBANISM

Car-oriented urban form results in **isolation**. And the politically urban development boundary has become a spatial **barrier**.



Melaleuca Tree Forest

Overburden Removal

Water Seepage From Ground

Limestone Piles



1. HYDROGEOLOGY
2. ECOLOGY
3. URBANISM
4. MINING

4. MINING

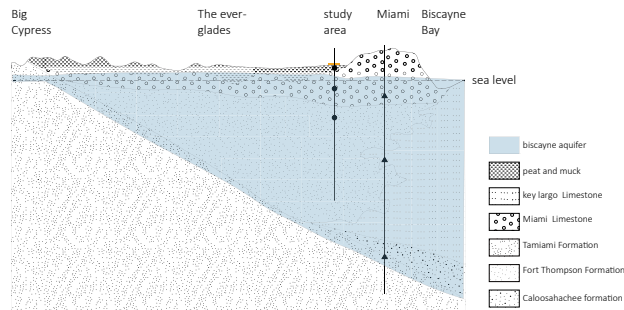
Limestone of the Best Quality

Most of Florida's geological history was covered by warm shallow sea, and limestone, mudstone, and sand which constitute the bedrock formed. Some of them are exposed to the surface and some are overlain with unconsolidated, loose sands and clays known as overburden (Herbert, 2007). The rock exposed at or near the surface in Florida is less than 40 million years in age. And Miami limestone that underlain the Lake belt area is only 0.1-1.2 million years old and during this period, the chemical redeposition of calcium and the addition of silica made it very hard. So the Lake Belt area produces unique limestone of best quality for aggregate production in Florida. Besides, the over 100 feet consistent material underlain without almost no overburden means the excavation can be done efficiently and economically here at an industrial scale.

Limited Resources

Florida ranks third in the nation in the production and use of aggregate products, consuming about 153 million tons per year. And nearly half of the stones come from the Lake Belt. These stones are used as the raw materials for cement, concrete, aggregates, and limerock base in the construction of buildings and infrastructure of everyday life. However, if the excavation continues at the existing rate, the reserves of Lake Belt will be exhausted within the next 30 years, and other limestone resources have either been covered by urbanized land or be protected underlain the Everglades. By 2050, the city will lose its cheap construction material supply, and Florida will also get half its limestone production reduced if no alternative mineral resources found.(U.S. Army Corps of Engineers, 2009)

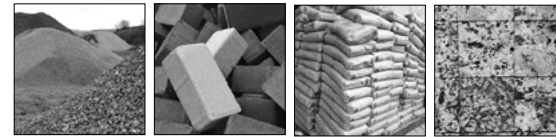
In other words, the excavation dig out the framework of the surficial aquifer and expose it to the surface. Without the framework, the water penetration rate is accelerated and the water storage amount is also increased.



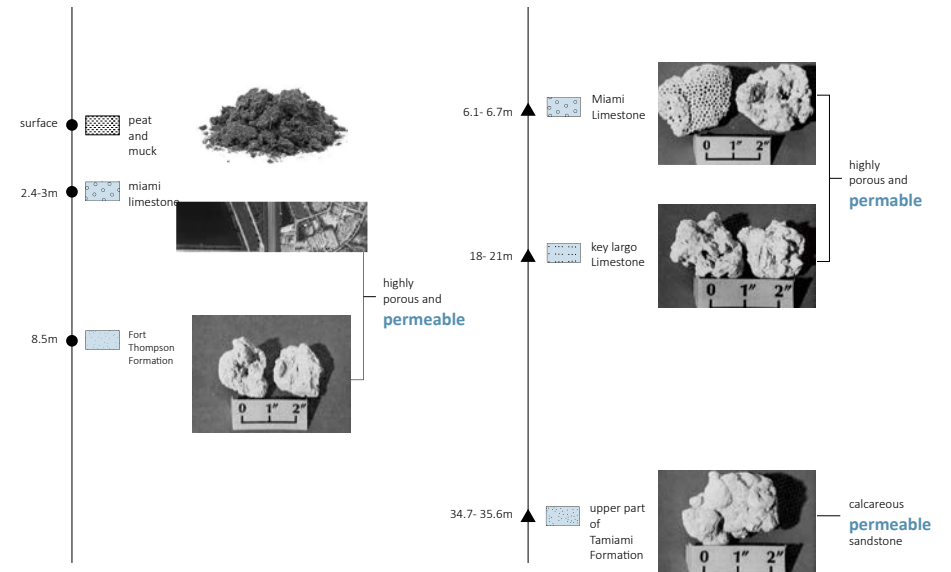
Lake Belt Area

- hard dense, oolite and fossil assemblage best quality in Florida
- 2004, over 139 million rock material consumed by Florida State
2009, 55 million produced by the Lake Belt area
Lake belt area produces **46%**

- raw material for cement, concrete, aggregates, limerock base.



- identified as **30** years reserves



4. MINING

GEORGIA

FLORIDA

- railroad
- limestone mining
- rail terminals
- ship terminals

Mining process mapping in the Lake Belt

Lake Belt area

Mining Process

Strip mining method is applied to excavation in the Lake Belt because the limestone is near the surface. First, the overburden is removed to expose the excavable bedrock. Then, the rock layer is drilled and loaded with explosives to break it by blasting. Due to the high water table, water seeps out and fill up the pits quickly. A small lake forms. Excavators or draglines are used to remove stones from the water and pile up along the shore. The dewatered stones are then moved to the processing area to be crushed and processed by different particle sizes to meet different market demands. Day after day, the lake gets deeper and deeper which will be ultimately around 18 to 23 meter deep, and also larger and larger.



transport to market

7



crush and process by particle size

5



dump mining waste (useless small particles)

6

move rocks to processing area

4



drag out rocks and dewater

3

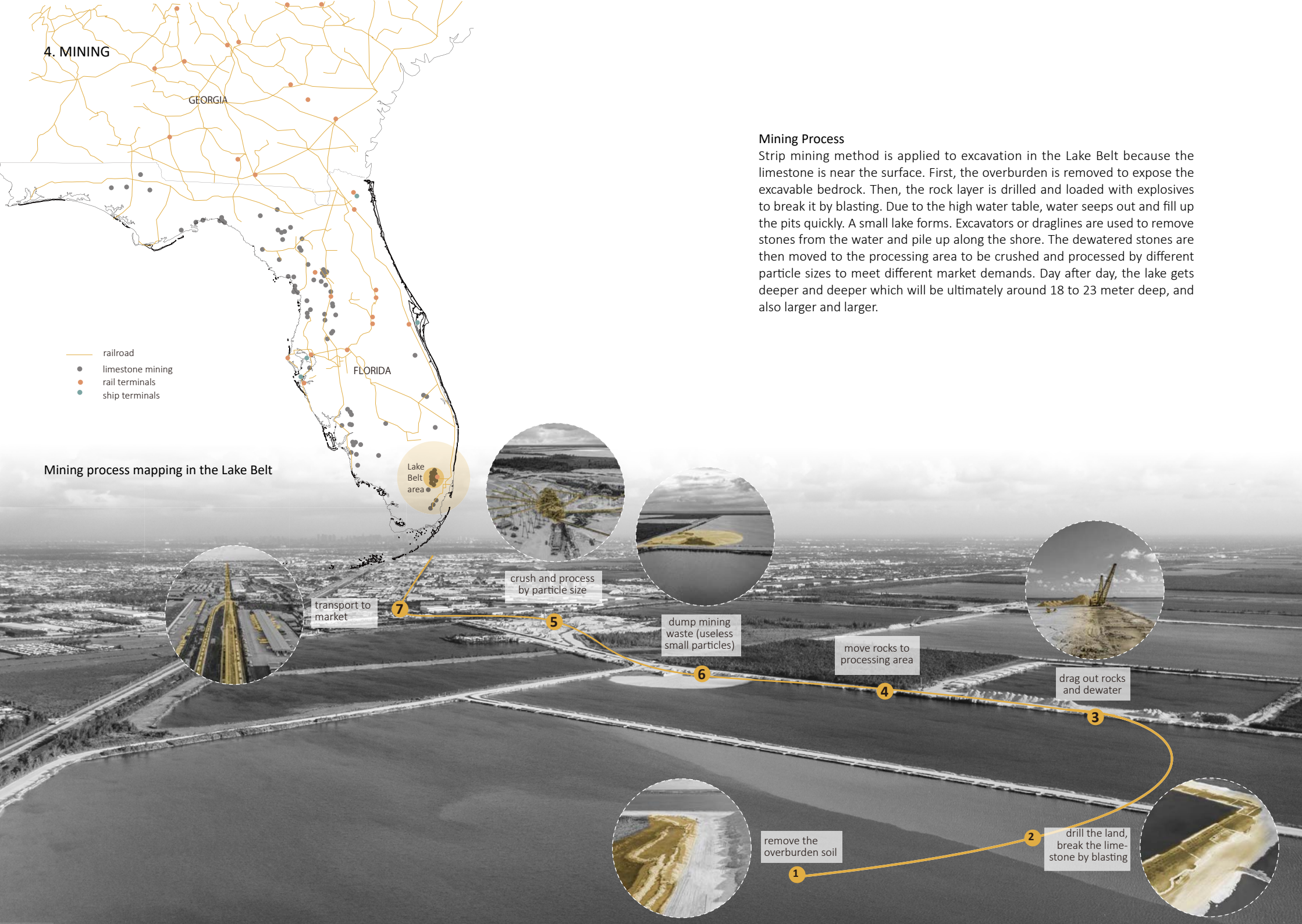
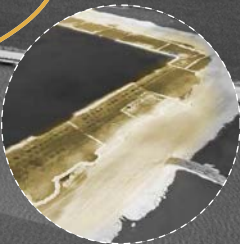


remove the overburden soil

1

2

drill the land, break the limestone by blasting



4. MINING



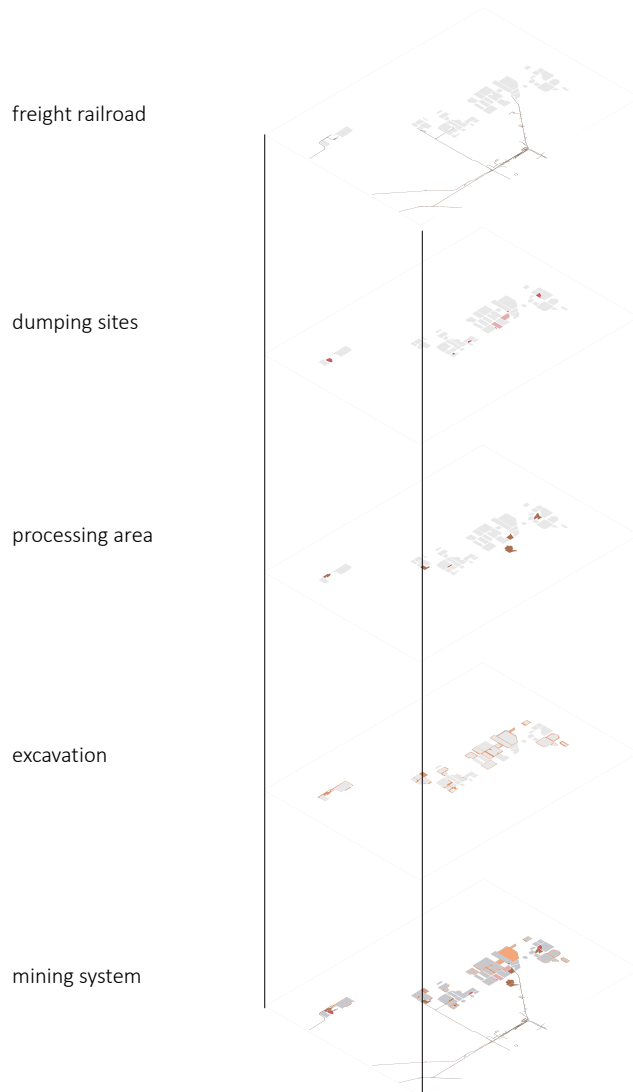
A logistics center in the industrial area



Railroad transport in LBA

4. MINING

Mining Process Decomposition



Landcover
 surface soil removed
 18m-24m deep lakes

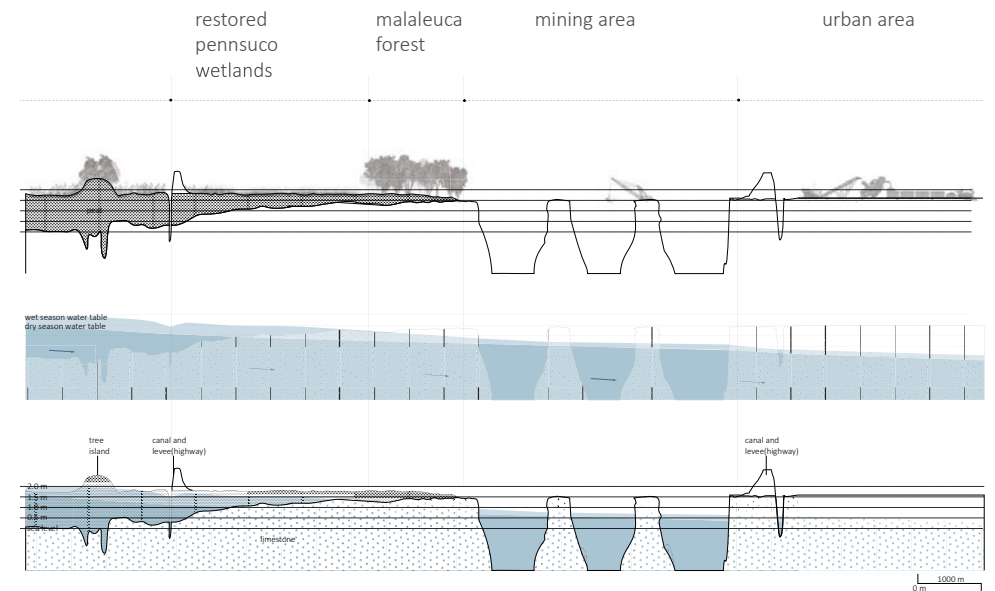
Water
 high water table
 freeboard:
 0.3m(wet)-1.0m(dry)

Bedrock and Soil
 aquifer exposed

Mining, as an activity of deprivation, consumes the deposition of thousands of years in a very short period of time. Those deep and large lakes that do not belong to the original landscape are not inhabitable for the native species and are hard to be fully used by humans. They are witness to the consumption of land productivity. After as long as 60 years of excavation, the lake-belt area almost exhausts its land productivity.

By 2050, there will be more than 10,000 hectare of abandoned lakes, which is larger than 15 times the size of Miami Beach, and almost double the size of Manhattan island. An approach that can regenerate the site potential and injects new productivity into the land is needed.

Landscape Features





MINING

Mining is going to **stop** and leave large area of inhabitable lakes. Land potential needs to be **regenerated**.

CONCLUSION

The western part of Urban Miami was originally built on swamps. Its bedrock of porous limestone and hydrological condition makes the city particularly vulnerable to flooding. To develop in this environment, the city established a set of flooding control system that employs the canal and levee which fragmented the whole ecosystem into several pieces and thus led to ecological degradation. By doing so, the natural process is blocked outside the city. In the meantime, under the tension of the rapid urban sprawl, the politically Urban Development Boundary has spatially become a clear jagged line defined by high-speed roads. Ultimately the connection between the natural system and the urban system is completely cut off politically and also spatially. Moreover, this kind of physical isolation, having removed the natural process from people's daily life, also causes psychological isolation. The binary opposition it implies between the two systems may create destructive attitudes to the environment as a whole.

On the other hand, the situation of isolation and opposition will not help protect the city anymore in the context of climate change. The city needs to be adaptive to future changes. Going against natural process is risky.

As for the mining industry, it has done irreversible changes to the landscape in a very rude way and almost exhausts the land productivity. New identity for the Lake-Belt area needs to be defined to regenerate land potential and values. Despite the challenges it brings, its termination also implies an opportunity. Being a large barrier between nature and urbanism, its removal will make room for the creation of a new interface where the two systems co-exist instead of opposition. This is an opportunity to educate people, to make peace with nature, to rebuild interactions between.

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Urban Sprawl: A type of development characterized by expansive single-use communities. The typical urban sprawl community consists of a series of residential developments connected by a high-speed arterial road designed strictly for automobile use. Moreover, the landscape sprawl creates has four dimensions: a population that is widely dispersed in low density development; rigidly separated homes, shops, and workplaces; a network of roads marked by huge blocks and poor access; and a lack of well-defined, thriving activity centers, such as downtowns and town centers.

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MINING

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Landscape , as a cohesive and a catalyst, is useful in driving and supporting the project. Its potentials are explored through different perspectives: landscape as process, landscape as palimpsest and landscape as infrastructure. The three features also represent three principles which are used to guide the formation of the three strategies.

The strategies, following the landscape principles, build a fundamental framework in which the intervention and design are developed and arranged.

CHAPTER III

HOW TO TRANSFORM BOUNDARY TO BORDER

- principles & strategies

1.PRINCIPLES

1.1 Landscape As Process

1.2 Landscape As Palimpsest

1.3 Landscape As Infrastructure

2.STRATEGIES

2.1 Site Deconstructuion And Extraction

2.1 Protected Structure

2.2 Sustainable Developement

2.3 Water Management

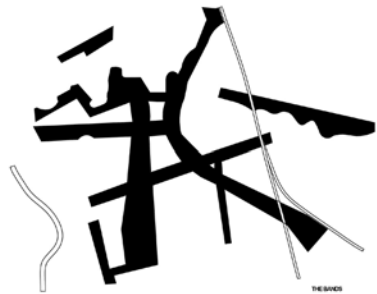
1. PRINCIPLES

1.1 Landscape As Process

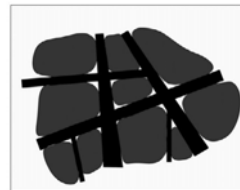
Landscape is employed as a dynamic process that changes in time. Two cases are studied to have a look at how to create a dynamic landscape.

SURRENDER, Ville Nouvelle Melun-SEnart, 1986, by OMA

positive & negative space in landscape



THE BANDS
".....will be formless, defined by this system of **emptiness** that guarantees beauty, serenity, accessibility, identity regardless.....its future architecture."



THE ISLANDS
".....each island's maximum autonomy ultimately reinforces the **coherence** of the whole....."

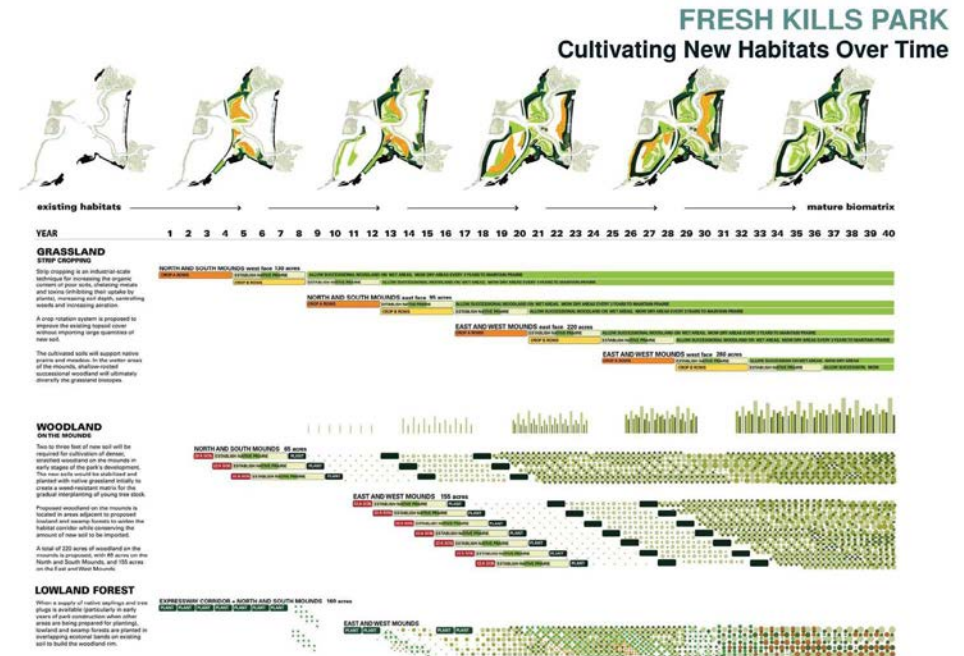


In this case, OMA decomposed the site into the islands and the bands. The bands could be seen as the negative space of the islands. Instead of designing the future of the developing islands (villages), they shift their attention on defining the emptiness of bands. They create a landscape framework that can absorb the urban development, guarantee the quality of landscape and finally contribute to a coherent system. The landscape is made in advance of urban development.

image source: URBANSTRATEGIES, http://urbanstrategies-networks.blogspot.com/2008/06/blog-post_28.html
REF: OMA, Rem Koolhaas, Bruce Mau, 1995. "S,M,L,XL" The Monacelli Press

Fresh Kills Park plan, 2001, By James Corner Field Operations

phasing and dynamic management



In this case by James Corner's Field Operations , a long term phasing plan of over thirty years is proposed. Through dynamic design and management, a park is grown instead of planted. It utilized both natural process and artificial interventions to cultivate a park system.

image source: <https://www.archdaily.com/339133/landfill-reclamation-fresh-kills-park-develops-as-a-natural-coastal-buffer-and-parkland-for-staten-island>

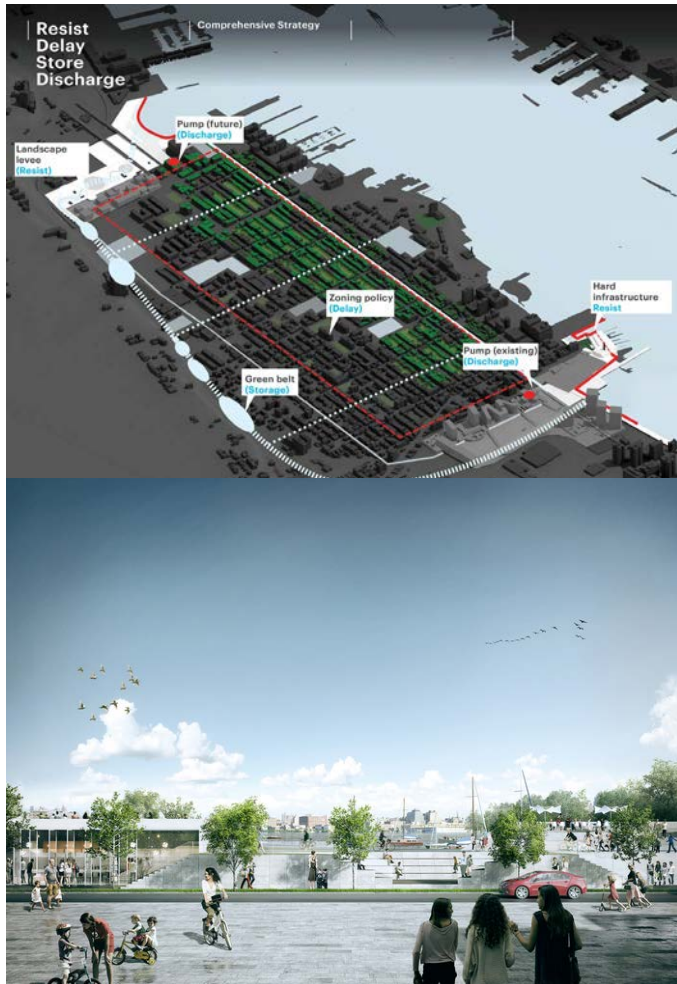
1. PRINCIPLES

1.2 Landscape As Infrastructure

Landscape functions as the urban infrastructure that can be manipulated to create a more resilient and adaptive system.

Resist, Delay, Store, Discharge: a Comprehensive Urban Water Strategy, 2013-ongoing, By OMA

multifunctional landscape infrastructure



In this case, water strategy of "resist, delay, store, and discharge" is put forward to manipulate the water system. The green and blue infrastructure is interweaved in the urban fabric and is combined with social and cultural aspects.



1. PRINCIPLES

1.3 Landscape As Palimpsest

The landscape is a palimpsest with strata of natural and artificial traces of different times. New events will occur to shape the landscape, but this does not mean the old layers are to be eliminated. This is a principle to redefine the identity of the post-mining site. Potentials can be regenerated from old traces.

Duisburg Nord Landscape Park, 1990-2002, By Latz + Partner

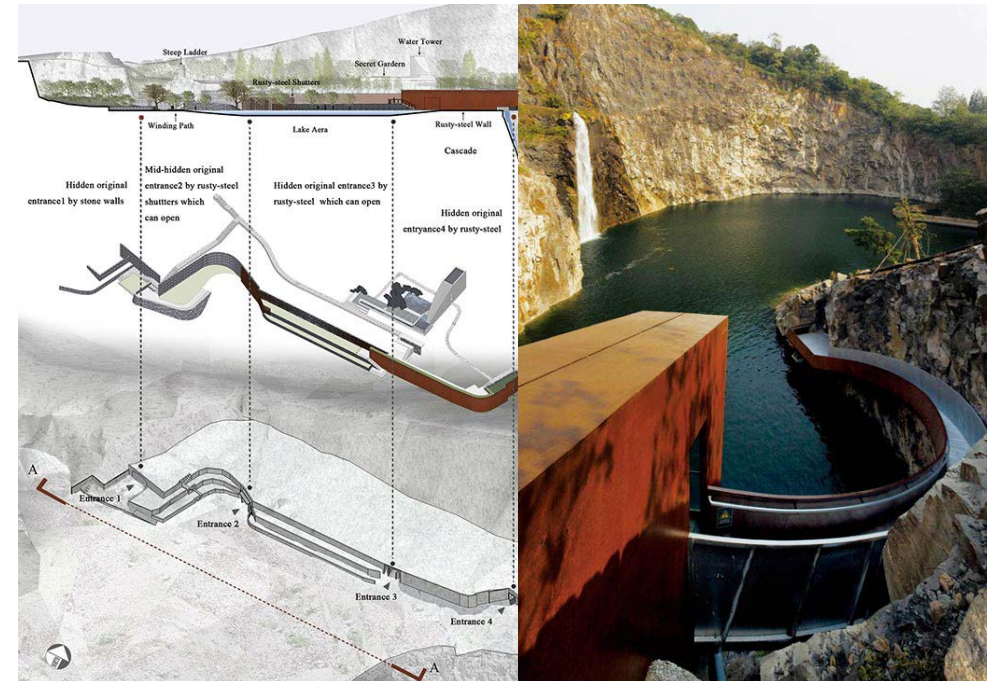
Industrial heritage is integrated into site memory.



"The existing fragments were to be interlaced into a new 'landscape'."

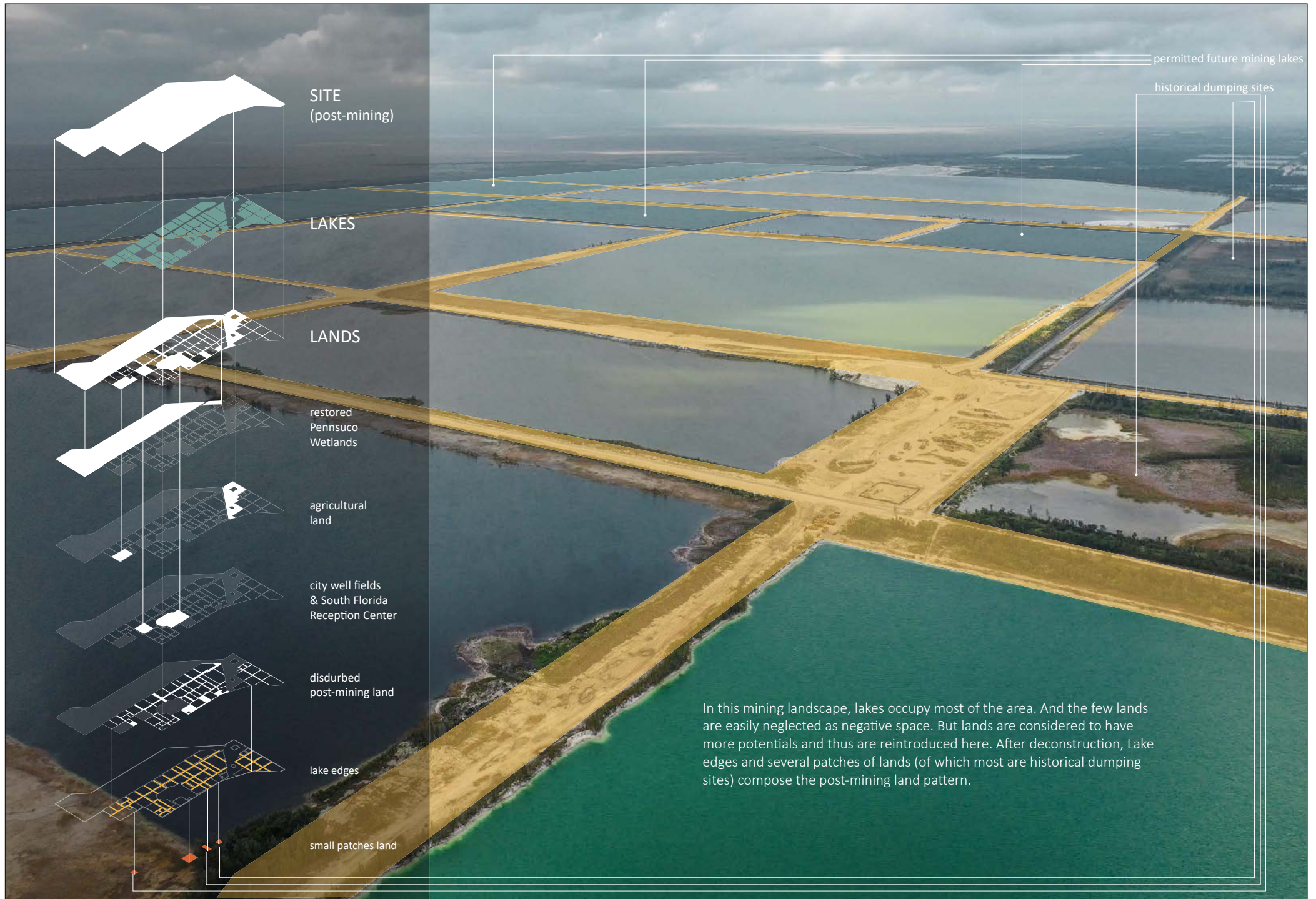
image source: <http://www.landezine.com/index.php/2011/08/post-industrial-landscape-architecture/>

Shanghai Botanical Quarry Garden, 2007-2010, By Yufan Zhu



" to respect the trueness of rock-wall landscape, rather than apply the routine wrapping method!."

image source: http://www.uedmagazine.net/UED_Theme_con.aspx?one=1&two=10&three=32&pid=5223



SITE
(post-mining)

LAKES

LANDS

restored
Pennsuco
Wetlands

agricultural
land

city well fields
& South Florida
Reception Center

disturbed
post-mining land

lake edges

small patches land

permitted future mining lakes

historical dumping sites

In this mining landscape, lakes occupy most of the area. And the few lands are easily neglected as negative space. But lands are considered to have more potentials and thus are reintroduced here. After deconstruction, Lake edges and several patches of lands (of which most are historical dumping sites) compose the post-mining land pattern.

2. STRATEGIES

Site Extraction

The lake edges are extracted to show the potentials. There are two existing opposite situations: naturalized and urbanized situation.

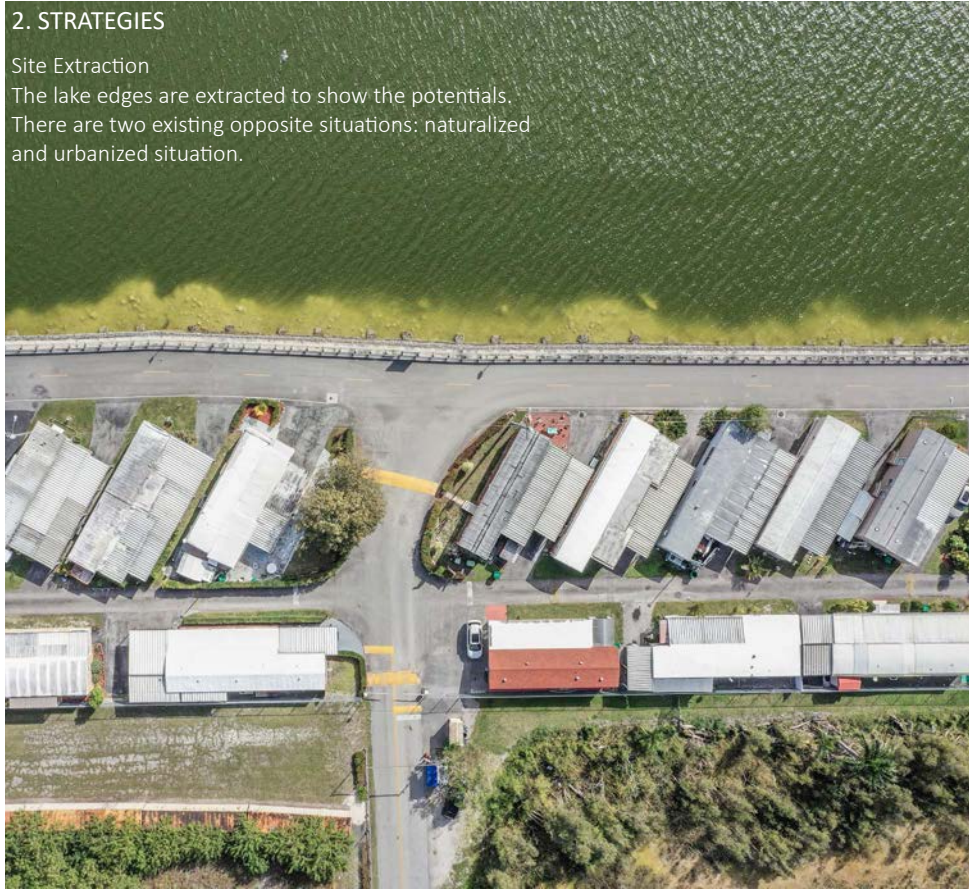


Image: mobile home park around a post-mining lake in the urban area.



Image: a restored wetland in the Lake Belt Area

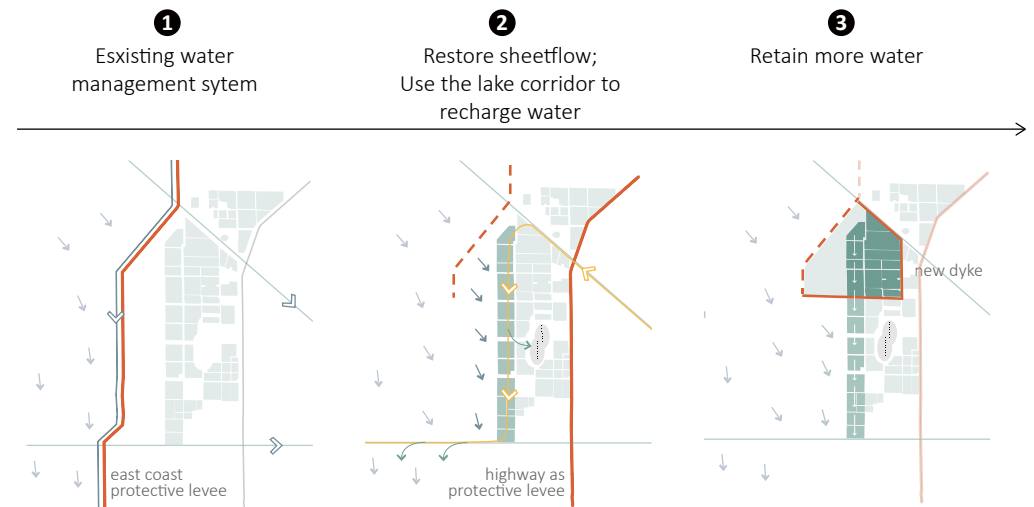
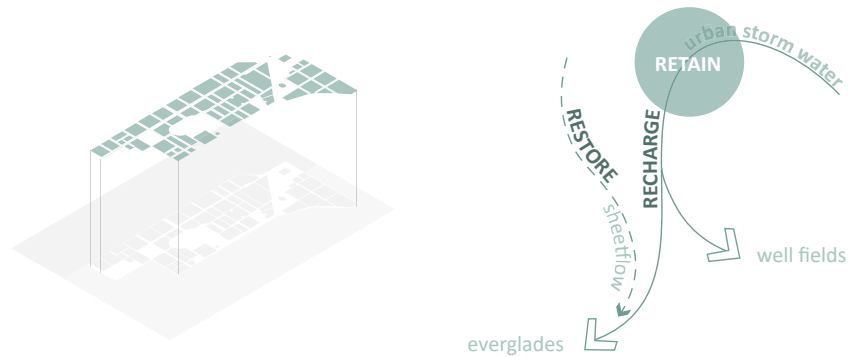
2. STRATEGIES

2.1 Water Strategy

Water strategy is deployed on the framework of lakes. It also works as the guiding principle for the whole plan.

Restoring the surface water flow provides more room for natural process, and more fresh water can be retained in the landscape. New water structures are designed to conserve more extra water. The water conserved is transported to recharge the surficial aquifer system to resist saltwater intrusion and to replenish fresh drinking water. The whole landscape is manipulated to work as resilient water infrastructure, replacing the static mono-function canals and levees.

WATER STRATEGY: RESTORE, RETAIN AND RECHARGE



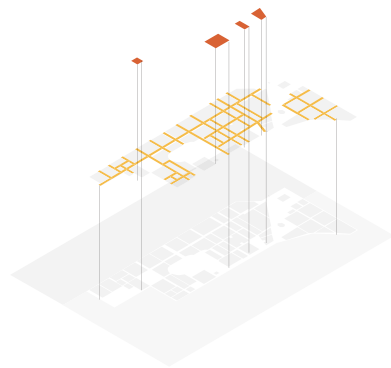
2. STRATEGIES

2.1 Land Strategy

Land Strategy aims to reactivate the potentials of the disturbed post-mining land and integrate urban and natural systems.

A landscape structure is grown prior to urban development. The protected ecological structure provides buffer time and buffer space to contain rapid urban sprawl. On the completion of the protected green network which should not be invaded, urban development is guided to penetrate. And over time, the two systems will grow and develop into an integrated whole.

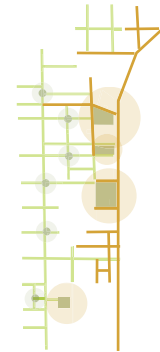
LAND STRATEGY: **PROTECT, PENETRATE AND INTEGRATE**



1
Grow the protected
landscape structure.
Create tree islands as
core habitats.



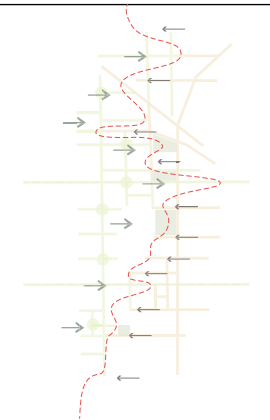
2
Guide the urban
penetration.
Regenerate post-mining patches
as primary recreational parks.



3
Connect, extend
and interpenetrate



INTEGRATION
& **INTERACTION**



The border is not a fixed form or result. It is a process in time which makes it responsive and evolving. The potential of border derives from its dynamics in this capacity to absorb and transform changes. So, the interventions are proposed to create conditions for things to happen instead of creating things.

The potentials are reflected in three aspects: ecological succession, water contribution and sustainable urban development.

CHAPTER IV

WHAT ARE THE POTENTIALS OF BORDER

- a dynamic interactive process

1. CREATING CONDITIONS

1.1 regional strategy

1.2 frameworks

1.3 phasing and development

2. POTENTIALS

2.1 ecological succession

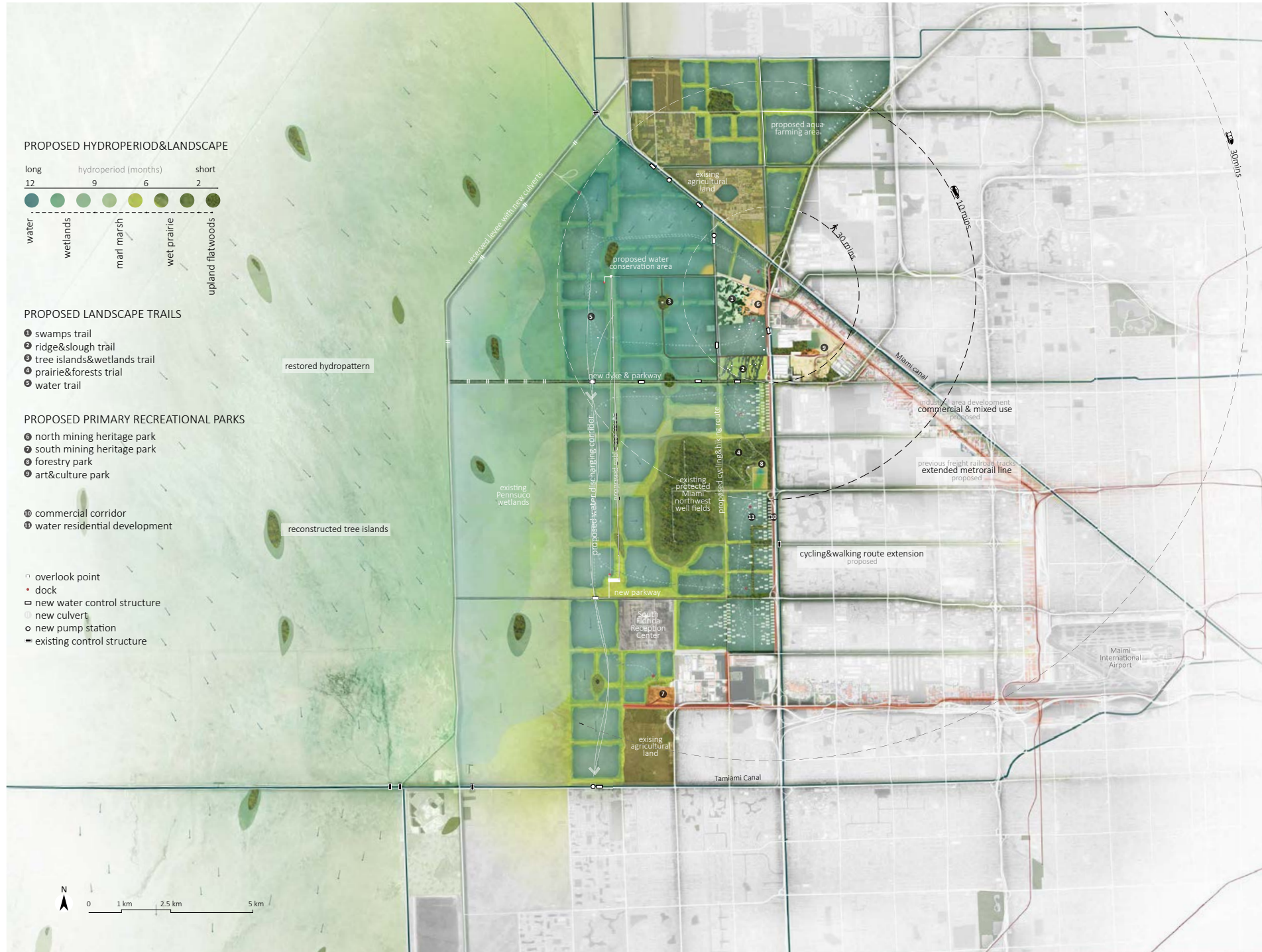
2.2 water contribution

2.3 sustainable urban development

1 CREATING CONDITIONS

1.1 Regional Strategy

Through the creation of different hydro-periods, diverse landscapes including swamps, wetlands, and forests can develop and evolve. These natural landscapes are accessible to urban people to provide various educational and recreational activities. The old mining system is reintroduced to the public. The abandoned processing area is regenerated as core heritage parks for recreation. And the old freight rails are used to transport people to connect the site with the city. This post-mining landscape integrates the natural system and urban system and plays a role in a larger scale.



1. CREATING CONDITIONS

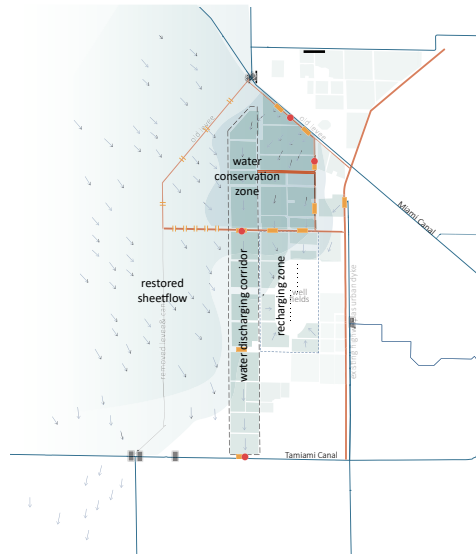
1.1 Regional Strategy

Decomposed Frameworks

The water structure is the fundamental framework for the regional strategy to develop. And the green structure is deployed according to different hydroperiods.

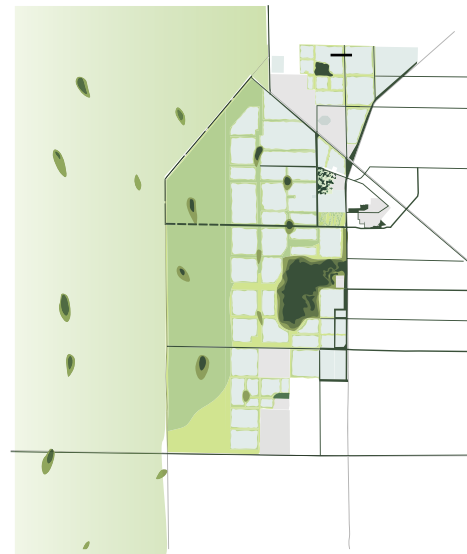
Public accessibility is increased to enable different new programs.

Proposed Water Structure



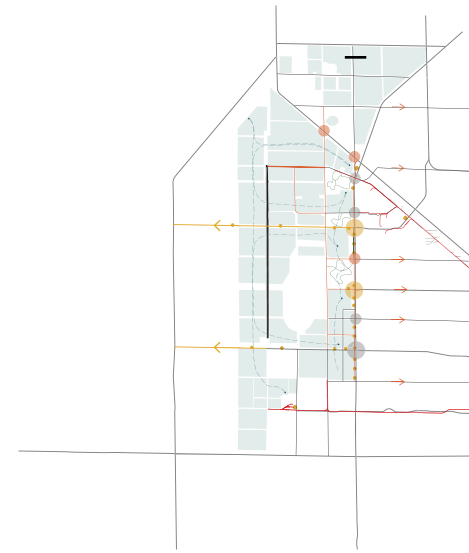
- | | |
|--------------------|-------------------|
| PROPOSED | EXISTING |
| seasonal flood | canal |
| surface water flow | control structure |
| culvert | |
| control structure | |
| pump | |
| wavebreaker | |
| dyke | |

Proposed Green Structure



- long hydroperiod (9-12 months), non-forested wetland
- medium hydroperiod (6-10 months), non-forested wetland
- short hydroperiod (2-6 months), wet prairie
- very short hydroperiod (1-2 months), hydric upland
- fluctuating hydroperiod (3-10 months), forested swamps
- ridge and slough landscape
- ridge: hydroperiod (9-10 months); slough: hydroperiod (12 months)
- reconstructed tree islands

Proposed Public Accessibility



- parking spot
 - primary park drive
 - water route for canoes, kayaks and boats
 - cycling & walking route
 - metrorail line
 - cable car route
 - trail
- | | |
|--------------------------------------|--|
| existing | proposed |
| existing | proposed |
| proposed parkways into the landscape | proposed cycling & walking paths into the city |

Proposed New Programs

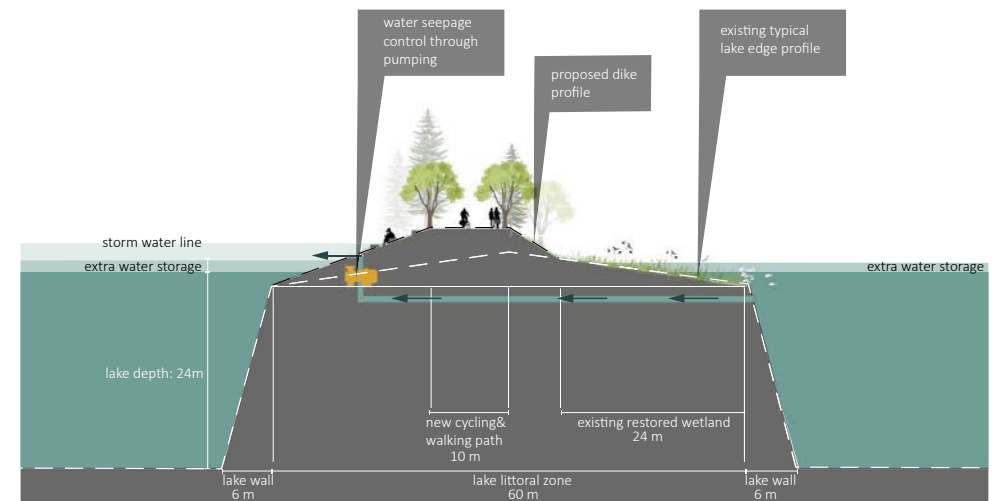


- residential
- commercial
- education
- aqua
- agriculture
- recreation
- events & festivals
- commercial & mixed use corridor

1.CREATING CONDITIONS

1.1 Regional Strategy

Dike Profile

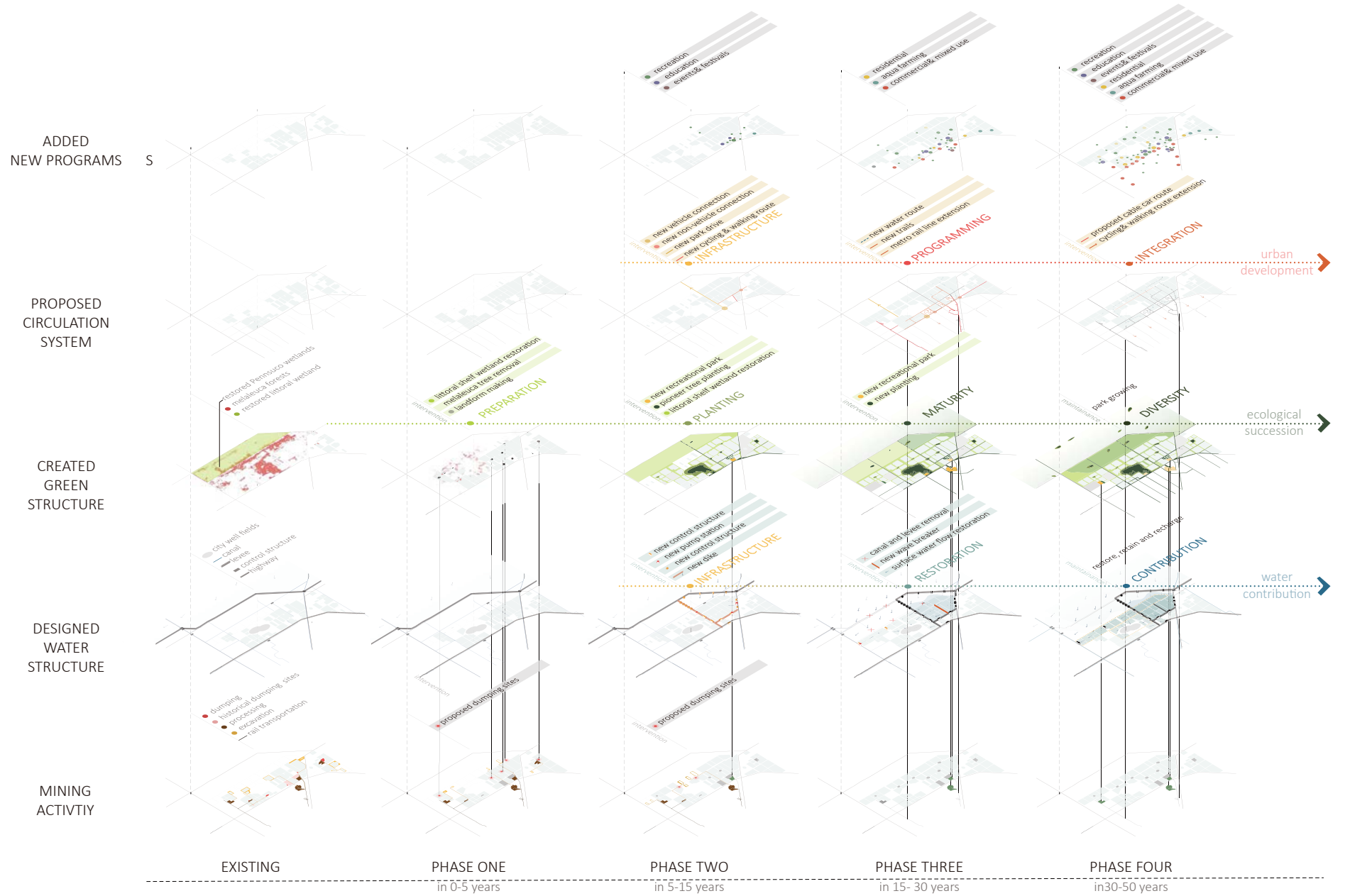


The dike is built upon the existing lake edges. It is a part of the urban water infrastructure. It is accessible by cycling and walking and it provides important habitats for vegetation and animals. The water level is controlled through pumping.

1. CREATING CONDITIONS

1.2 Phasing And Development

Four phases are made to create conditions for ecological succession, urban penetration and water contribution in the long term.



1.CREATING CONDITIONS

1.3 Phasing And Development

As the ecological structure gets mature and diversified, urban activities are guided to penetrate. Basic infrastructures are arranged to make it accessible. And the lakes are proposed to accommodate water-adaptive housing types which encourage the emergence of new building technologies and new materials:



The mining activity of overburden removal and waste dumping are utilized to make terrains and recycle soils. The removal of invasive Melaleuca trees, the planting of pioneer species and the restoration of sheet flow prepare conditions for peat formation and native species succession.



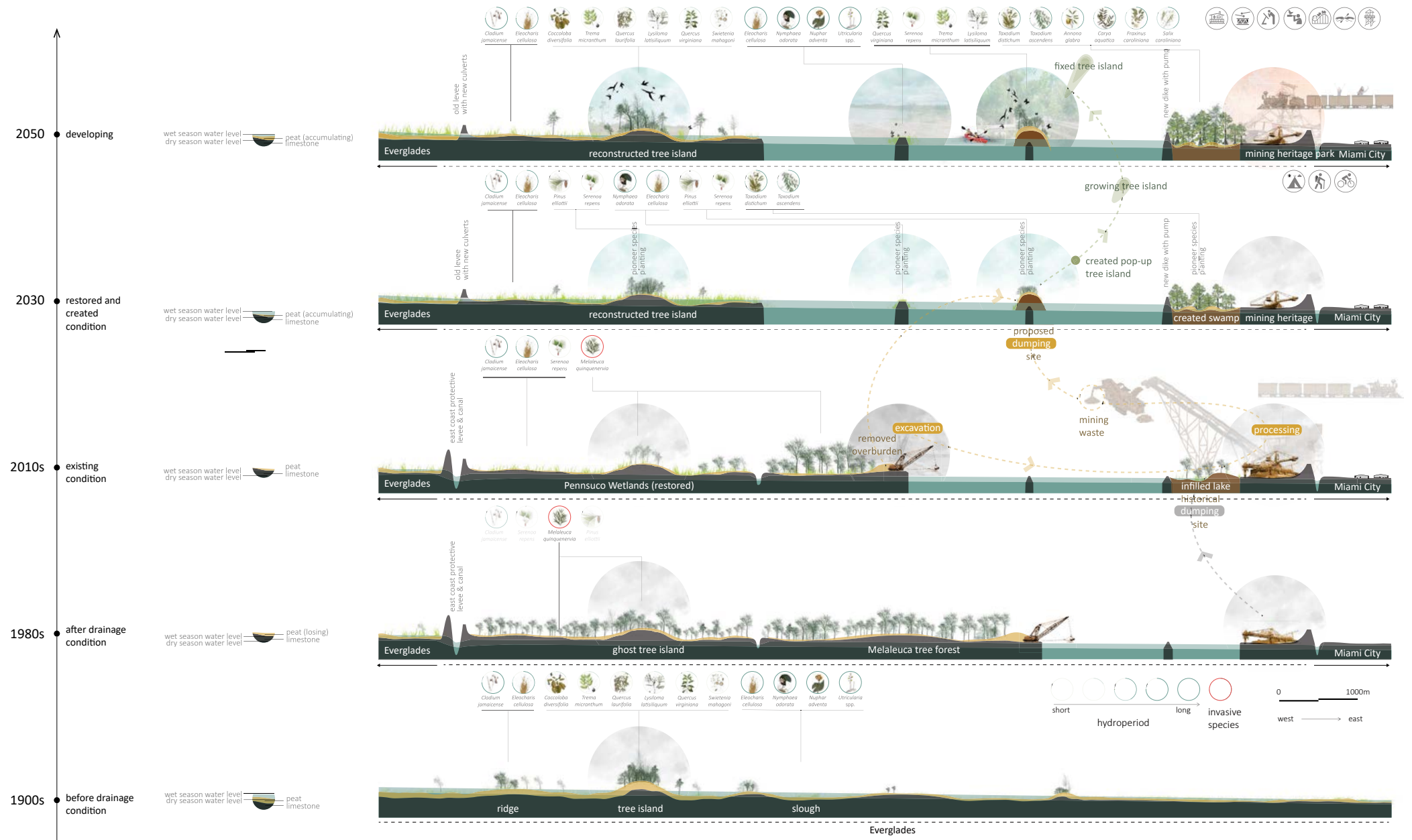
Water infrastructure is completed step by step to play a indispensable role in the whole system.



2. POTENTIAL

2.1 Ecological Succession

As proper water condition is created, the peat soil accumulates again.. Diverse species grow and evolve..



2. POTENTIAL

2.1 Ecological Succession

Different landscape are created and provides diverse spacial experiences.

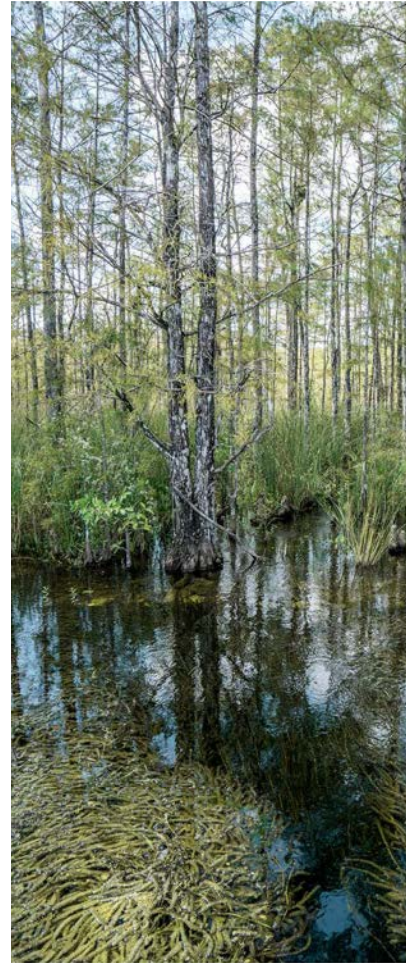
hammock forest



pineland



cypress swamp



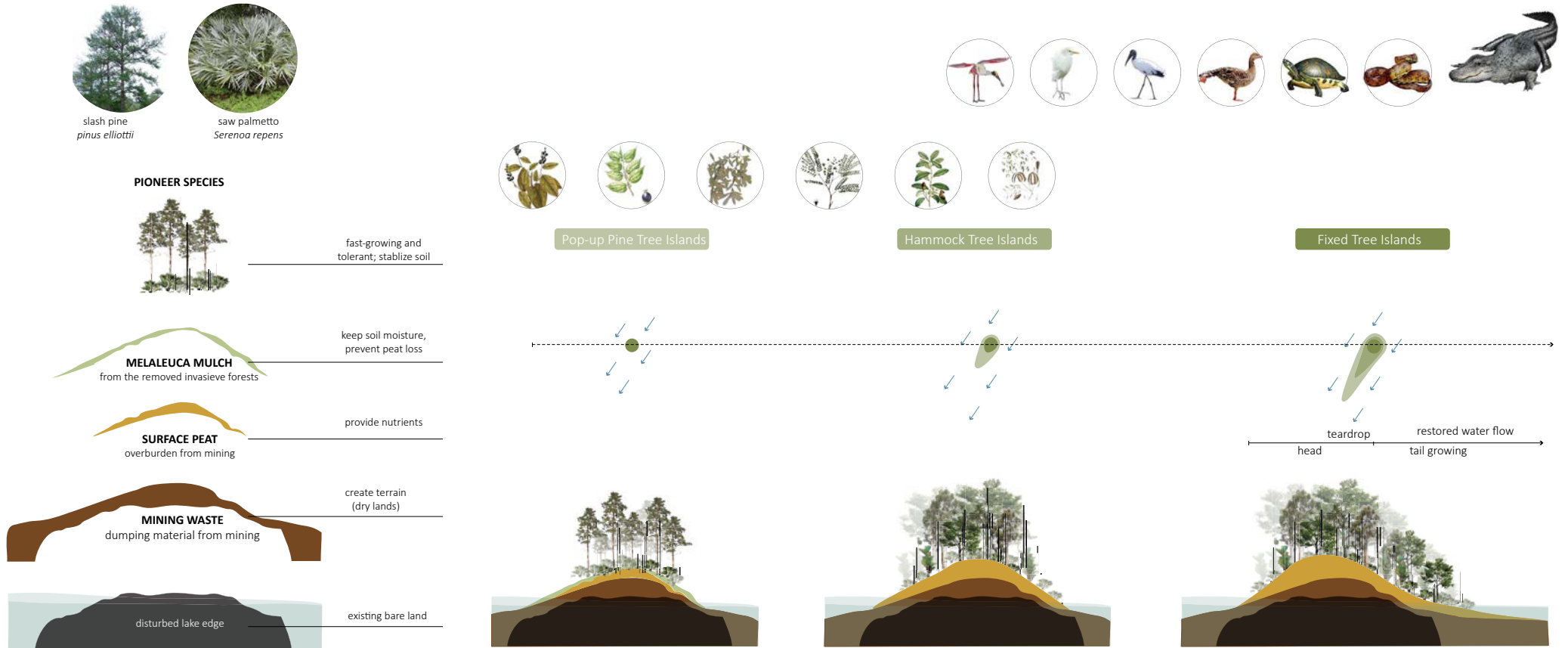
wetland



2. POTENTIAL

2.1 Ecological Succession

The mining process is employed to make tree islands. And the local material are recycled and reused. So the reconstructed tree islands can grow over time and serve as core habitats for diverse native species.



2. POTENTIAL

2.1 Ecological Succession

Boardwalk to a tree island.

People are invited to interact with nature.

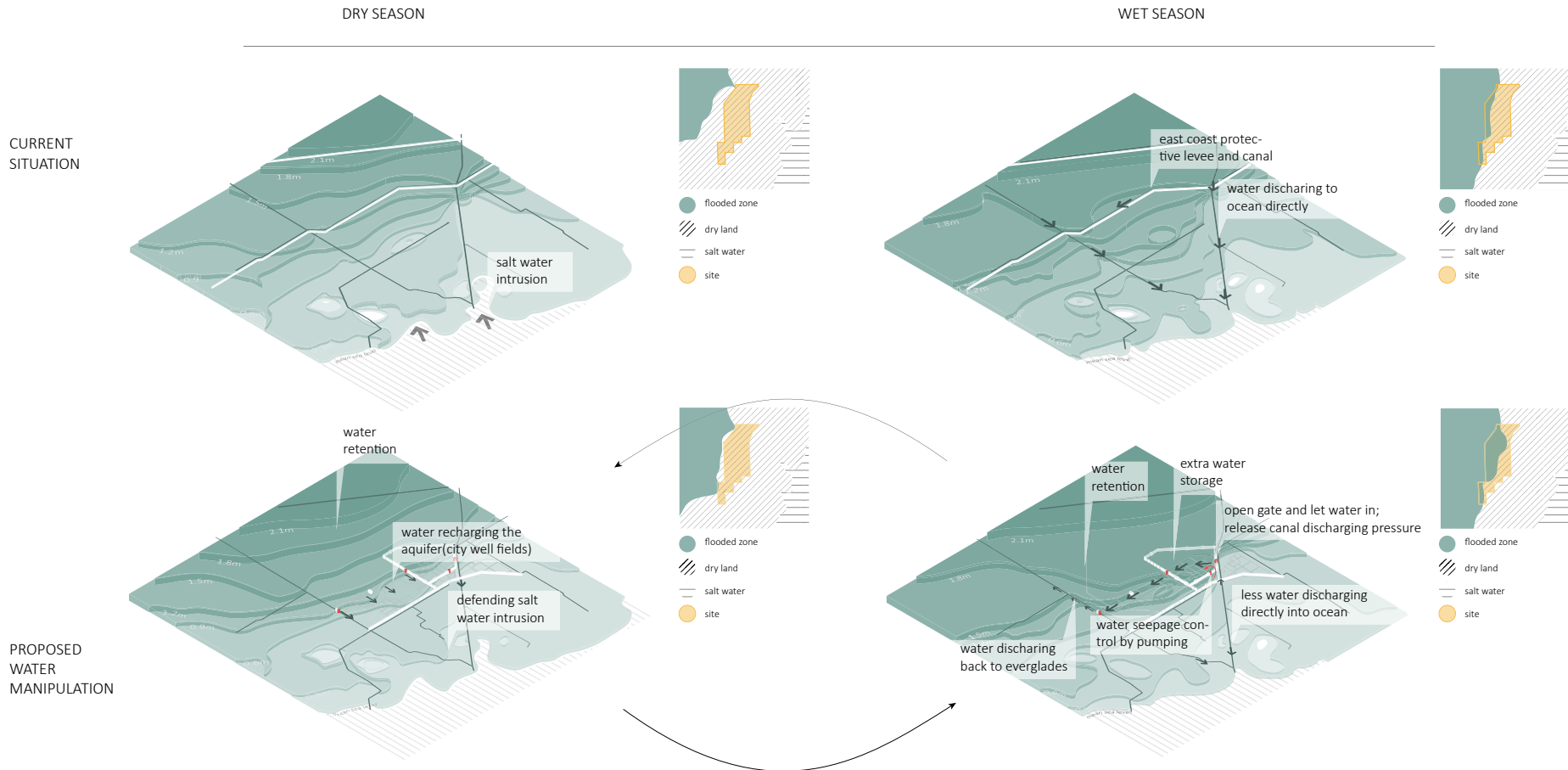


2. POTENTIAL

2.2 Water Contribution

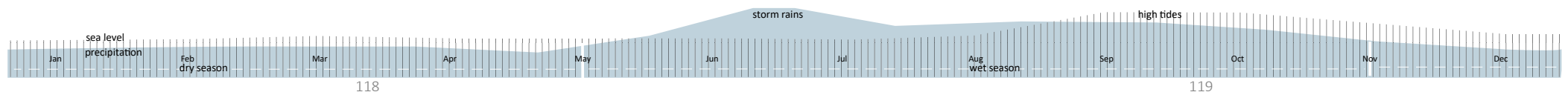
As sea level rises, the city will need to conserve more fresh water to resist saltwater intrusion and to supply fresh drinking water. The existing northwest well field, as the most inland one, will be the safest well field in the future.

By flooding the wetlands, more water will be retained in the ecosystem. And increasing the water level by building new water structures will add extra water storage in the lakes. The water stored and retained can offset the amount of water extracted by wells.



- Miami Dade County population: 2.2million; daily fresh water consumption per person: 0.5m^3
- With **0.3 meter** water level increased, one medium size lake can store extra amount of water: **$768,000\text{ m}^3$** (satisfying **1.5 million** people's daily consumption)

- With **0.3 meter** water level increased, The water conservation zone can store extra amount of water: **$10,752,000\text{ m}^3$** (equal to **8-days fresh water consumption of the whole county population**)

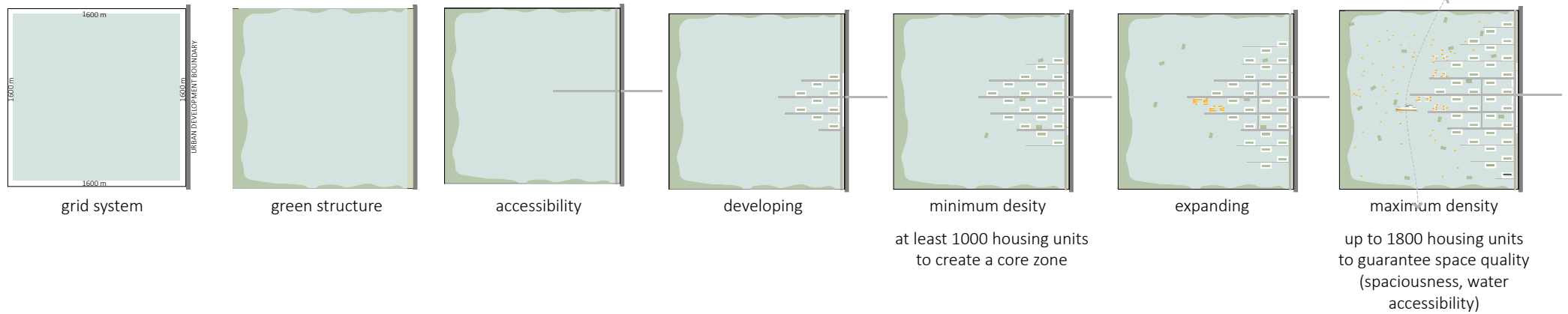


2. POTENTIAL

2.3 sustainable urban development

Neighborhood- Fabric

Instead of surrounding a water body, the urban network is extended into water so as to create more opportunities for all kinds of water activities and interactions with water. The lake is open and accessible to the public.



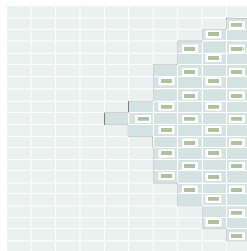
Neighborhood- Capacity

A minimum density is set to create a mixed-use core zone that provides multiple services. And it also has a capacity to absorb further urban expansion. A maximum density is set to guarantee the space quality including the connections of water transportation and space spaciousness.

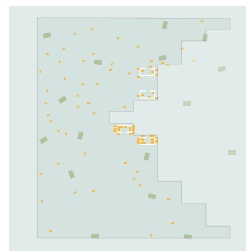
Neighborhood- Density

Housing Types

In addition to permanent blocks, temporary mobile houses are allowed to settle on open water to provide extra dwellings and different living experiences.



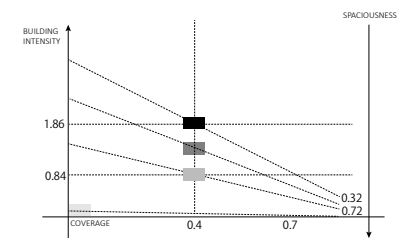
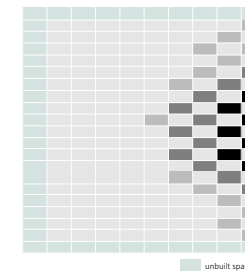
permanent blocks
up to **1500** housing units



temporary mobile houses
up to **300** units

Intensity

Building intensity is designed to avoid too much pressure on the environment and contribute to a core zone where people gather around.

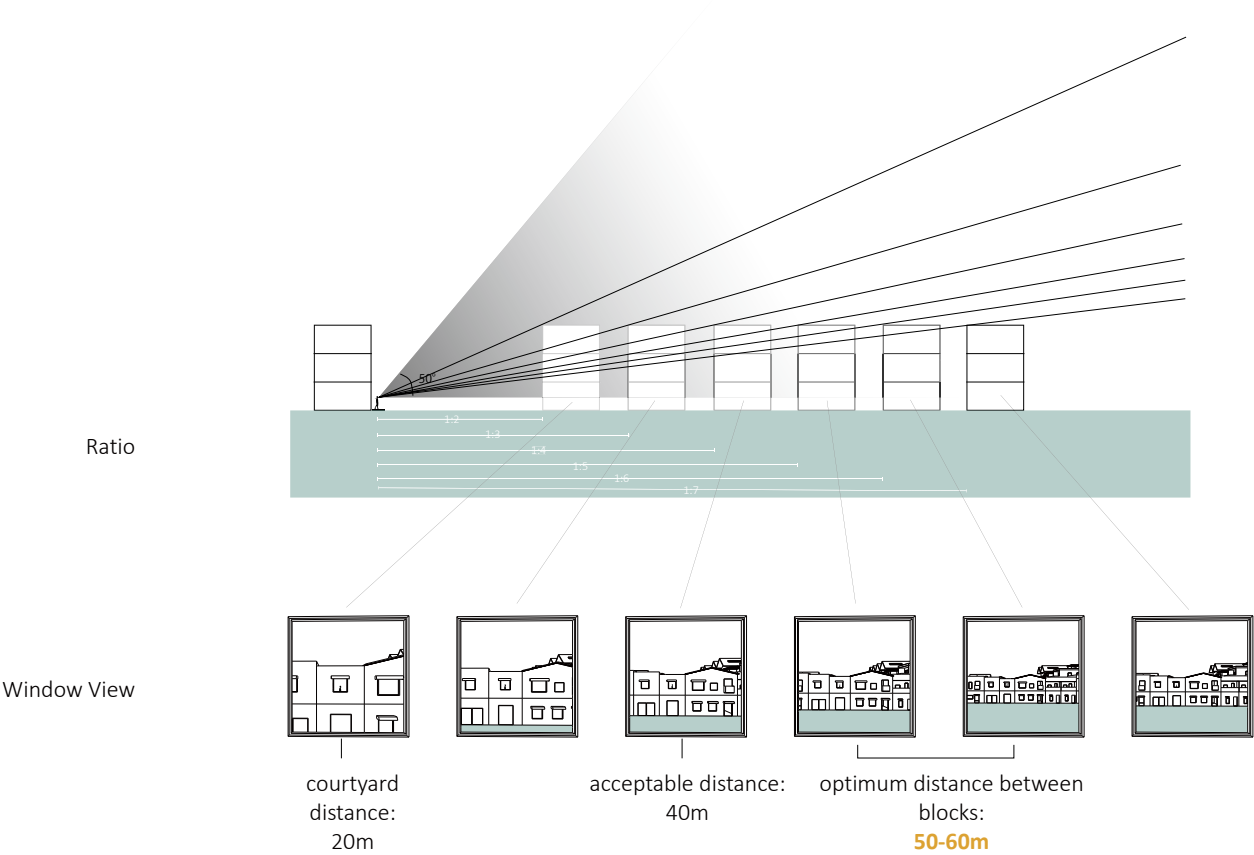


2. POTENTIAL

2.3 sustainable urban development

Neighborhood- Quality

According to the visual logic of human beings and a series of viewing tests, an optimum distance between bocks is recommended to avoid congestion and guarantee water transportation and individual housing privacy.

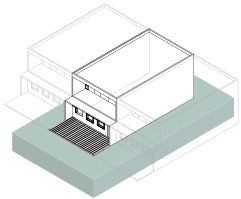


2. POTENTIAL

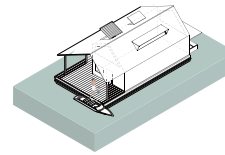
2.3 sustainable urban development

Islands- Variations

Within the fabric of the district, many different types of islands are possible.



multi-family condo



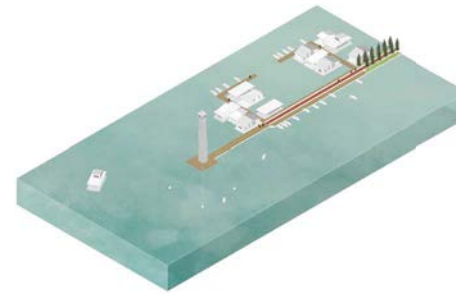
single-family house



72 housing units



21 housing units



13 housing units



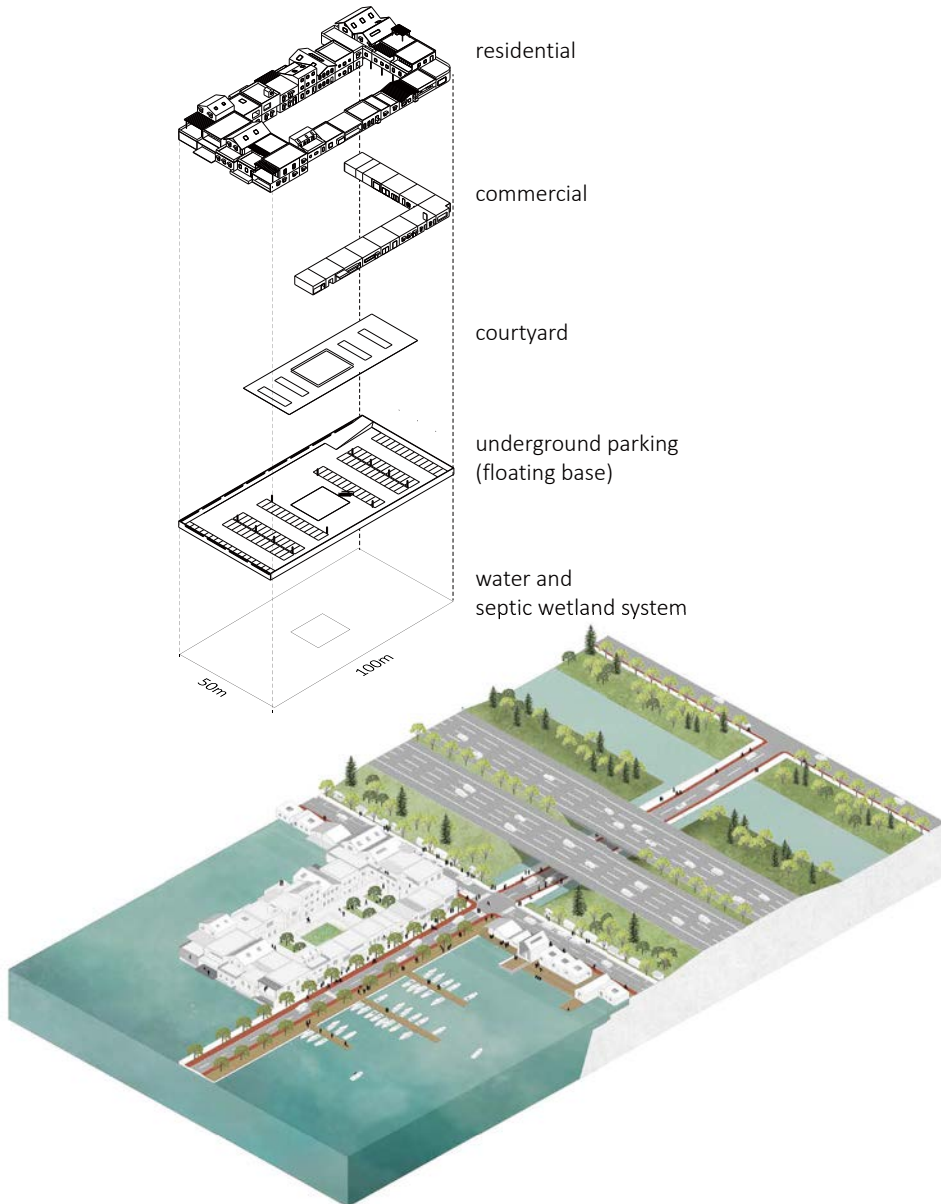
5 housing units

2. POTENTIAL

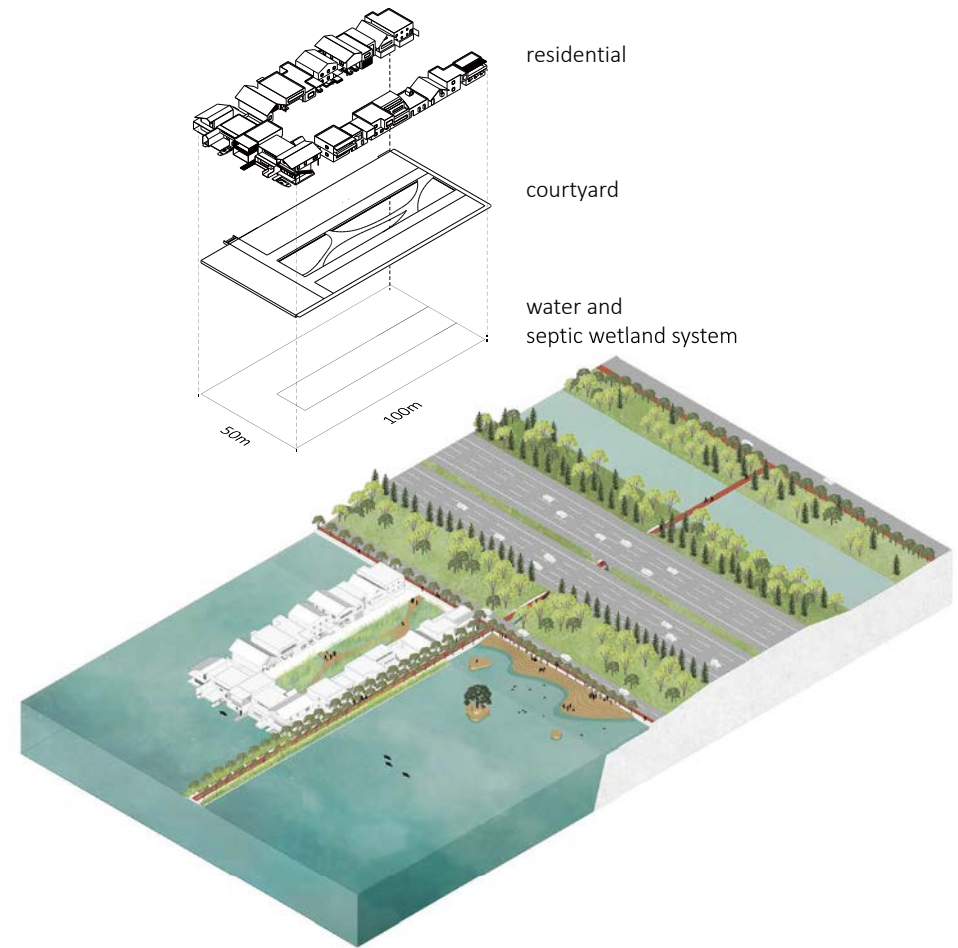
2.3 sustainable urban development

Islands- Variations

The residential in the core zone is mixed with the ground-floor commercial. And underground parking provides extra parking spaces in addition to side-parking along the main road.



In a remote zone, a low-density residential block is designed. And it is mixed more with nature. The parking spaces are limited and walking and cycling are encouraged.

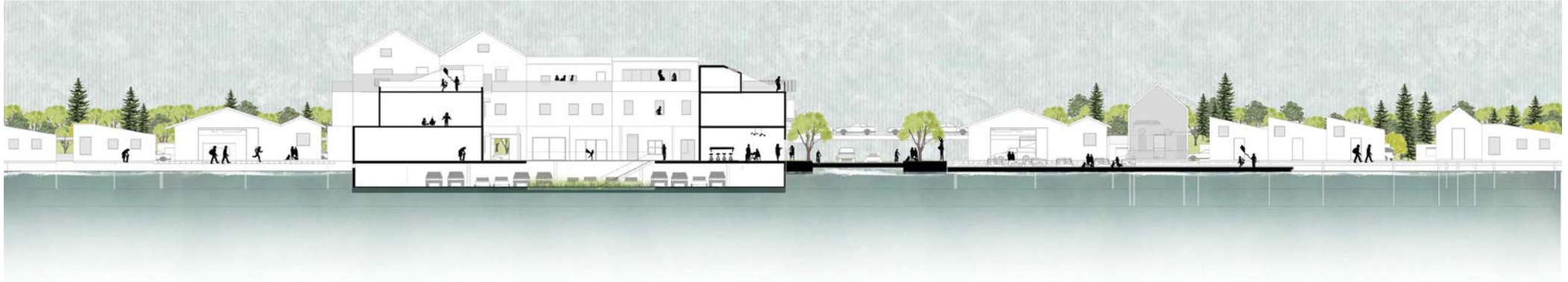


2. POTENTIAL

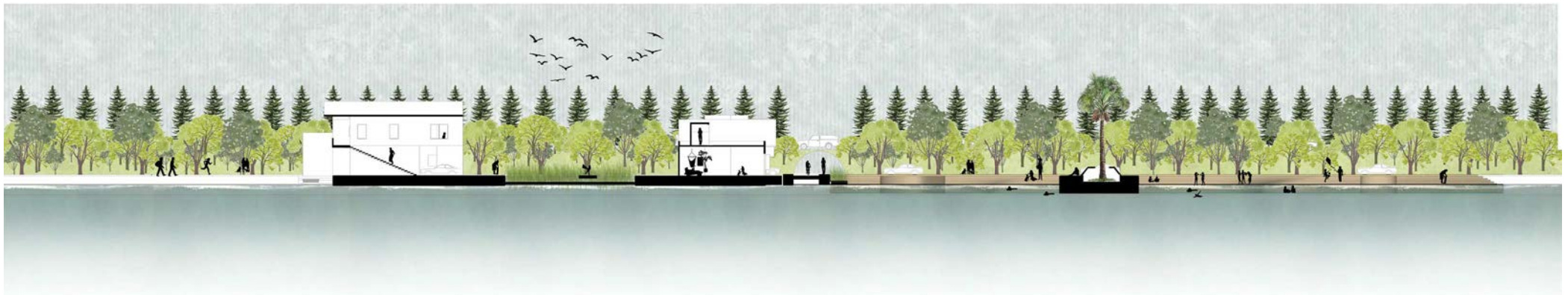
2.3 sustainable urban development

Islands- Variations

core zone section



remote zone section



2. POTENTIAL

2.3 sustainable urban development

Islands- Exterior Connections

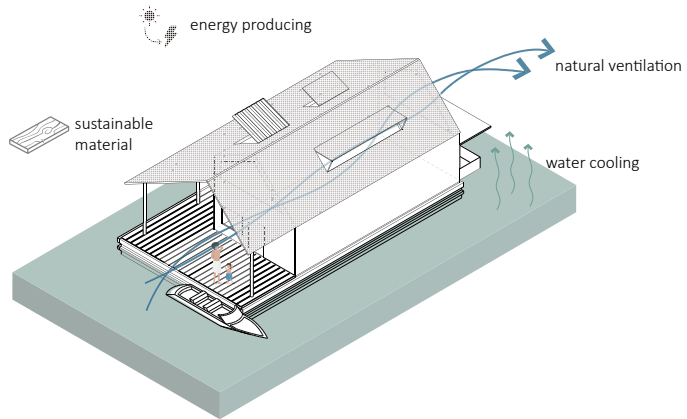


2. POTENTIAL

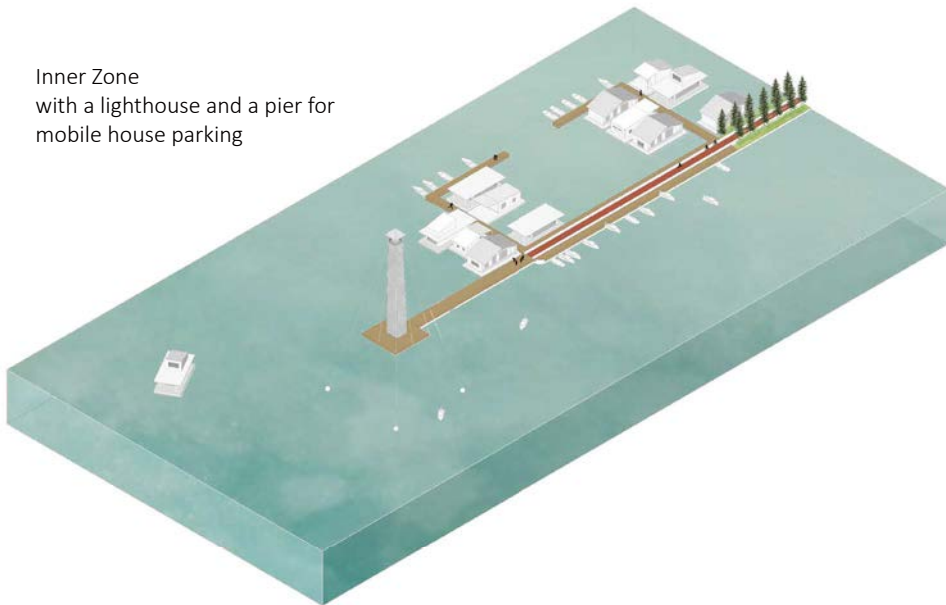
2.3 sustainable urban development

Sustainable Building

A new type of sustainable building is proposed. It makes use of the water body for cooling and the natural wind for ventilation so as to lower down the energy consumed by air-conditioners. And a roof with solar panels could utilize the tropical sunlight to produce energy for other daily consumptions. New sustainable materials should be used to replace limestone.

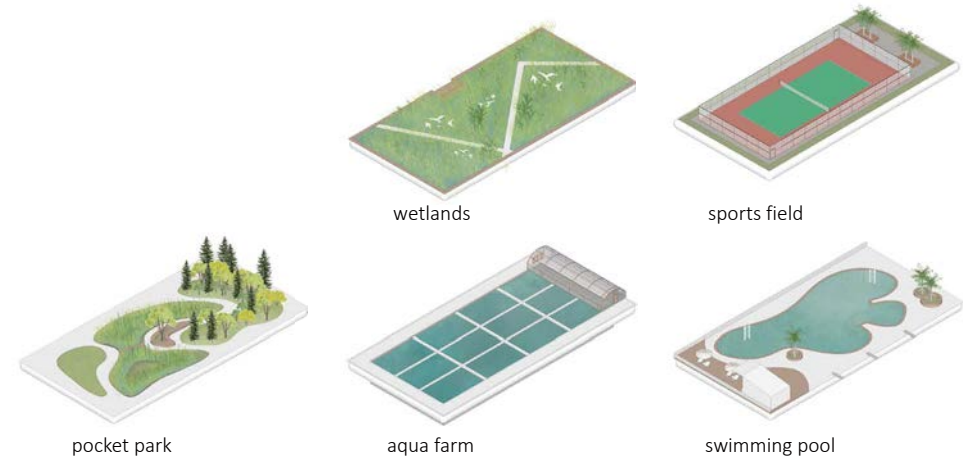


Inner Zone
with a lighthouse and a pier for
mobile house parking

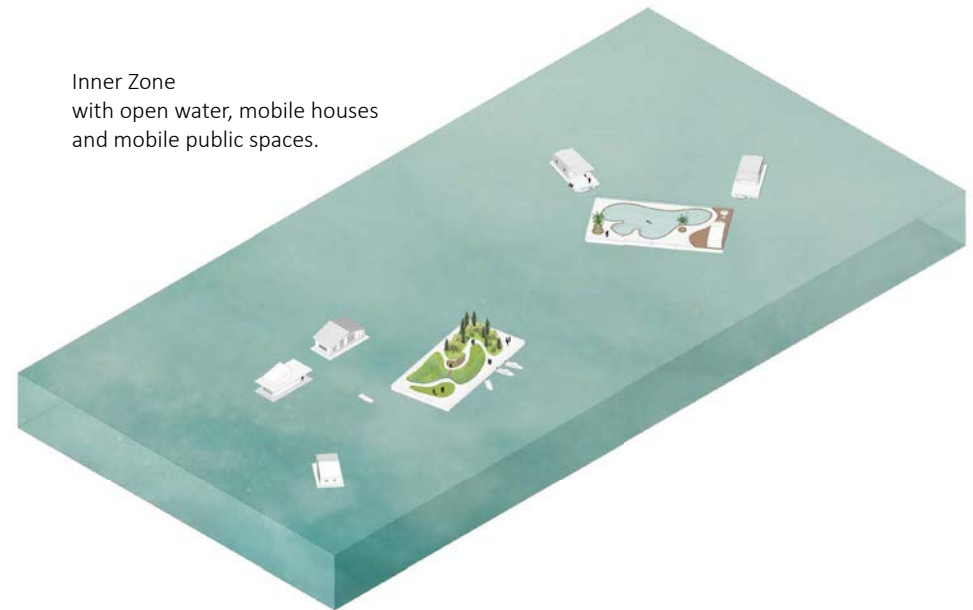


Flexible Combination

Different types of floating islands can be organized freely to provide pocket public spaces on the lake.



Inner Zone
with open water, mobile houses
and mobile public spaces.



2. POTENTIAL

2.3 sustainable urban development

Inner Zone

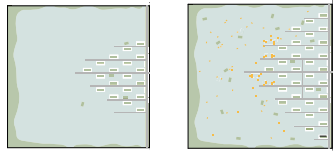
peaceful and dark sky towards nature.



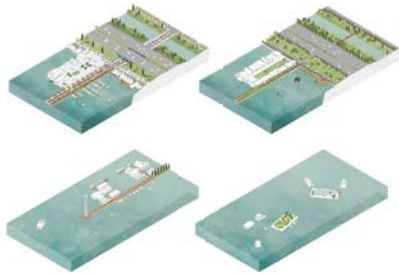
2. POTENTIAL

2.3 sustainable urban development

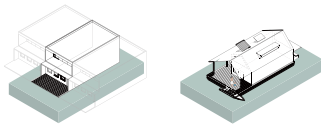
WATER
Neighborhoods



DIVERSE
Blocks



SUSTAINABLE
Buildings



The potential for sustainable urban development is explored from multiple scales. It shows a possibility instead of a final result. A series of development principles and guidelines are put forward to reserve the space for nature and guarantee the quality of space. This future urban form should not be car-oriented but be walkable and accessible by diverse transportations. Each unit should be adaptive to the water and the local climate in order to reduce the pressure on the environment.

2. POTENTIAL PENETRATION



Over time, nature will be brought back to urban life. The border provides easy accessibility for urban people to watch birds, observe wetlands, learn trees, etc. It is the best way to educate people through direct contact and daily interaction. In addition, water-adaptive houses on lakes bring urbanism into nature and mitigate the residential pressure of the city. The residential development increases the land value and the economic benefits it brings can also be used to protect the ecological structure.

2. POTENTIAL

INTERACTION

Recreated natural cypress forests and mining heritage.



CHAPTER V
CONCLUSIONS AND REFLECTIONS

1. CONCLUSIONS
2. LESSONS LEARNED
3. OUTLOOK

CONCLUSIONS

After the research and design, the three questions are answered.

How to read the boundary?

The boundary is read as a physical and psychological isolation between natural and urban systems. It implies an attitude of binary opposition. This opposition came into being and got enhanced as Miami city expanded and encroached the Everglades. People tried to control the natural process and block it away from the city. But natural systems are so complex and uncontrollable, especially in the context of climate change. Now, this opposition has caused serious problems to both systems including Everglades ecosystem degradation and Miami urban flooding. In addition, the boundary eliminates the possibilities for urban people to get interacted with nature, which exerts imperceptibly influence on shaping urban people's attitudes that may be destructive to the whole environment.

How to transform boundary to border?

The border is distinguished from boundary as border is dynamic and adaptive. So, the principle of landscape as process is utilized to explore its dynamics; the principle of landscape as infrastructure is followed to make the urban system more adaptive to natural process; the principle of landscape as palimpsest is used to explore the potentials of the post-mining site. The three basic principles are transformed into specific strategies on site. Water strategy employs the natural water process as a driving force to reactivate the site potential as urban infrastructure. Land strategy encourages interactions between the two systems to harvest ecological, economic, social and educational benefits. Overall, these strategies build a landscape framework on the existing situation for the two systems to grow and adapt in time.

What are the potentials of border?

Under the landscape framework, a series of interventions are proposed to create conditions for the natural process and urban process to take place. These conditions encourage and absorb changes and interactions that make the border adaptive and dynamic. Water is manipulated to nourish the ecosystem and replenish the aquifer to supply drinking water and resist saltwater intrusion. Water is not a burden anymore but a valuable resource. Diverse species can be brought back. Urban people can live together with nature and get educated. The land value is reclaimed, and the city is more resilient to climate change.

Through answering the three questions, the research objective (to explore the potentials of border as a dynamic interactive process through a landscape approach that employs the processes of urbanism and nature to create a more sustainable and resilient landscape on post-mining site) is achieved. And some lessons could be learned from this project.

LESSONS LEARNED

These lessons could be learned from this project.

From concepts to design

This project starts from the biological notions of boundary and border. This a good start to put forward the concepts first so that people can have initial association and better understanding. A strong concept is impressive and straightforward to express ideas. And then the concepts become more and more imaginable and physical as more details added.

Research and Design

This project uses design research and research-by-design as basic methodology. They complement each other and should move forward simultaneous. However, the research objective was not specific in the beginning. During this project, the design came after research. As a result, the research direction was not clear, which is reflected in the research part of the first two layers: hydrogeology and ecology that focuses on the context of South Florida. Although they are important, some went so far that are not necessary for the design.

“Flowscape”

The graduation studio topic is “Flowscape” which aims to explore the process of landscape, the relations between landscape and infrastructure, and cultural identity of landscape. These features of landscape are employed as the three principles: landscape as process, landscape as infrastructure and landscape as palimpsest to guide the development of designs. From a static image to a dynamic process, landscape is experiencing a transformation. This transformation should be reflected not only in theories but also in practical designs. This project of “from boundary to border” is such an attempt to translate this abstract theoretical notion into spatial forms and test it in the context of Miami. This is also the most difficult part: to extract the notion of “boundary” from a real site and project back "border" as spatial form.

Method and Approach

Mapping, as the most important approach in this project is a powerful technique in both understanding and creating. In this project, photography was explored as a way of mapping. It is very useful in mapping the site, especially in researches on the mining system. The mining processes are mapped into images to elaborate how things happen and change. Photography mapping is also an approach to uncover site qualities. For example, it revealed the unusual mining landscape qualities that can be translated into designs.

OUTLOOK

The project builds a framework of landscape. But only the knowledge of landscape will not make it complete. Multidisciplinary knowledge is needed to supplement it. Therefore, the landscape framework serves as an adhesive and a catalyst. Although as much knowledge as possible is touched in the last year to make it more convincing, the project may still ignore many important aspects. For example, the technical aspect and the policy aspect require more considerations. Without knowledge of these aspects, it is impossible to make the project implemented and function.

This project hopes to call for more attention to these edge conditions. The meaning of border in landscape not only applies to Miami but also to many other cities with the same problem of isolation. It is time to re-establish the interactions between city and nature, and the edge is a good place to start making changes.

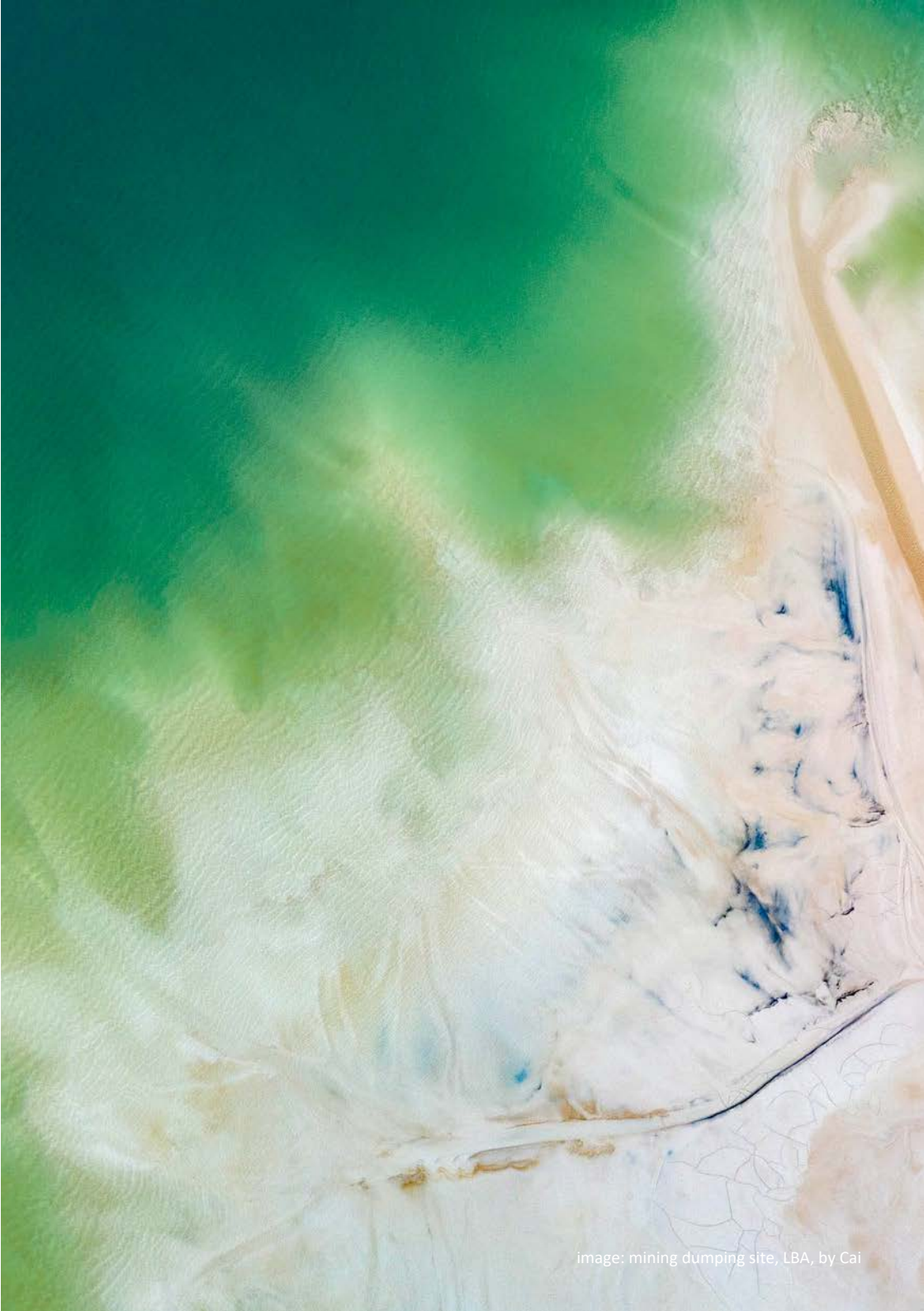


image: mining dumping site, LBA, by Cai