YANG, YUXIN

PORTFOLIO

YANG, YUXIN

Environments as Engineered Systems

Yuxin Yang is a climate-positive and technology-savvy designer. She interfaces the built environment as an engineered system with a particular interest in the mega-infrastructure, mix-used development, and energy and water system. She integrates the knowledge of sensing technology and data visualization in design thinking. At or after work, Yuxin values opportunities and tools to facilitate the public agenda.

Yuxin has worked as an urban designer and landscape architect for internationally renowned design companies. She has held a practice or research position at SOM, SWA Group, URBANGENE, Zhuyufan Studio of Tsinghua University, and Shanghai Study Center of Hongkong University.

Yuxin holds a Master of Landscape Architecture from Harvard Graduate School of Design and is cross-registered at MIT Media Lab and EECS. She has a Bachelor of Engineering in Landscape Architecture from the School of Architecture, Southeast University, China.

Technicals

Landscape and urban design (Rhino, Adobe Creative Suite (Photoshop, Illustrator, Indesign, Audition, Premier), Lumion, Vray, AutoCAD) - 5
Computation (Python, Grasshopper (Ladybug, Millipede), Arduino, Electronics, Processing) - 3
Geo tools (ArcGIS, ENVI, eCognition) - 3
Prototyping (3D Printing, Laser Cut, 3D Scan) - 3

Selected Works

From Airport to HST Station: Bio Intermodality
From sustainable functionality to bio connectivity / Airport City / 3

Crosswind Data Center
Decentralized energy future and digital town / Data Center Town / 14

Migration is Beautiful
Landscape as dissolvent of social and natural dilemma / Biophillic City / 24
2021 WLA Awards shortlisted

Dredge Engine
Dredge cycles for vegetation and coastal defense/ Dredge / 33

Vernal Ponds
Nature self-assembled restoration / Quarry / 44

Mobile Market on the Track
Wasteland as recollection of history / Industrial Revitalization / 52

Airport City, Zhengzhou, China

Bio Intermodality

Instructor

Joan Busquets, busquets@gsd.harvard.edu

Dingliang YANG, dyang1@gsd.harvard.edu

Collaborator

Shuhan NIE

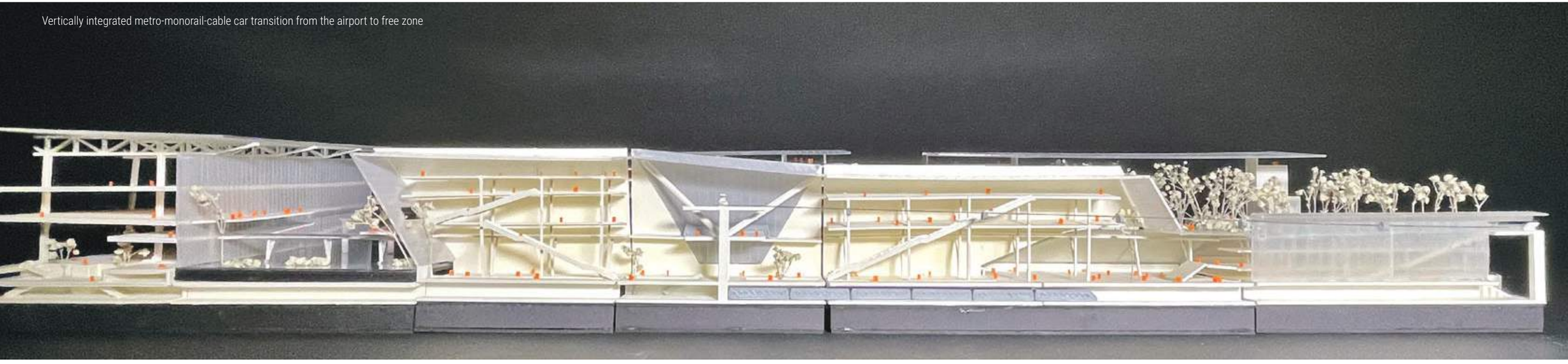
02/2022 - 05/2022, Academic

The studio rethinks airports in the context of environmental crisis challenges for exploring efficient intermodal transportation nodes as a new frontier for developing the future. The right combination of transportation modes can ensure the high-level accessibility that an innovative economy demands and reduce the negative impact of unnecessary long-range traveling.

The two models introduced for the airport districts are "complimentary" and "integrated." The integrated model refers to the airport and high-speed train (HST) station being integrated into one mega-infrastructure, creating a densified arrival experience. In contrast, the complementary model refers to the airport and HST station apart, where transfer needs to be choreographed with local development. Zhengzhou airport, China, is one exemplar case of the complementary model, with the airport 7km distant from the train station.

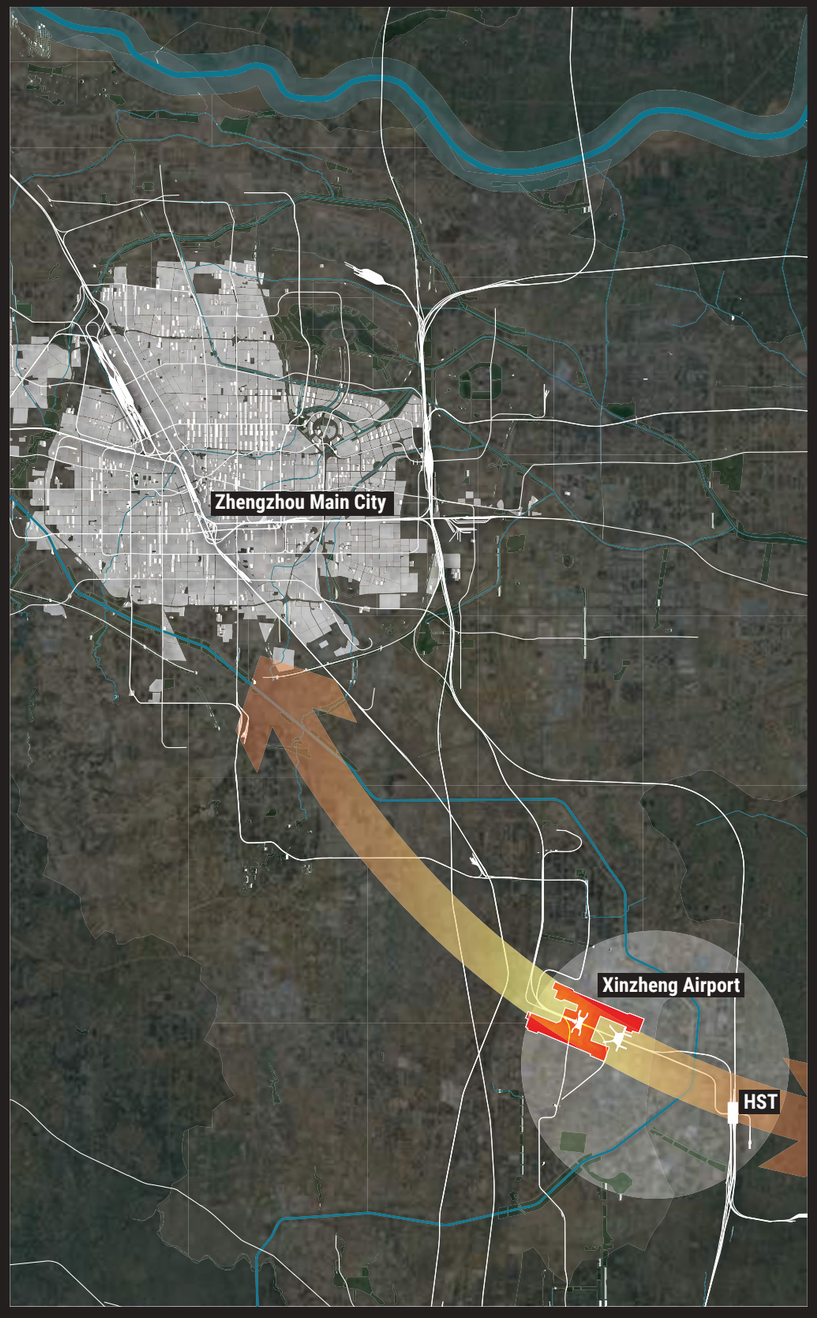
Zhengzhou is one of China's busiest logistic and low-end manufacturing cities, with dense metro and railroads. In-between the 7km from the airport to the HST station, a river serves as the critical south-to-north drinking water transfer canal, and the land is primarily undeveloped with a few villages. *Bio Intermodality* proposes a bio-diverse corridor extension to mingle high-tech and business development. To adapt to airport issues like noise, pollution, and height control, the master plan strategy of low-lying landscape continues in the TOD infrastructure to facilitate various transportation, interlinking of neighborhoods, and ecological continuity. Road, metro (existing), monorail, and cable cars are vertically-integrated to sustain intermodality by enhancing logistic, transfer, and travel experiences.

Vertically integrated metro-monorail-cable car transition from the airport to free zone



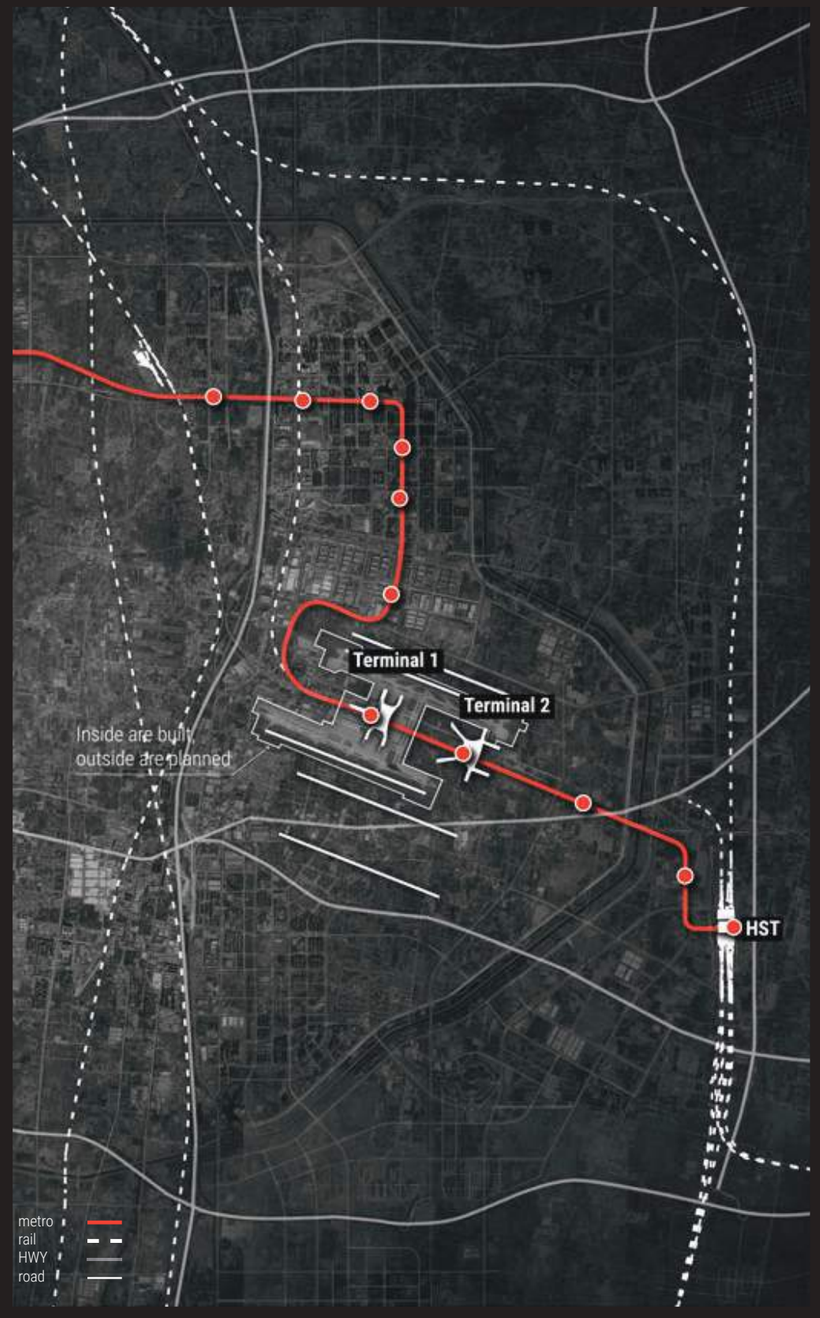
AIRPORT AND CITY

1 Zhengzhou as Rail Metropolitan
- Leading High Tech and Economy Corridor for Zhengzhou



2 Airport as Secondary Urban Center
- Reversing Noise Zone as Eco Connection

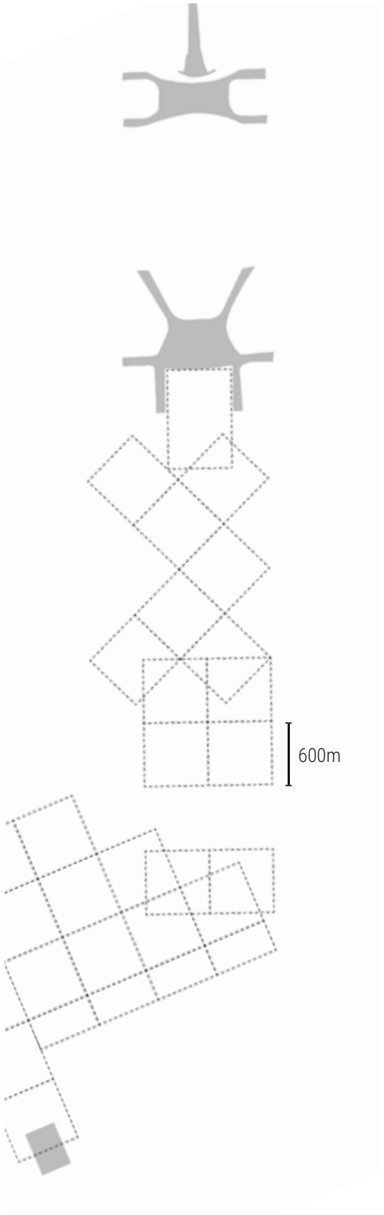
- Strengthening Intermodality and Connection to City



AIRPORT AS INTERMODAL PLACE

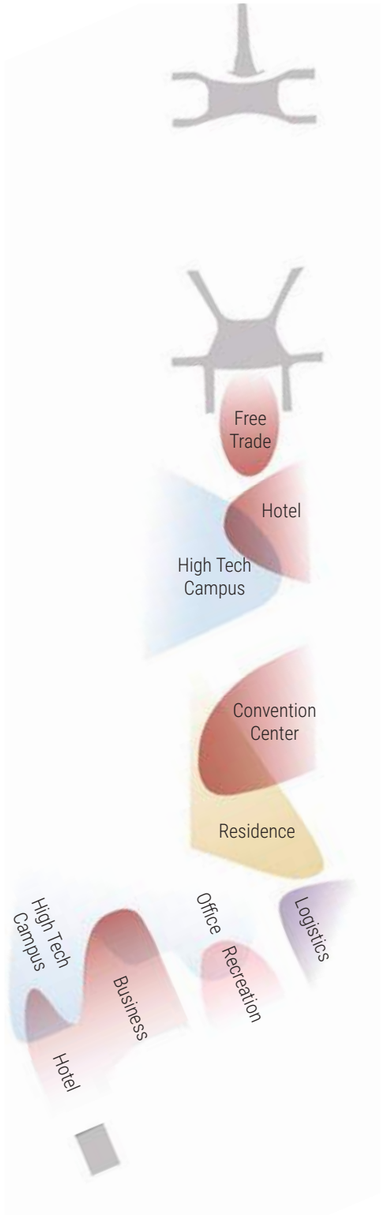
The terminals and HST station suggest a corridor in-between. Filling business zones and high-tech campuses along, the project proposes core mix-used development zones located at overlapping functionalities and integrated with transportation systems. A landscape bio-strip interweaves the elements along the corridor.

Urban Grids



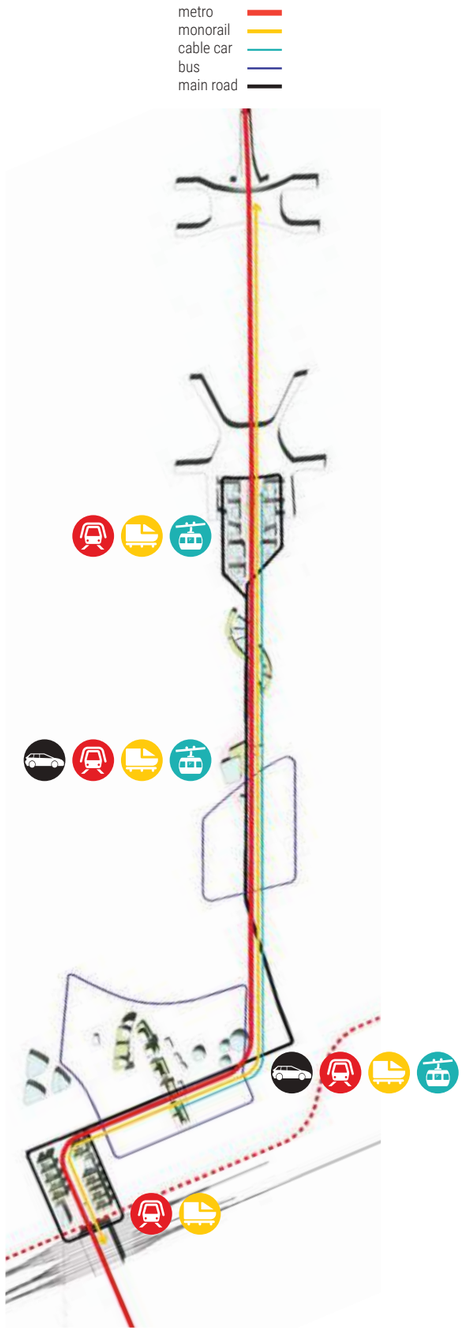
Economy and High-Tech

* The spatial choreography and ratio of the functionality dominance are supported by the 35 airports' statistical research (p.9-12)



Landscape Bio-strip

TOD



MASTER PLAN

Xinzheng Airport City, Zhengzhou, China

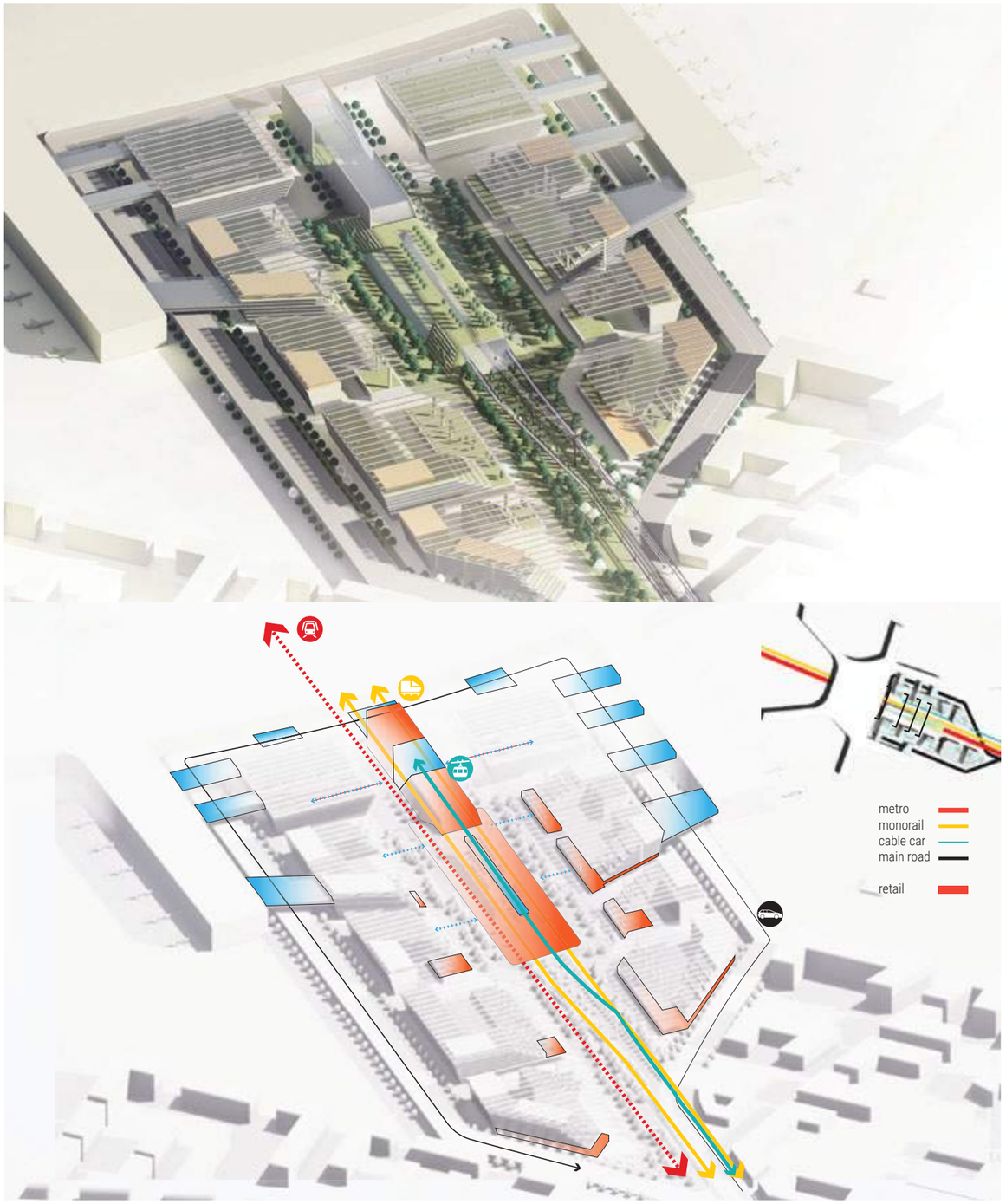
1. Airport TOD
2. High-Tech Center
3. Convention Center
4. Recreation Glasshouse
5. Business Center
6. High-Tech Center
7. HST TOD

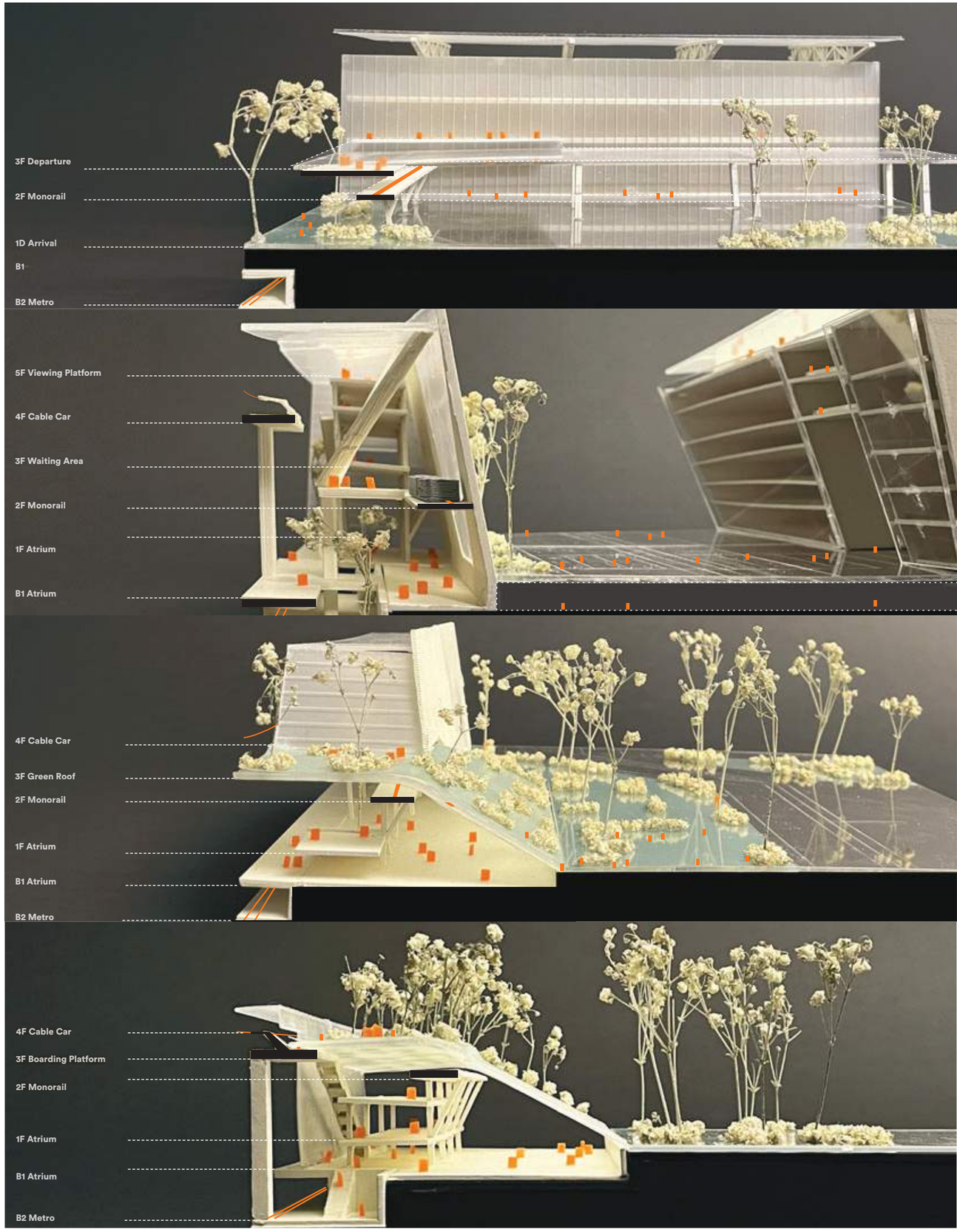
8. Free Zone
9. High-Tech Zone
10. Hotel Zone
11. Business Zone
12. Residence Zone
13. Logistics Zone
14. High-Tech Zone
15. Business Zone
16. High-Tech Zone

N

600 300 0 600m

FREE ZONE DEVELOPMENT AND TOD INFRASTRUCTURE





Xinzheng Airport Free Zone, Zhengzhou, China

APPENDIX FUNCTIONALITY OF 36 AIRPORTS IN THE GLOBE

Definition of an airport, airport district, and airport zone and research framework

Airport - Airport District - Airport Zone

[Airport] *An airport consists of a landing area, which comprises an aerially accessible open space including at least one operationally active surface such as a runway for a plane to take off and to land or a helipad, and often includes adjacent utility buildings such as control towers, hangars and terminals.*

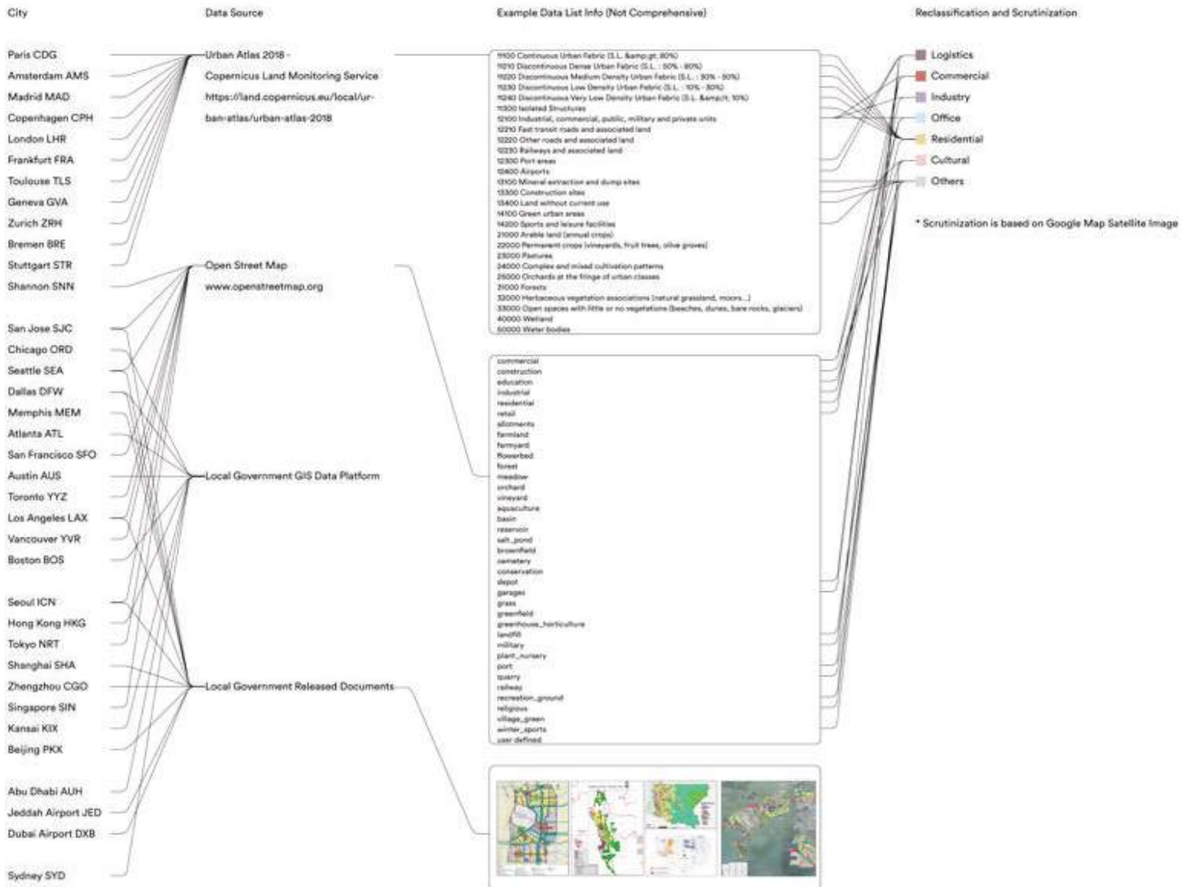
[Airport District] *An airport district consists of the major economic neighborhoods vitalized by the airport, such as commercial, business, industry, cultural, ecology, and residential.*

[Airport Zone] *An airport zone consists of proximate neighborhood of the airports bounded by infrastructure such as bridge, highway, landscape segregation.*

Airport, Airport District, and Airport Zones
Schematic Diagram

Amsterdam Airport Schiphol (AMS) Airport Airport District Airport Zone

Note on Data Source

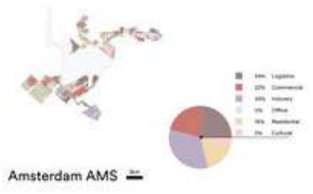


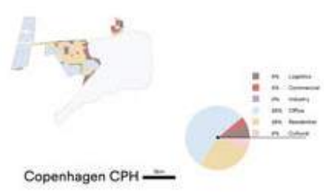
Research Framework

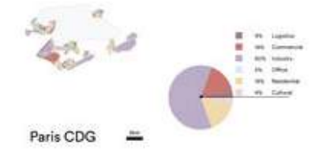
APPENDIX　FUNCTIONALITY OF 36 AIRPORTS IN THE GLOBE

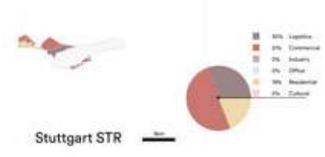
Landuse map of 36 airport districts by ArcGIS+ python

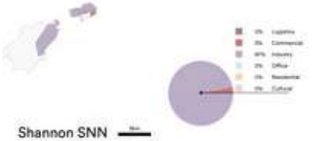
Europe

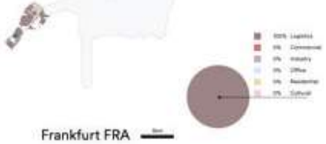


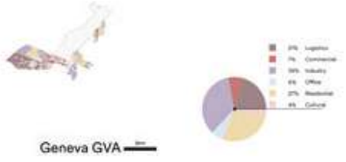


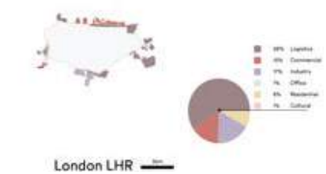


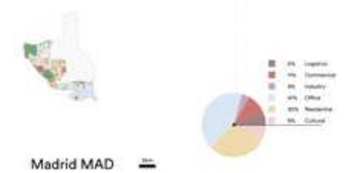


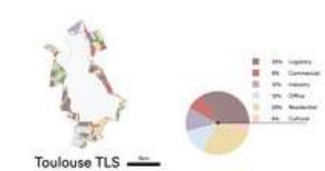




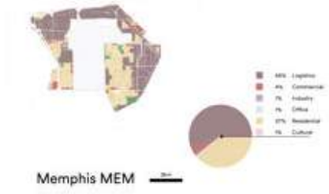


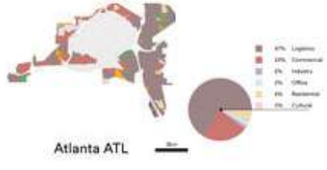


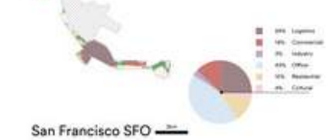


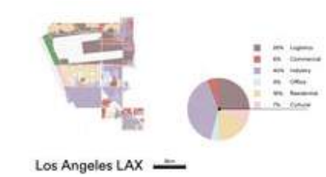


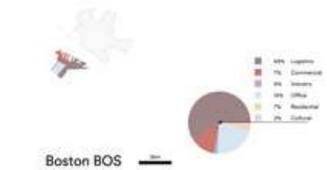
America

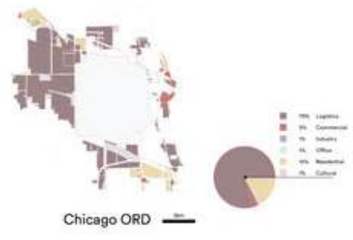


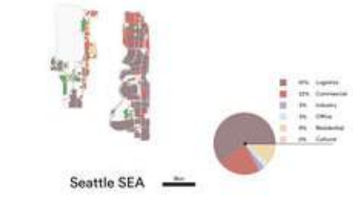


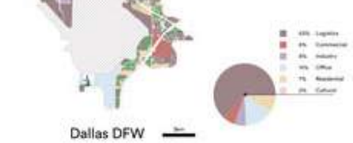


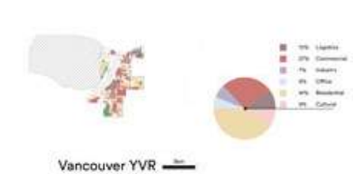


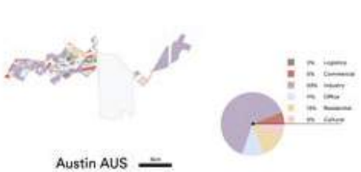




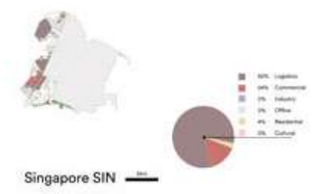


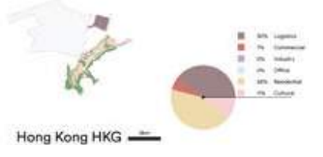


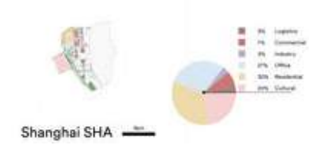


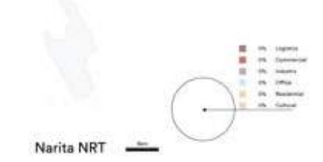


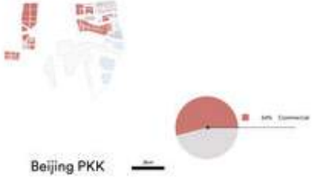
Asia

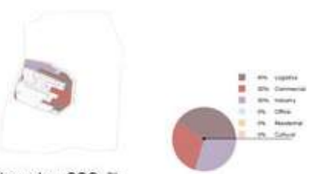


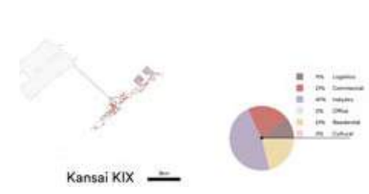


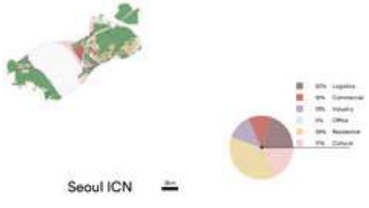




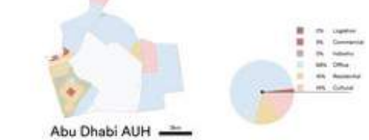


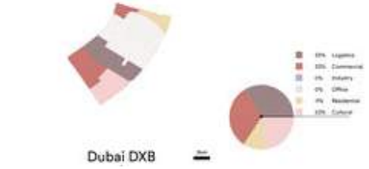


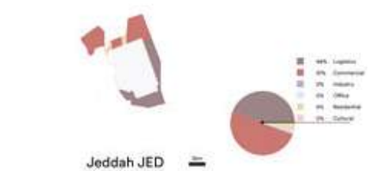




Middle East



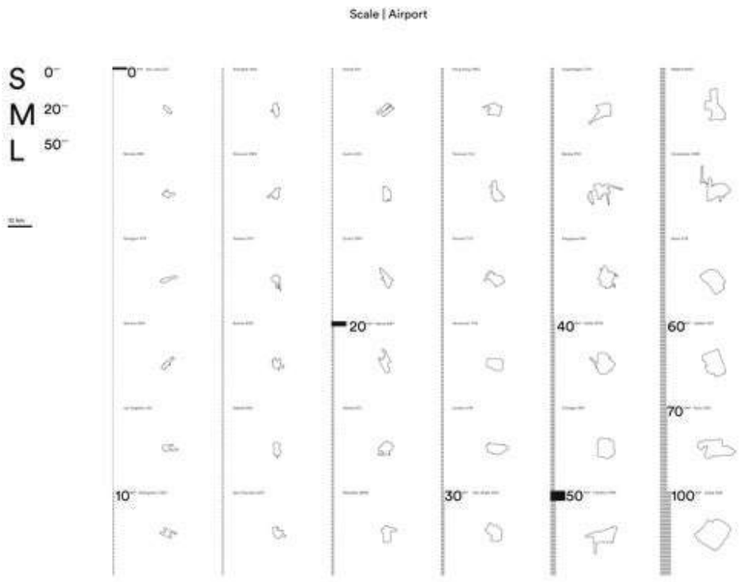


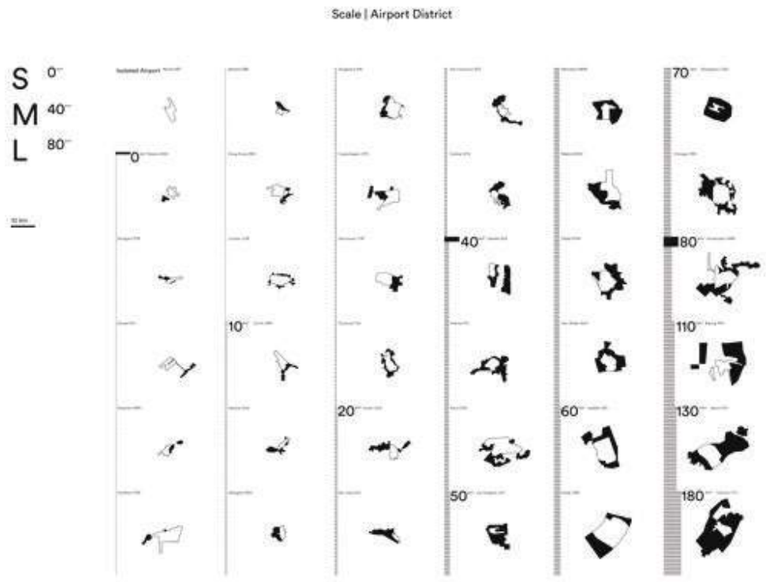


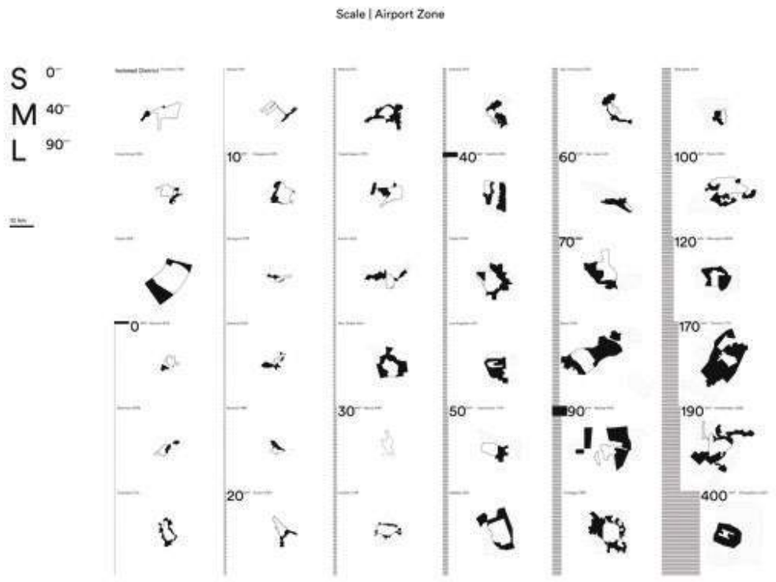
Oceania

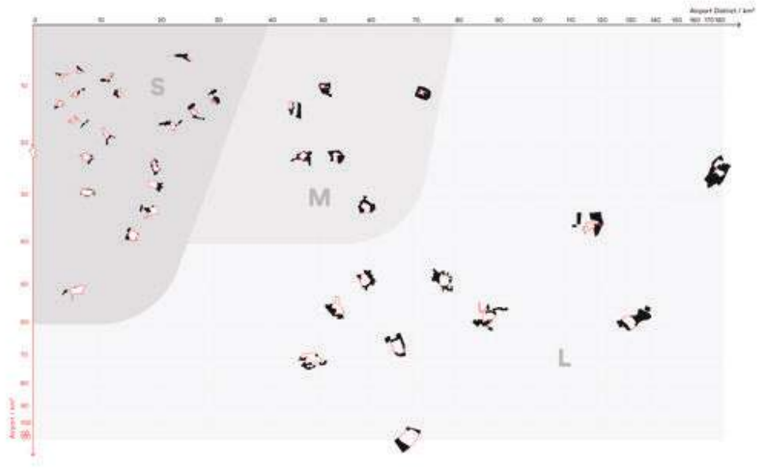
APPENDIX　FUNCTIONALITY OF 36 AIRPORTS IN THE GLOBE

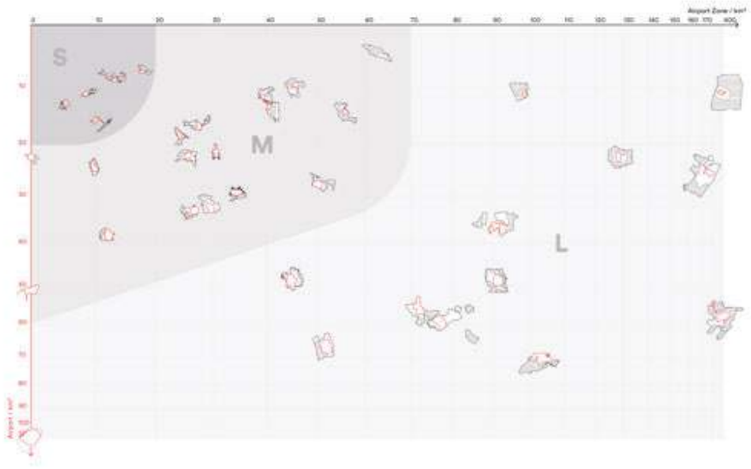
Scope Analysis: Above　Scale of the airport, airport district, and airport zone
Below　The chart shows the approximate positive correlation between the scope of airport-airport district, airport-airport zone, airport district-airport zone. The fluctuations are to do with spatial pattern, economic factor, and etc.

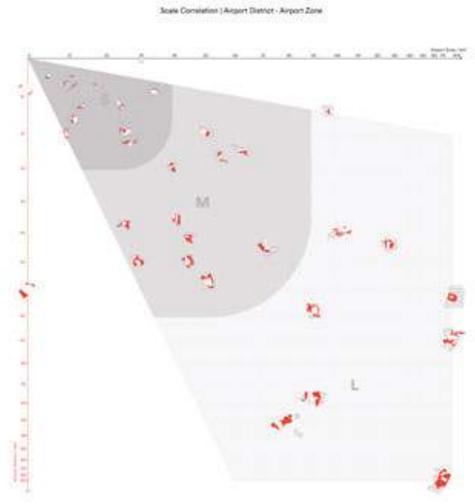






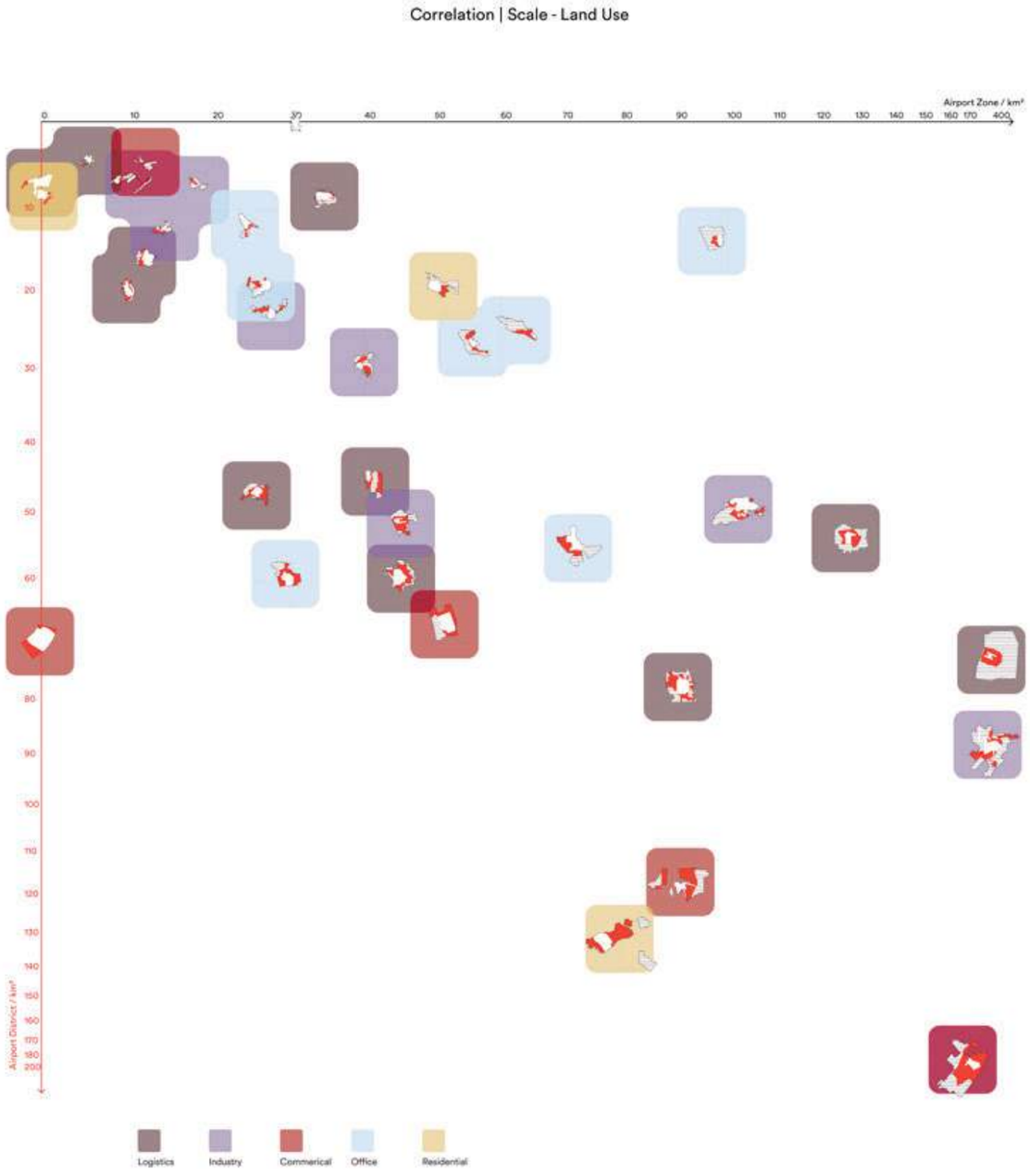


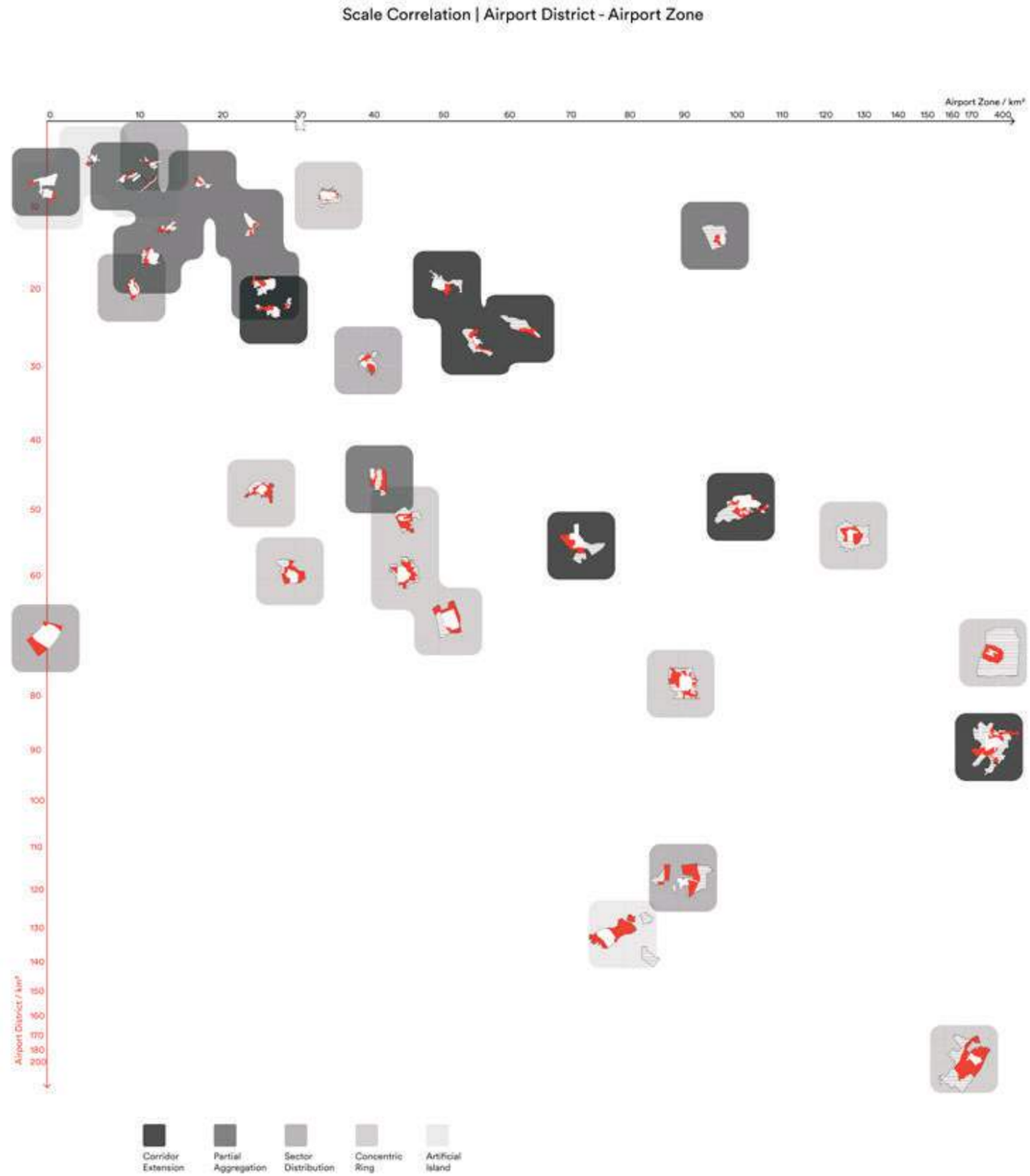


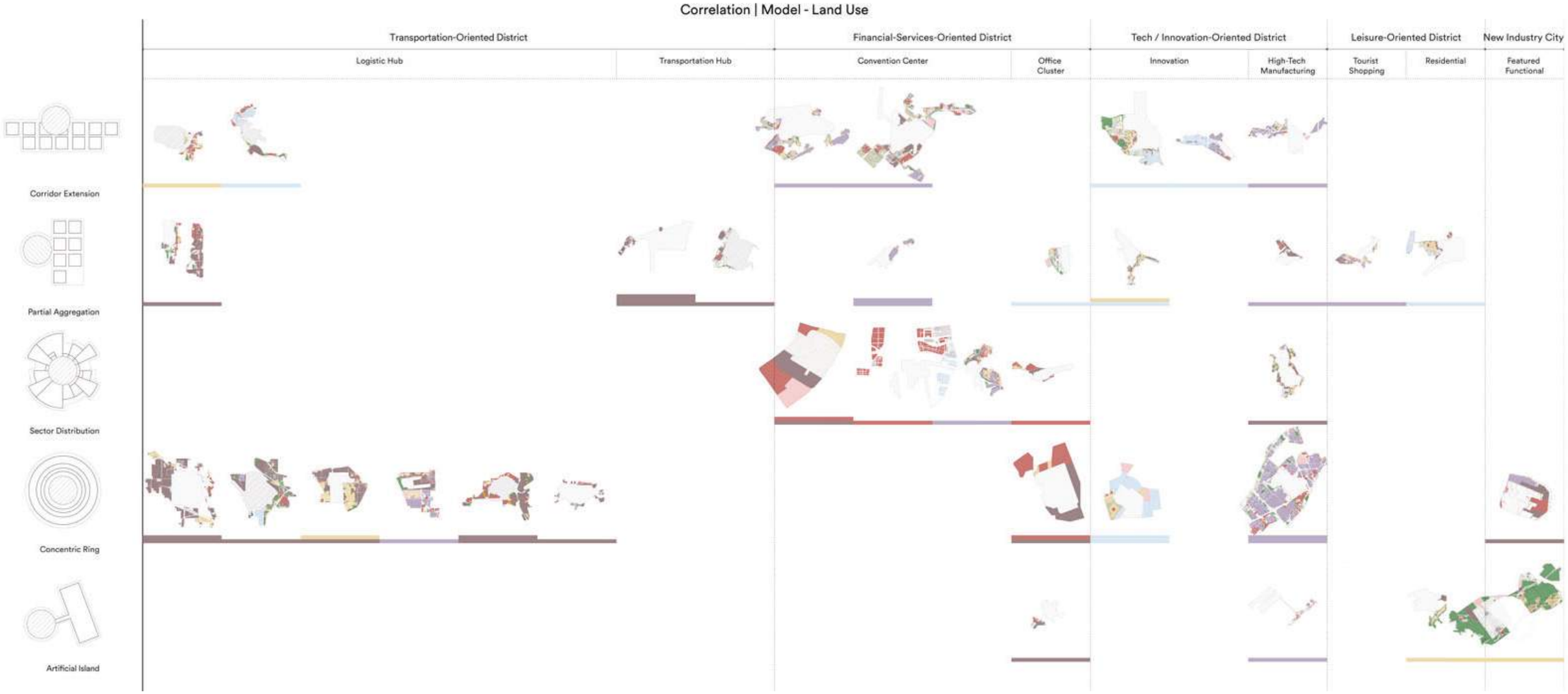


APPENDIX FUNCTIONALITY OF 36 AIRPORTS IN THE GLOBE

Left *Beyond the positive correlation of the airport districts and zones earlier, clusterings of land use dominance suggest that the innovation, and manufacturing tends to cluster at smaller scale while the logistics tend to cluster around the positive correlation line.*
Right *Corridor extension and partial aggregation tends to the cluster at smaller scale, concentric ring dominance tends to be medium airport district scales.*






Correlation | Model - Land Use
Transportation-Oriented District
Financial-Services-Oriented District
Tech / Innovation-Oriented District
Leisure-Oriented District
New Industry City
Logistic Hub
Transportation Hub
Convention Center
Office Cluster
Innovation
High-Tech Manufacturing
Tourist Shopping
Residential
Featured Functional
Corridor Extension
Partial Aggregation
Sector Distribution
Concentric Ring
Artificial Island

Data Center Park, Limerick, IRELAND

Harnessing a Nomadic Data Center Future

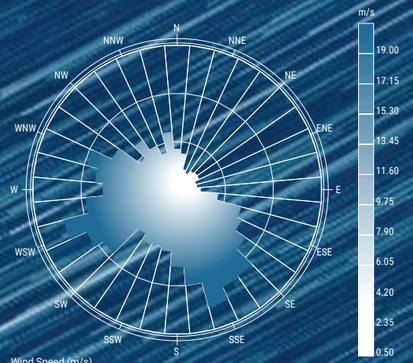
Instructor
Thomas Oslund
Catherine Murray

Individual Work

08/2021 - 12/2021, Academic

The contemporary age is driven by energy intensification and technology monopolies. Following the Irish government's renewable wind energy commitment by 2030, the project proposes a self-sustaining data center module with crosswind energy. This module enables the decentralized enegy and water supply of data center, which empower a model of a self-sufficient data town.
The master plan design is based on the decentralized data town conception. The limerick government will lease the land and establish the infrastructure, water system for each company town. The interactions, clusterings and personalities of crosswind data center towns evoke nomadic memory. Limerick's history stretches back to its establishment by Vikings as an island in the River Shannon. Ireland's historical nomadic nature is back, but in a new form, driven by the crosswind data center.

WIND FROM THE NORTH ATLANTIC



Wind Speed (m/s)
location: Shannon Airport
country: Ireland
source: ISD-TMYx
period: 1/1 to 12/31 between 0 and 23 @1
Calm for 1.78% of the time = 84 hours.
Each closed polyline shows frequency of 2.2% = 100 hours.

SHANNON
RIVER

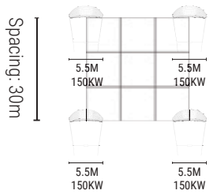
LIMERICK

SITE

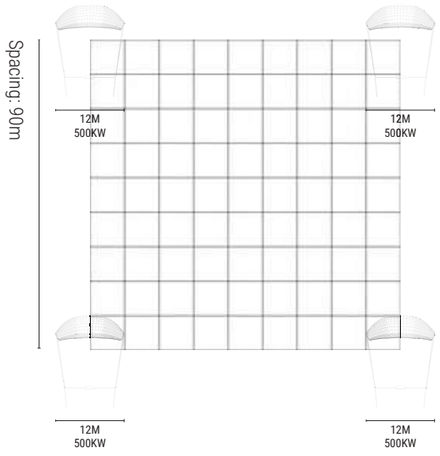
DECENTRALIZED METRICS OF CROSSWIND DATA CENTER

CROSSWIND GENERATOR

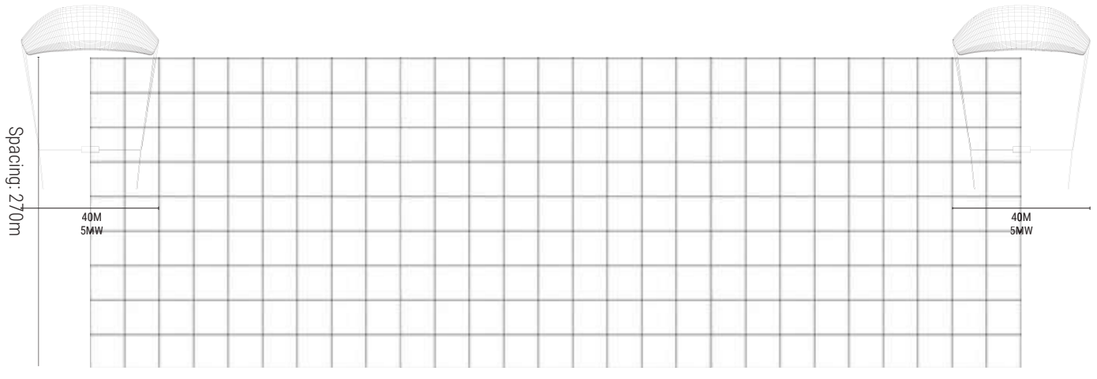
Small/Medium



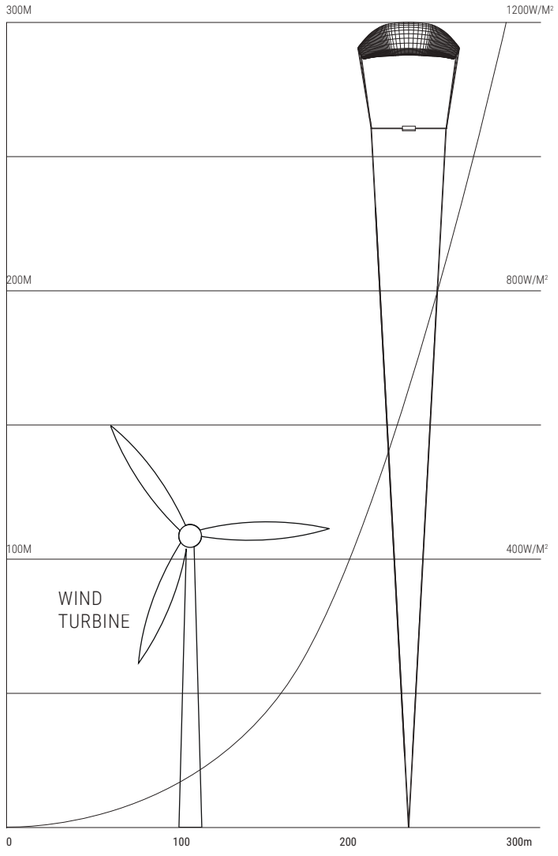
Large/Massive



Mega



WIND POWER DENSITY

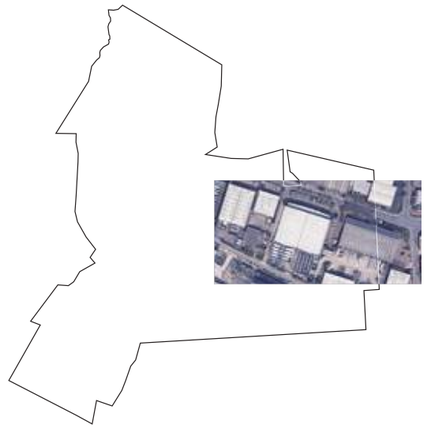


DATA CENTER

Small/Medium

Rackspace –
London, United Kingdom

Power: **10MW**
Investment: N/A
Size: 65340 sq. ft.
On-site workers: N/A



Large/Massive

Apple –
Reno, Nevada

Power: **35MW**
Investment: $1 billion
Size: 65,340 sq. ft.
On-site workers: 100

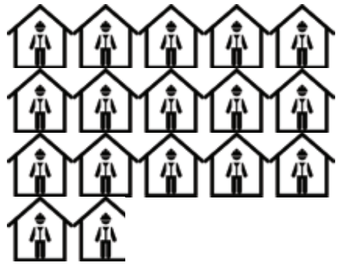
Mega

Facebook
– Altoona, IA

Power: **117MW**
Investment: $1.5 billion
Size: 1,440,000 sq. ft.
On-site workers: Altoona alone has more than 300 employees employed by Facebook. There's also an average of 800 construction workers per day at the site.

HOUSING

Construction Phase, 18-24 Months



1688 Local jobs
$77.7 million wages
$243.5 local economic activities
$9.9 million state & local taxes

Operation Phase, Annually

157 Local jobs
$7.8 million wages
$32.5 local economic activities
$1.1 million state & local taxes

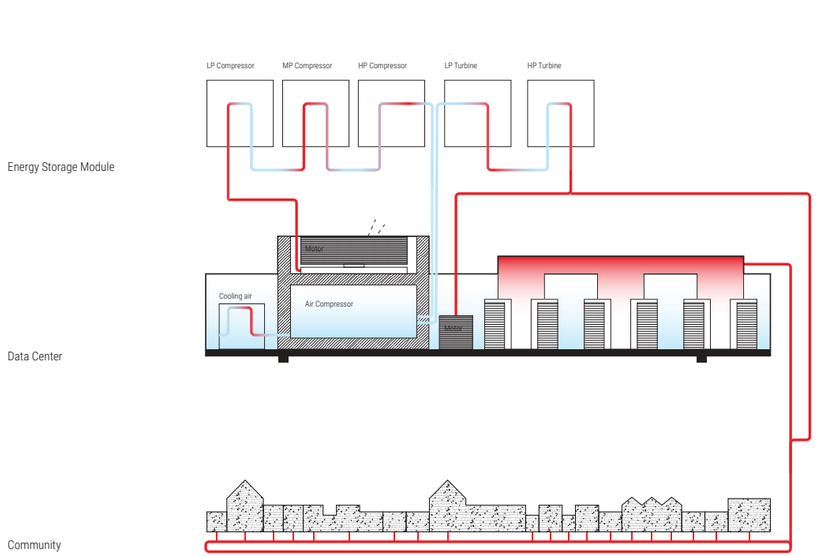
WHAT IS A SELF-SUSTAINING DATA CENTER MODULE AND SELF-SUFFICIENT DATA TOWN?

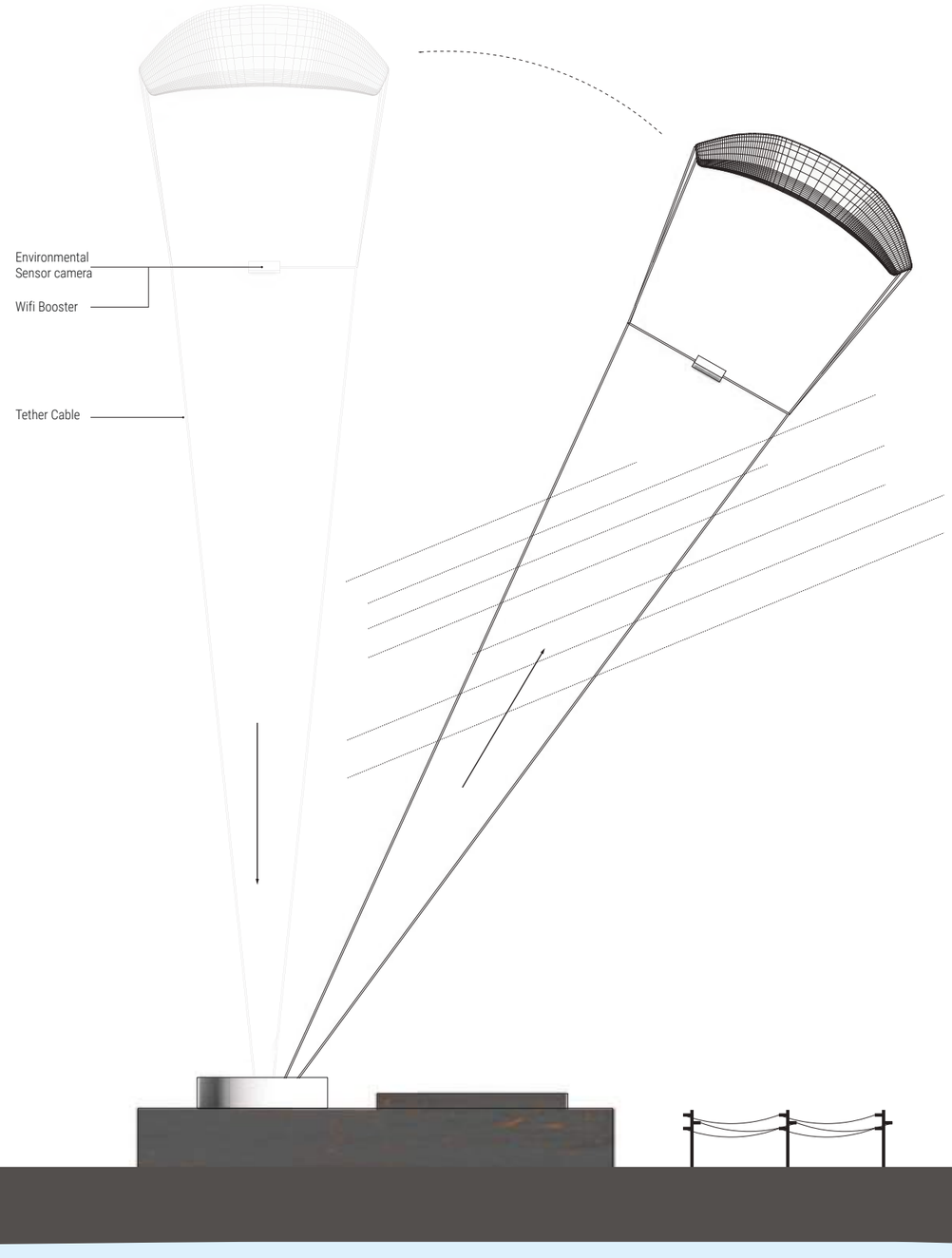
01 Self-Sustaining Energy System and Data Infrastructure

02 Self-Sustaining Water Resources

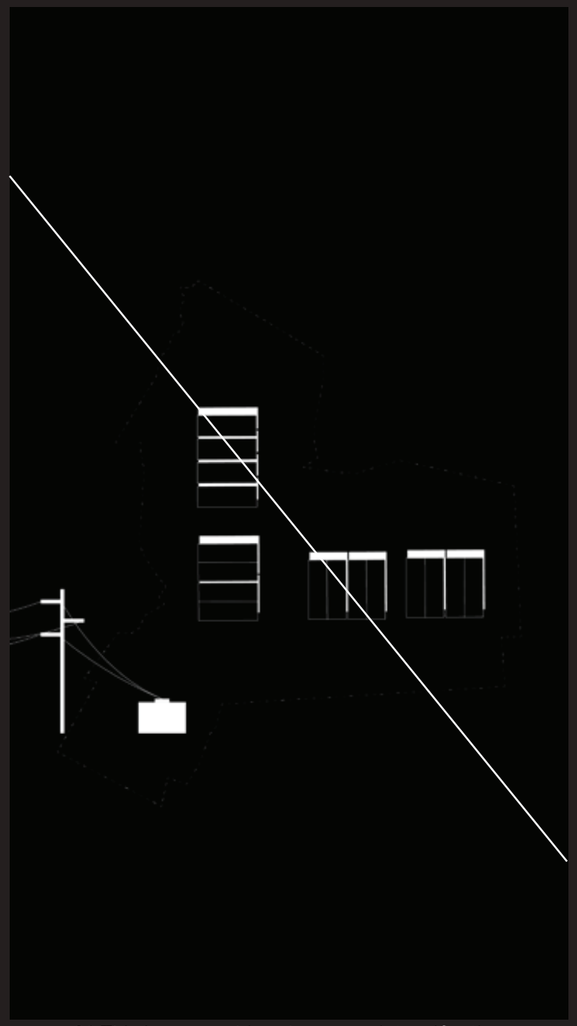
03 Housing, Jobs, and Local People

04 Characteristic Company Philosophy and Community Culture

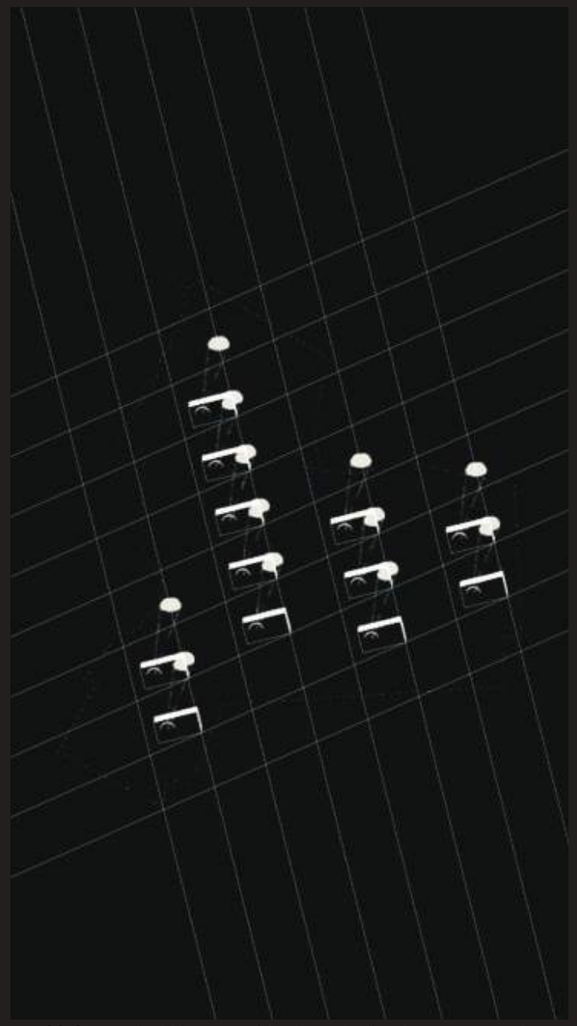




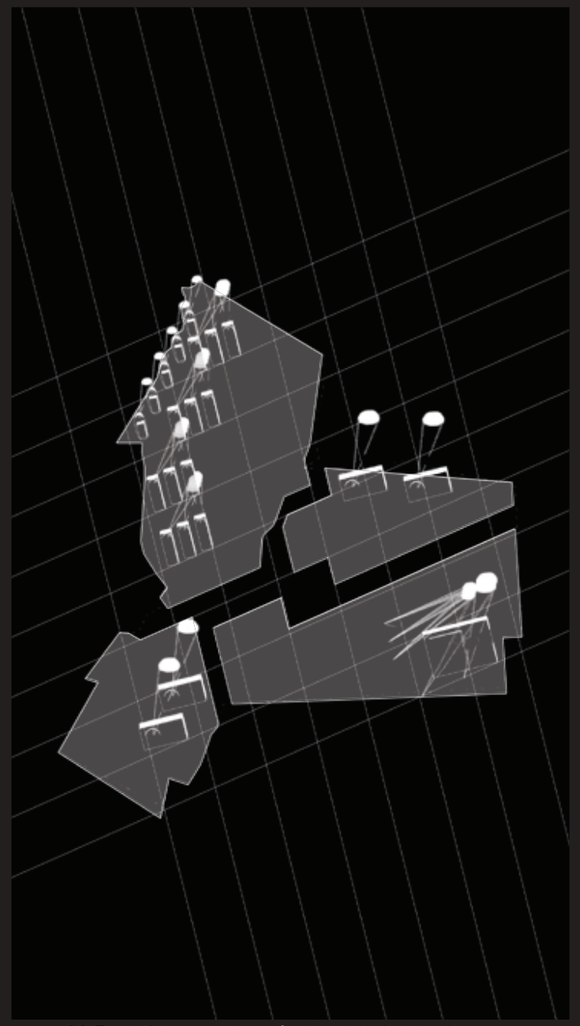
LONG SHOT FROM A NEAR-BY VILLAGE ASKEATON



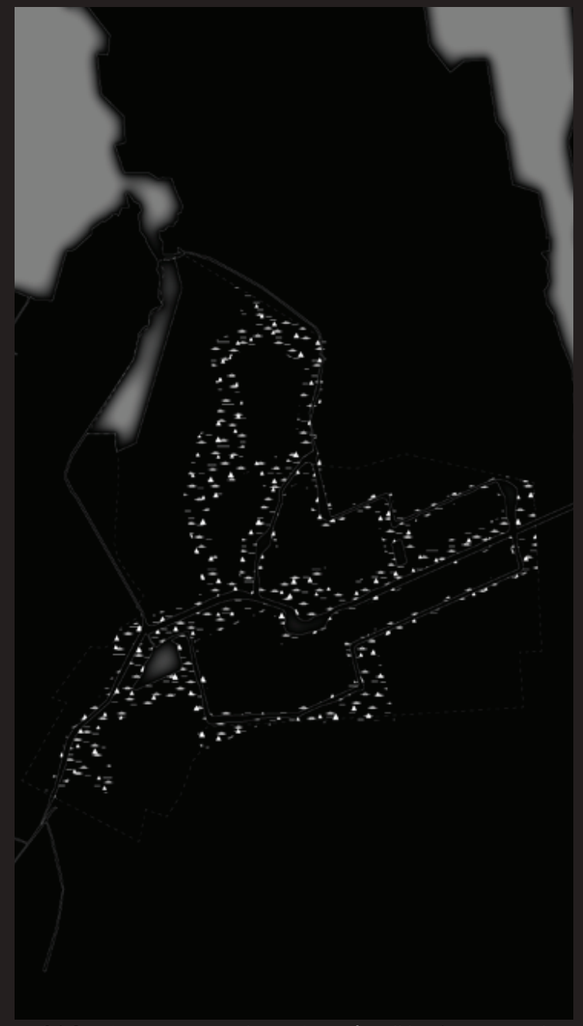
01 This is an age driven by energy intensification and technology monopolies



02 Crosswind kites provide decentralized energy supply and establish the development metrics

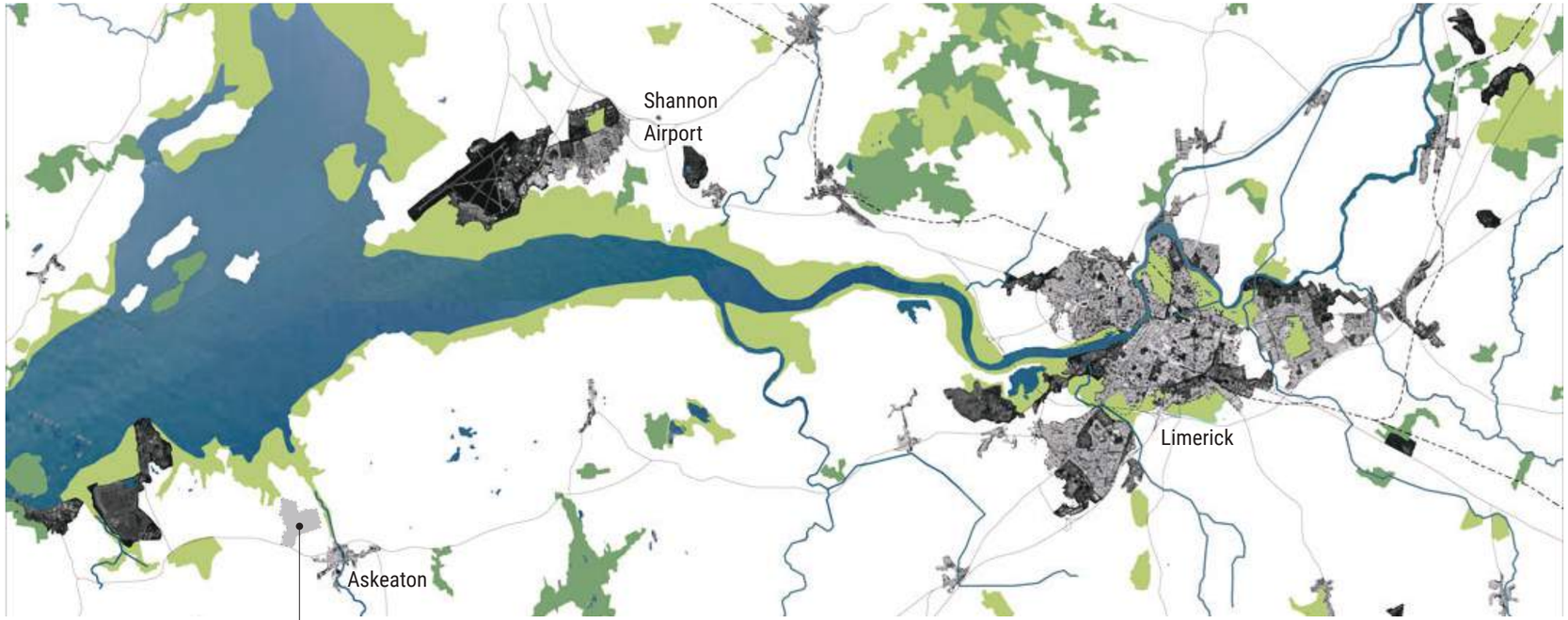


03 Establish townships for local digital businesses

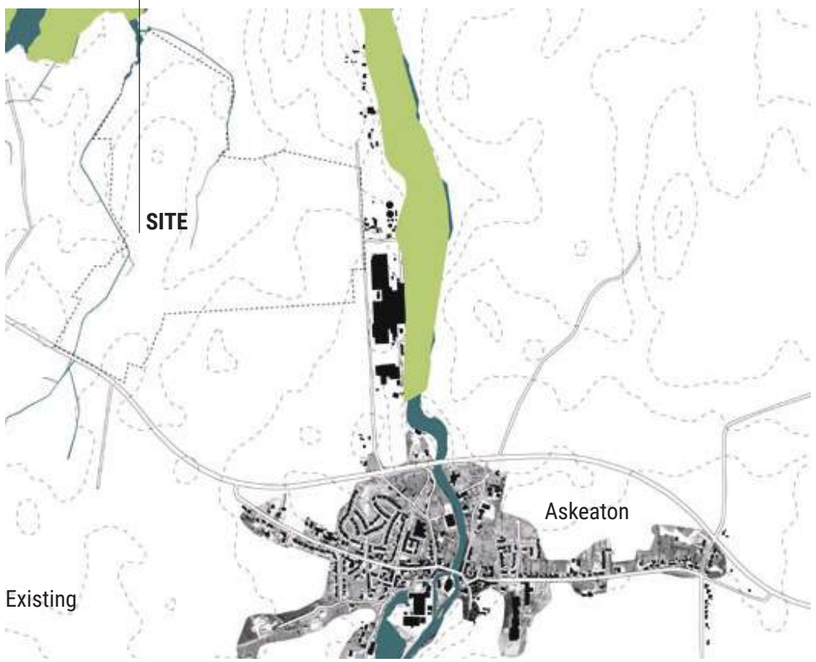


04 Create common parks systems for all businesses and connect the park system to the larger landscape network

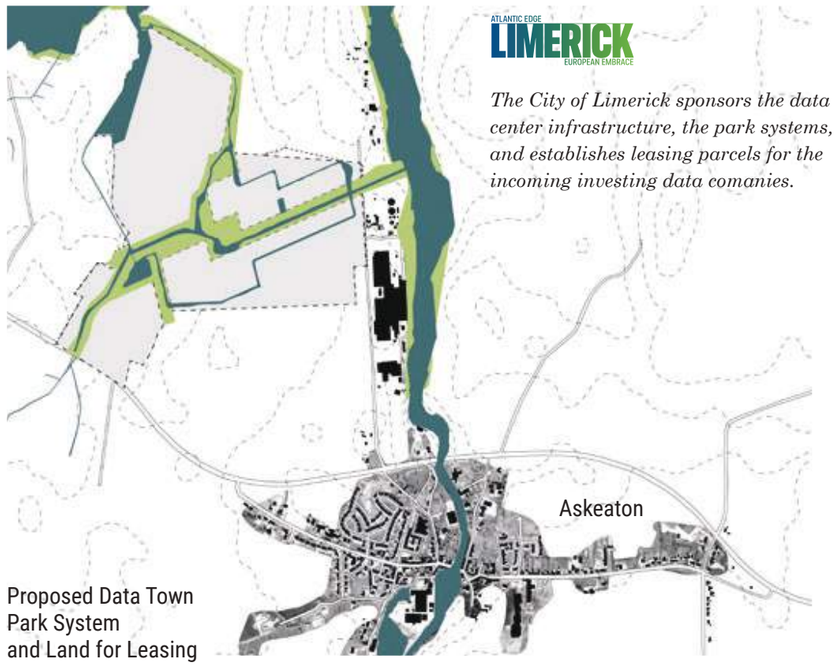
FROM NOMADIC SETTLEMENT AND SHANNON RIVER LANDSCAPE SINCE VIKINGS
TO DATA TOWN PARK SYSTEM



Marsh & inland marsh
Vegetation
Shannon River
Settlement
Industry



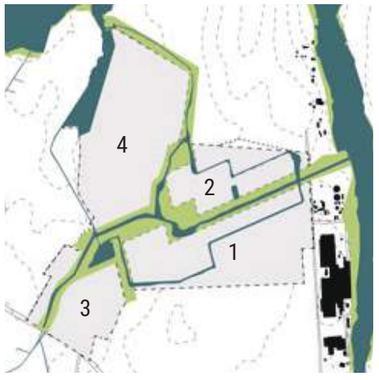
Existing



Proposed Data Town Park System and Land for Leasing

ATLANTIC EDGE LIMERICK EUROPEAN EMBRACE

The City of Limerick sponsors the data center infrastructure, the park systems, and establishes leasing parcels for the incoming investing data comanies.



CHARACTERISTIC
COMPANY TOWNS

Investing Company

Google EQUINIX Microsoft DIGITAL REALTY

Data Center Technology


Mega data center


Massive data center

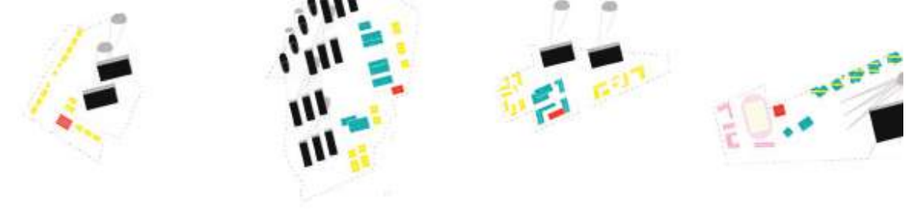

Modular Data Center


Floating data center

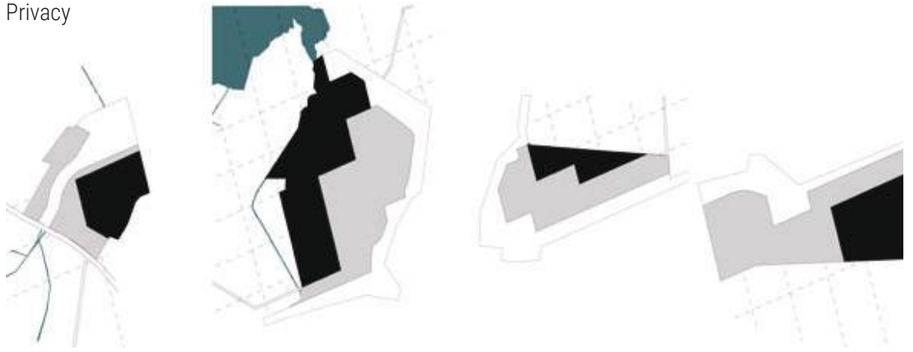

Crosswind Data Center Modules


Landscape Feature

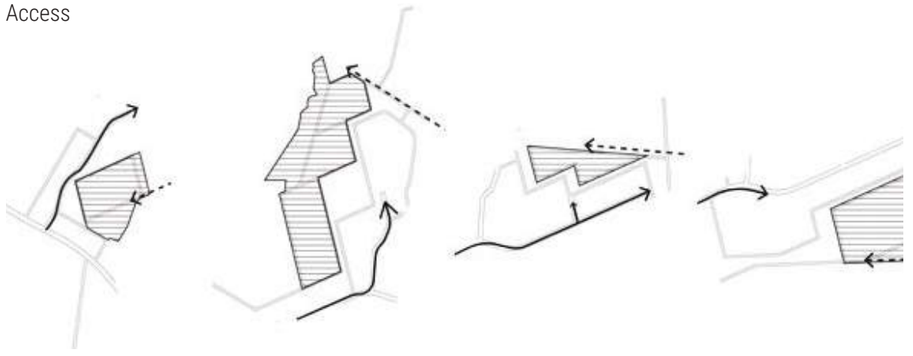
Program and footprint



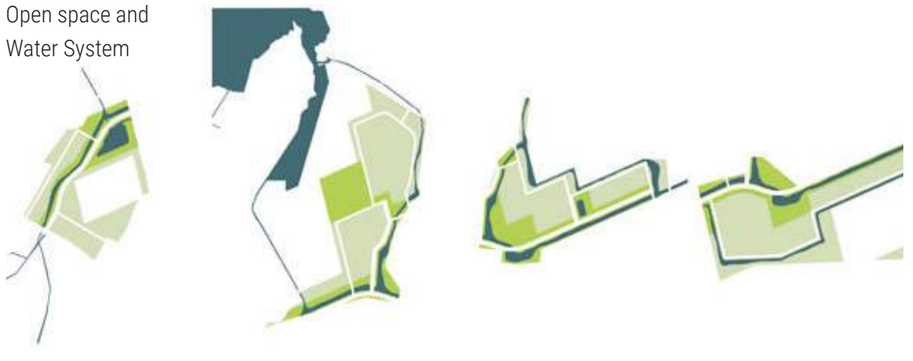
Privacy



Access



Open space and Water System



N

0 200m

1 Crosswind Data Center

- 1-1 Floating Data Center
- 1-2 Modular Data Center
- 1-3 Massive Data Center
- 1-4 Mega Data Center

2 Shared Park System

- 2-1 Creak
- 2-2 Sports Park

3 Company Towns

- 3-1 Microsoft
- 3-2 Digital Realty
- 3-3 Equinix
- 3-4 Google

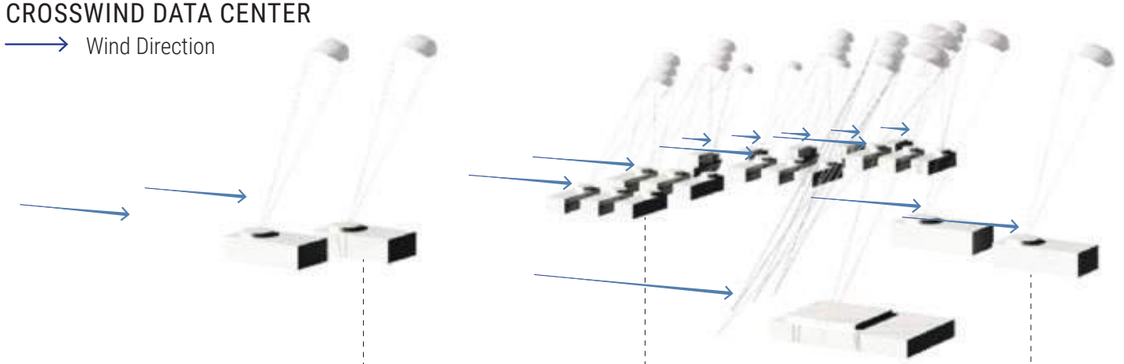
4 Research Institution

5 Community Park

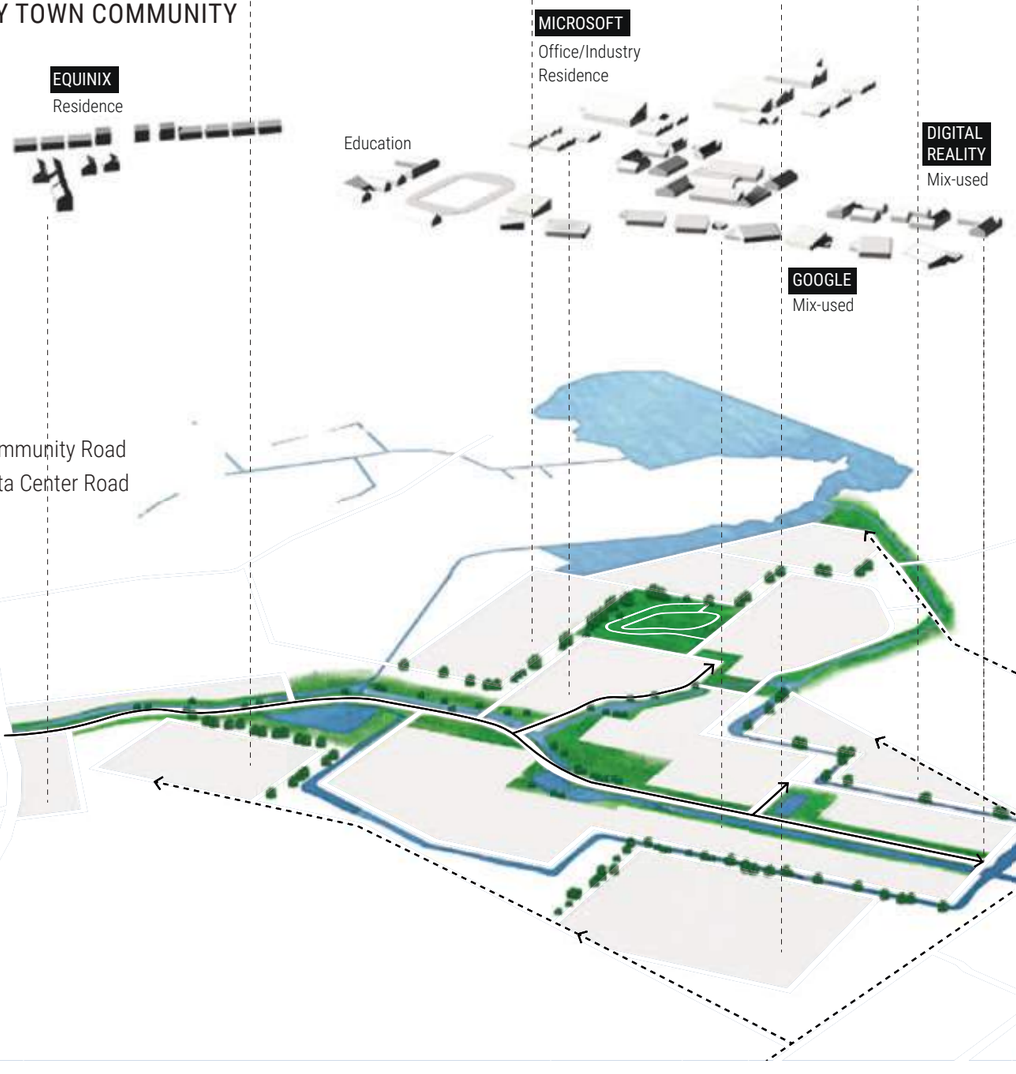
- 5-1 Hill
- 5-2 Dog Park
- 5-3 Community Spa
- 5-4 Ponder Park

CROSSWIND DATA CENTER

Wind Direction



COMPANY TOWN COMMUNITY



GROUND

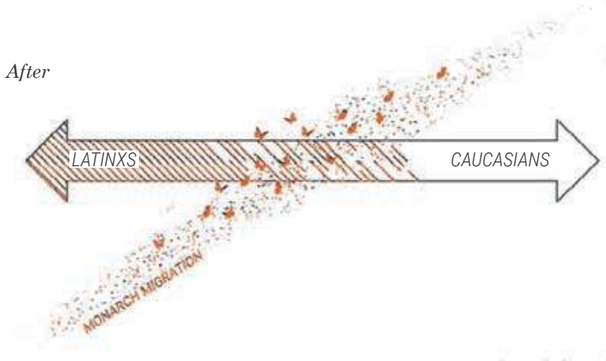
Community Road

Data Center Road

A metaphor connected by the parallel between the migration path of monarchs and Latinxs

Before

After



Urban Design, Perry, IA

MIGRATION IS BEAUTIFUL

Instructor
Benjamin Schirtcliff

Individual Work

08/2018 - 12/2018, Academic

Like many towns in the Midwest, Latinx immigrants, often resulting from the restructuring of the local industry, are reshaping Perry's future. Inspired by the parallel of the migration trajectory of monarch butterflies and the Latinxs, the project aims to create a sense of place for "the migrants" in Perry. By introducing the milkweed boulevard along the past railway, monarch migration would be facilitated by the new habitat and it would in turn help revitalize the ecology, agriculture, and industry of the city. Meanwhile, the color palette of the milkweed planting implies an interacting and diverse ethnic landscape for Perry. In this way, the divided urban landscape of Perry would be reconnected, conveying the philosophy that migration is beautiful in Perry.

MONARCH'S JOURNEY NORTH

Monarch is the only species of butterflies known to make an annual two-way migration. Monarchs from eastern North America overwinter in the Sierra Madre Mountains of Mexico and those from western North America overwinter in California. The number of the monarch has decreased dramatically for habitat losses along the journey.

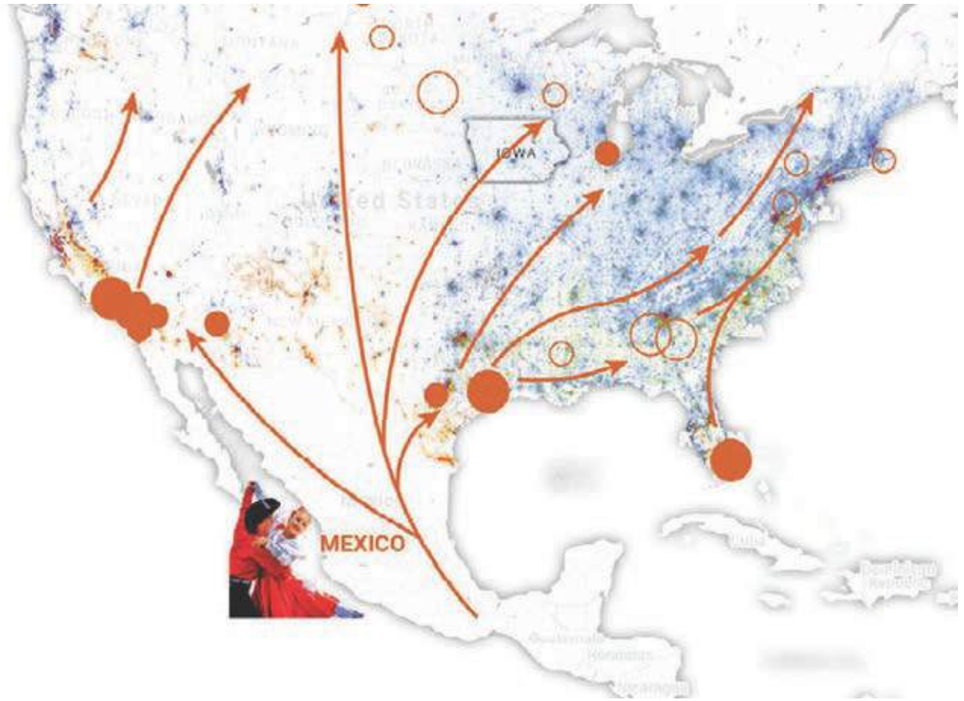
Monarch Adults Sighted Map

Spring
Summer
Winter
Fall

Trajectory Map

Trajectory
Overwinter Habitat
Breeding Field

Credit: Data from Journey North



LATINX'S JOURNEY NORTH

Latinx migrants have had interstate migration since the last century for job opportunities. California and Texas, often serving as the transfer for the in-migrants of the Latinxs, have the largest amount of the Latinx population.

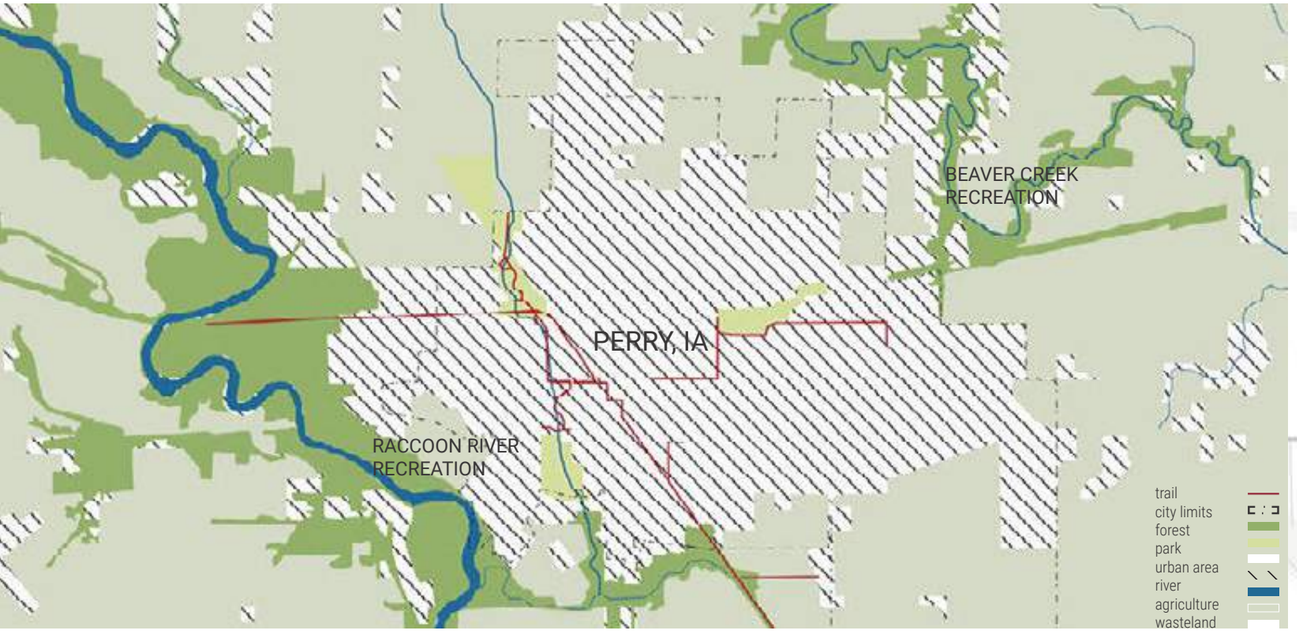
Racial Dot Map

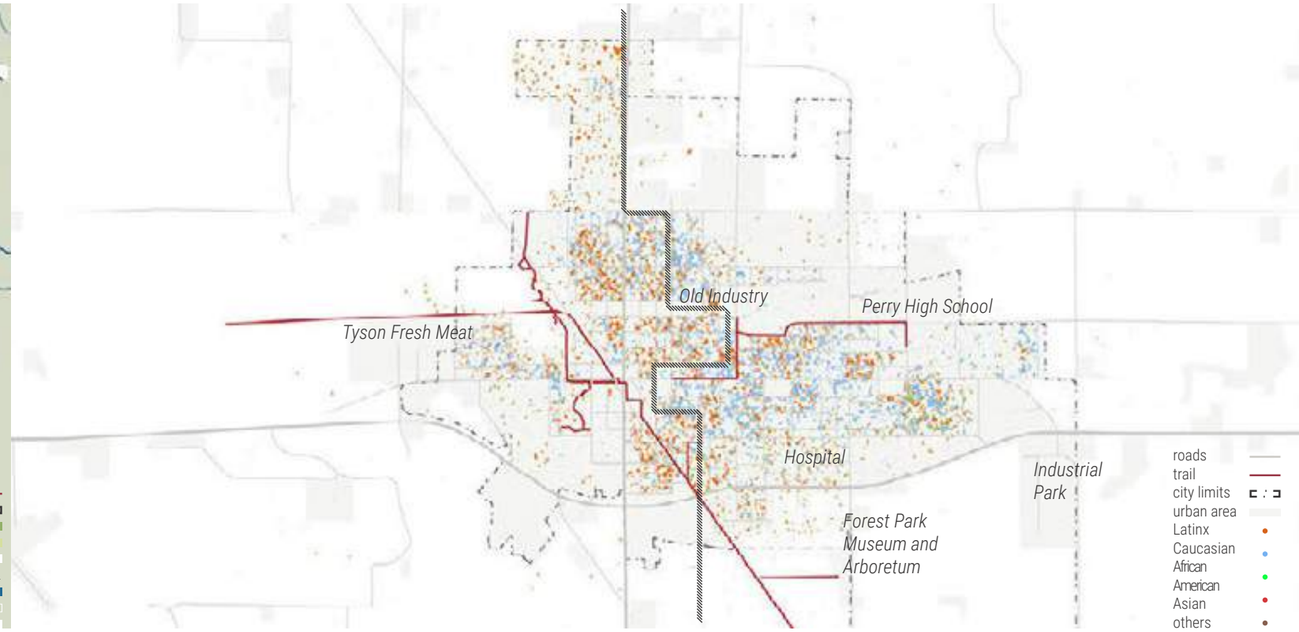
Caucasians
African American
Others
Latinxs
Asian

Trajectory Map

Trajectory
Cities with top-10 Latinx population
Cities with top-10 Latinx growth

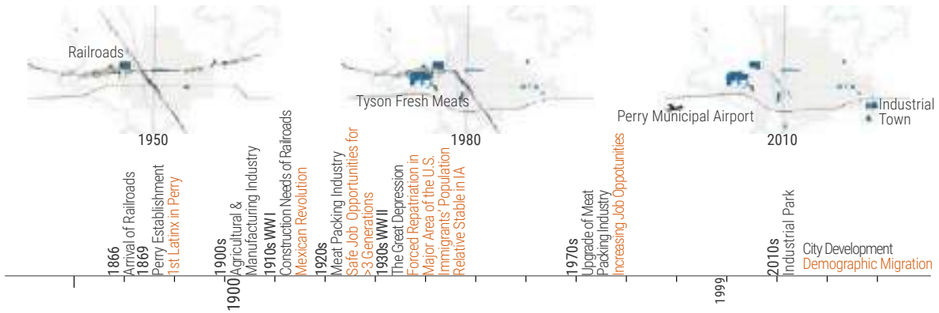
Credit: Image Copyright, 2013, Weldon Cooper Center for Public Service, Rector and Visitors of the University of Virginia (Dustin A. Cable, creator)





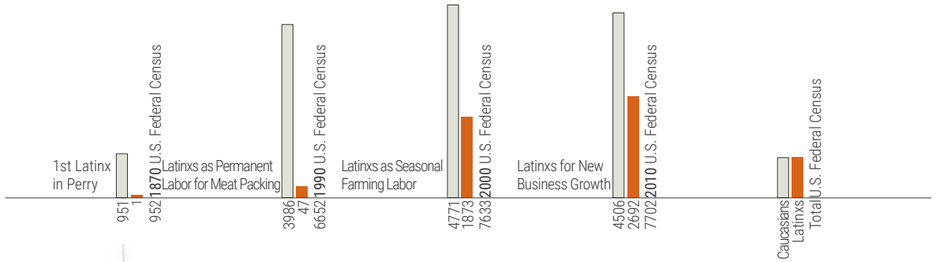
DIVIDED LANDSCAPE OF PERRY

The continuity of forest around the Raccoon River and its creeks is divided by the urban area of Perry.



DIVIDED ETHNIC LANDSCAPE OF PERRY

With an influx of Latinxs during the past two decades, Latinxs has grown to a constituent of Perry that can never be neglected. Perry is more diverse than ever, yet division between locals and migrants is still marked by an invisible line separating the west and east of the city.



MIGRATION IS AN INSTINCT

MONARCHS

An annual two-way migration between North America and Mexico
Journey-up to 3,000 miles

LATINXS

Migration-from Mexico, Central America & Interstate In-migration
Population-50.5 million, sixfold since 1970

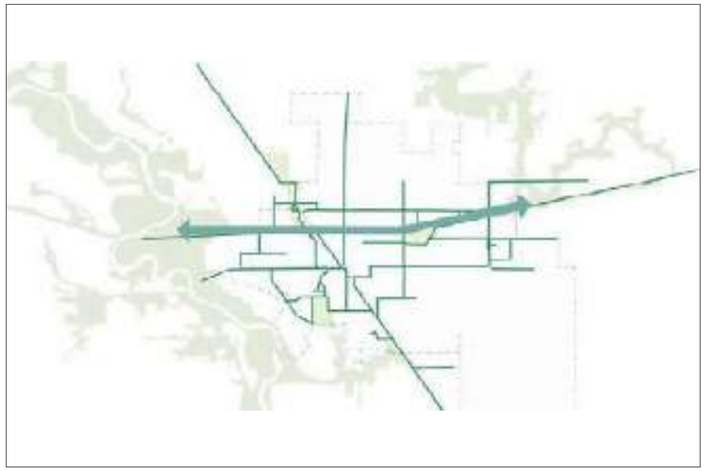
HELPING PERRY BY HELPING MONARCHS NETWORK

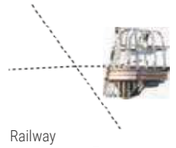
By facilitating monarch migration, color-patterned milkweeds are introduced to make a sense of place in Perry. With surrounding interventions concerning monarchs, Perry would, in turn, be helped ecologically, economically, and humanistically.

HOW CAN LANDSCAPE FACILITATE MIGRATION IN THE DIVIDED CITY OF PERRY

CONNECTIVITY

Continuous Landscape Network





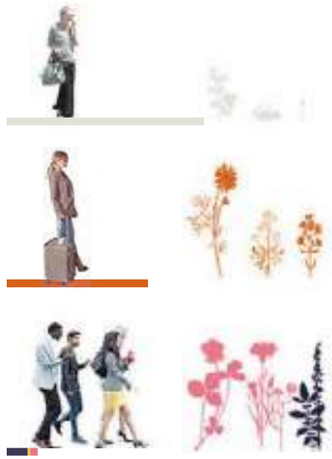
Railway

Trail

Milkweed Boulevard

VISIBILITY

Milkweed planting brings the spectacular of monarch migration
Color palette of planting implies the diversified racial communities

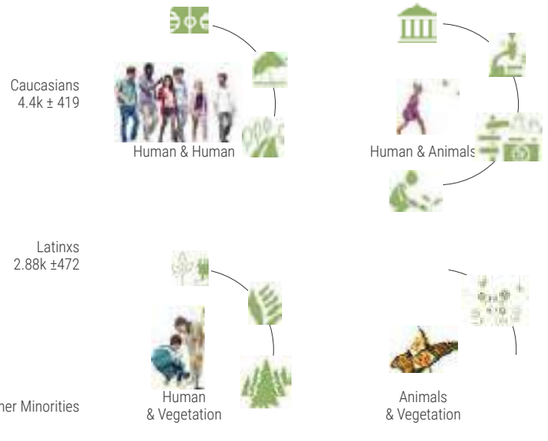


Latinxs
2.88k ±472

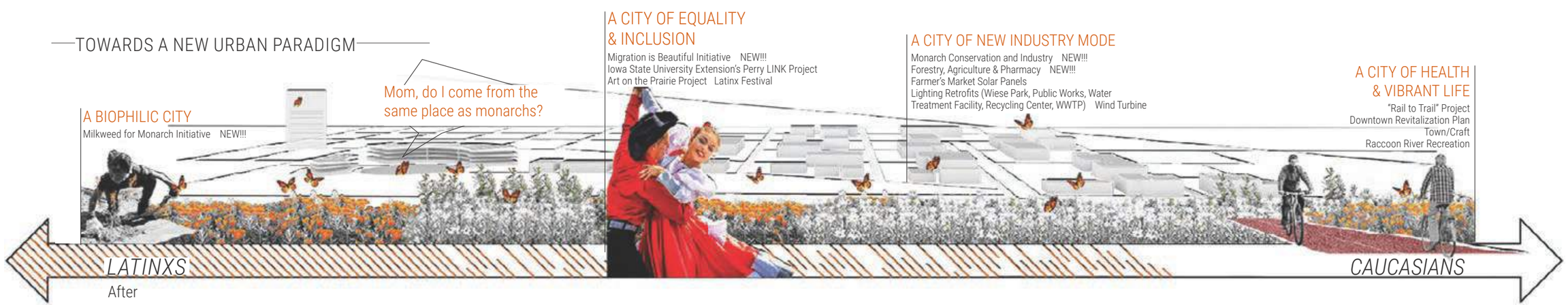
Other Minorities

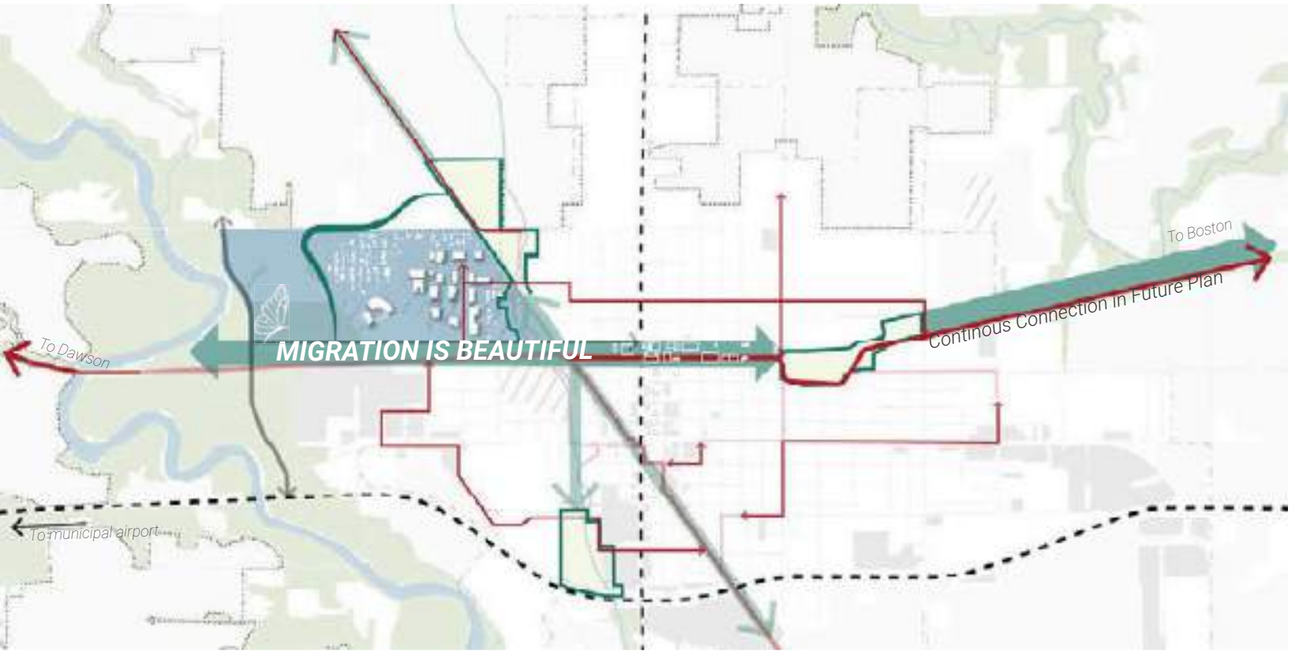
INTEGRITY

Milkweed Connection for Interaction between Human and Nature
Open Space for Social Inclusion



TOWARDS A NEW URBAN PARADIGM





RACCOON RIVER RECREATION | MILKWEED CONNECTION | POCKET PARKS FOR OLD INDUSTRY | WISES PARK | BEAVER CREEK RECREATION | FUTURE CONNECTION

proposed road
proposed trail
proposed neighborhood
green connection
proposed industry
proposed housing
monarch breeding area
park
old main street
old industry

New Farming
monarch breeding area

New Industry
monarch conservation
monarch economy
sustainable energy

New Green Connection
Milkweed corridor for monarchs

New Farming
Monarch breeding cornfield

New Industry
Monarch conservation & economy

New Residence
Affordable housing for new workers nearby

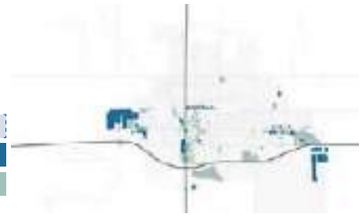
MASTER PLAN & STRATEGIES

The main intervention is to create the green connection along the past railway. On the west-northern side of the connection, a new neighborhood would be built, with a concentration of institutions and business relating to the monarch industry, cornfields friendly to monarchs, and affordable housing for new citizens.

Housing Values
$50k
$100k
$150k
$200k

Increased and Balanced on the west

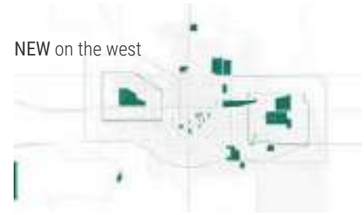
Main Business
zone linked industry
commerce



major **Business** linked along the connection

Civic Institution
1/4 miles bounded
1/2 miles bounded
institution

NEW on the west



Green Connectivity
trail
1/4 miles bounded
1/2 miles bounded
park

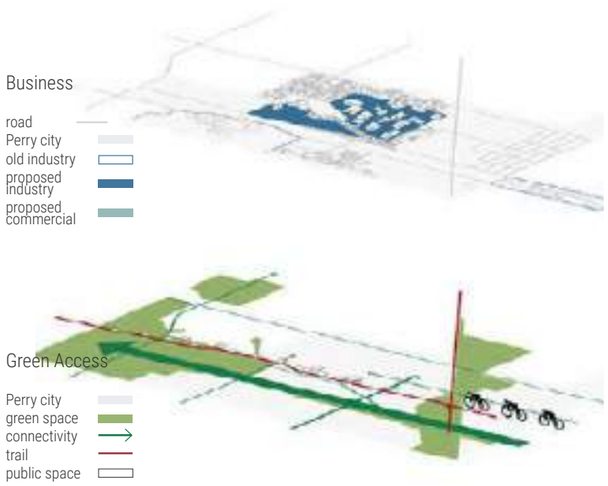
Landscape connected

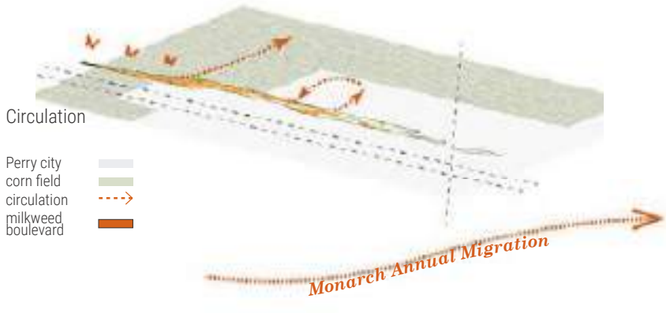
Before

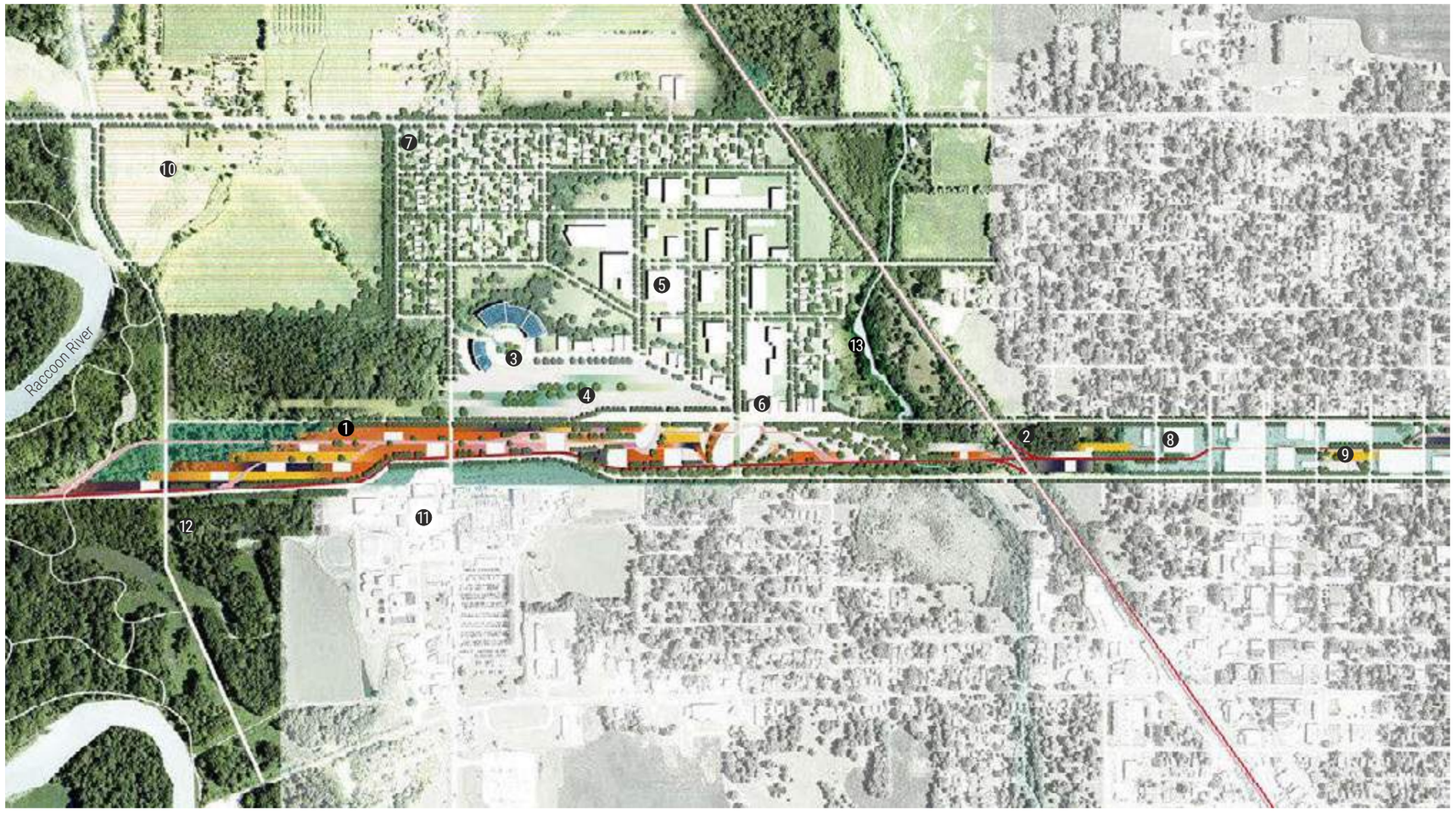
After

NEIGHBORHOOD PLAN

A metaphor for fusion is embedded in the color palette of the milkweed bands. Plants of diverse colors represent diverse races, bringing the invisible minorities to visibility while evoking the sense that migration is beautiful. Also, the public space is arranged along the bands, following the context of old railway warehouses.







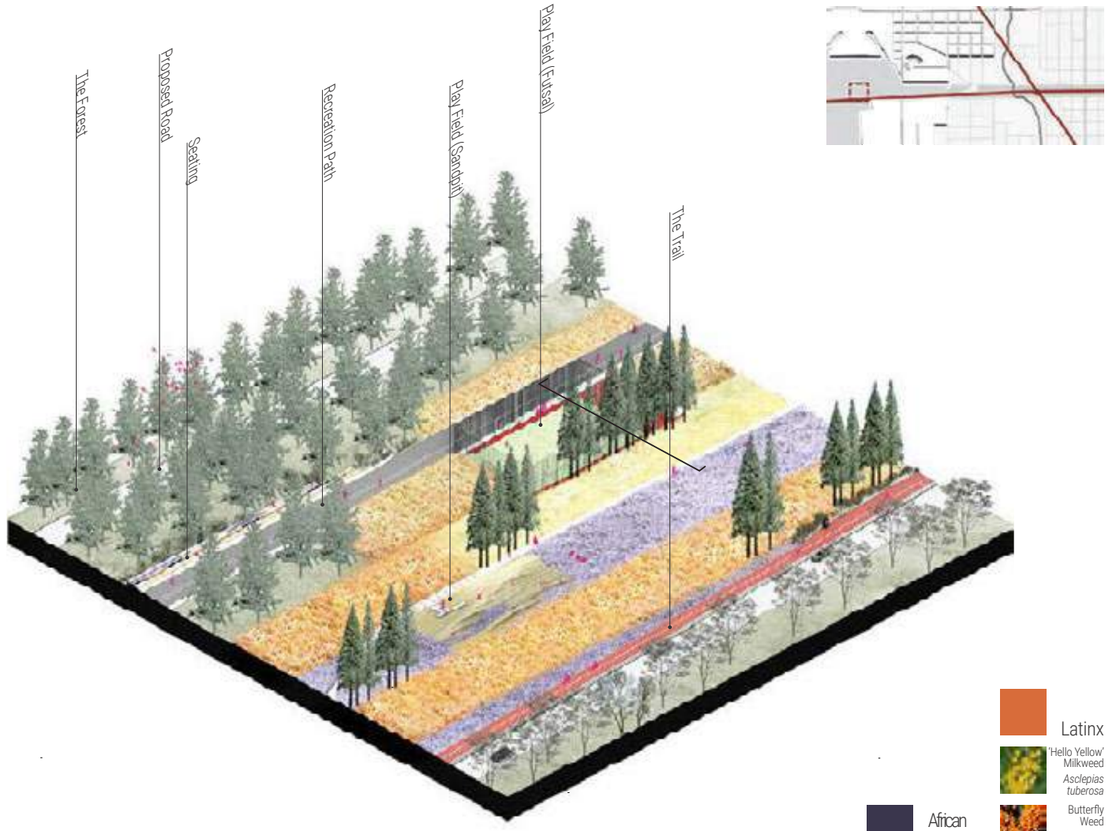
N

730 365 0 730ft

1 Milkweed Connection
2 The Trail
3 Innovation Center
4 The Rail Plaza
5 New Industry
6 Civic Institution
7 New Housing
8 Old Industry *(existed)*
9 Pocket Garden
10 Corn Field
11 Tyson Fresh Meats
12 Raccoon River Recreation
13 The Creek

THE PASTORAL

In the rural area of Perry, the milkweed bands grow wildly. Major activities are sports.



African American


Salvia
Salvia 'May Night'


Anise Hyssop
Agastache foeniculum


'Black Scallop'
Ajuga reptans


Catmint
Nepeta

Latinx

'Hello Yellow' Milkweed
Asclepias tuberosa

Butterfly Weed
Asclepias tuberosa


Mexican Sunflower
Tithonia rotundifolia

Asian

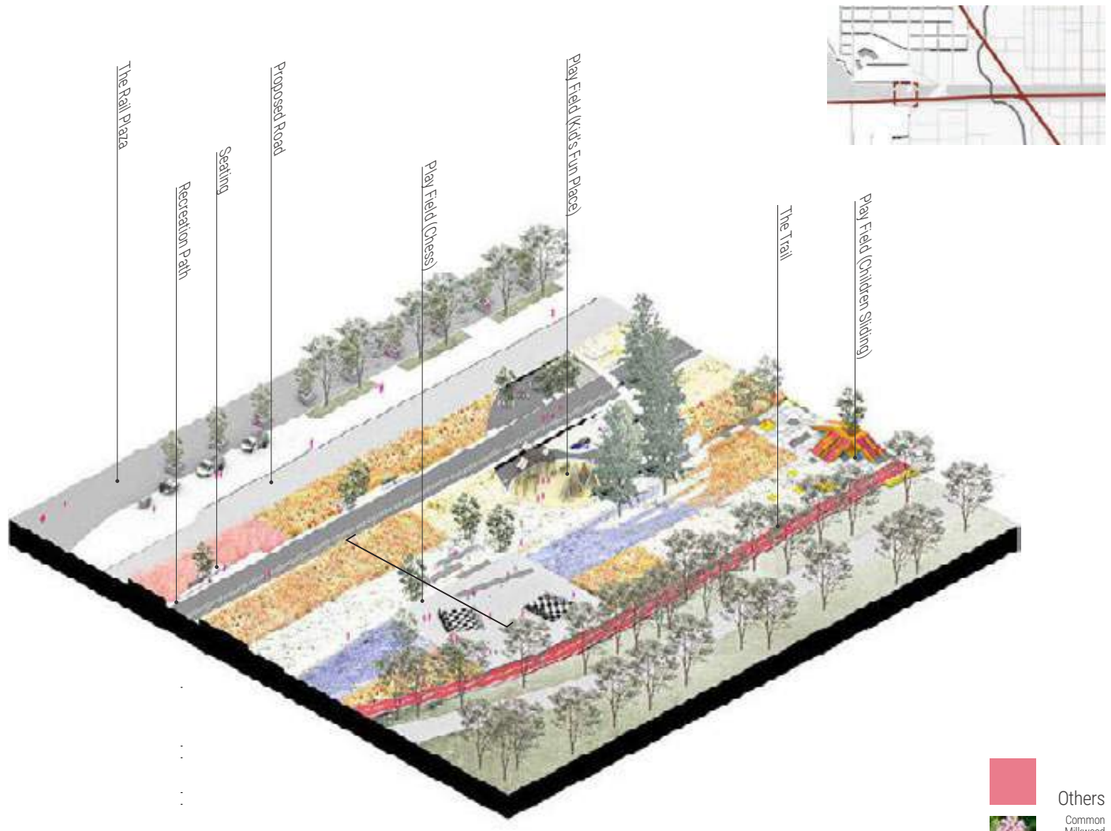

Coreopsis
Coreopsis 'Moonbeam'


Black-Eyed Susan
Eupatorium selections

PLAY FIELD (FUTSAL)

THE URBAN

As the milkweed connection approaching Perry city, the bands turn sophisticated. Activities arranged in this section encourage communication and interaction.



White


Star-of-Bethlehem
Ornithogalum


Whorled Milkweed
Asclepias sullivantii

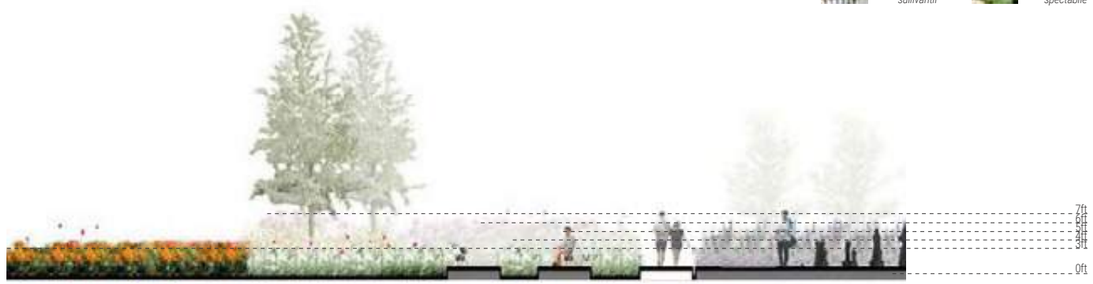
Others


Common Milkweed
Asclepias syriaca


'Soulmate' Milkweed
Asclepias incarnata


Joe Pye Weed
Eupatorium selections

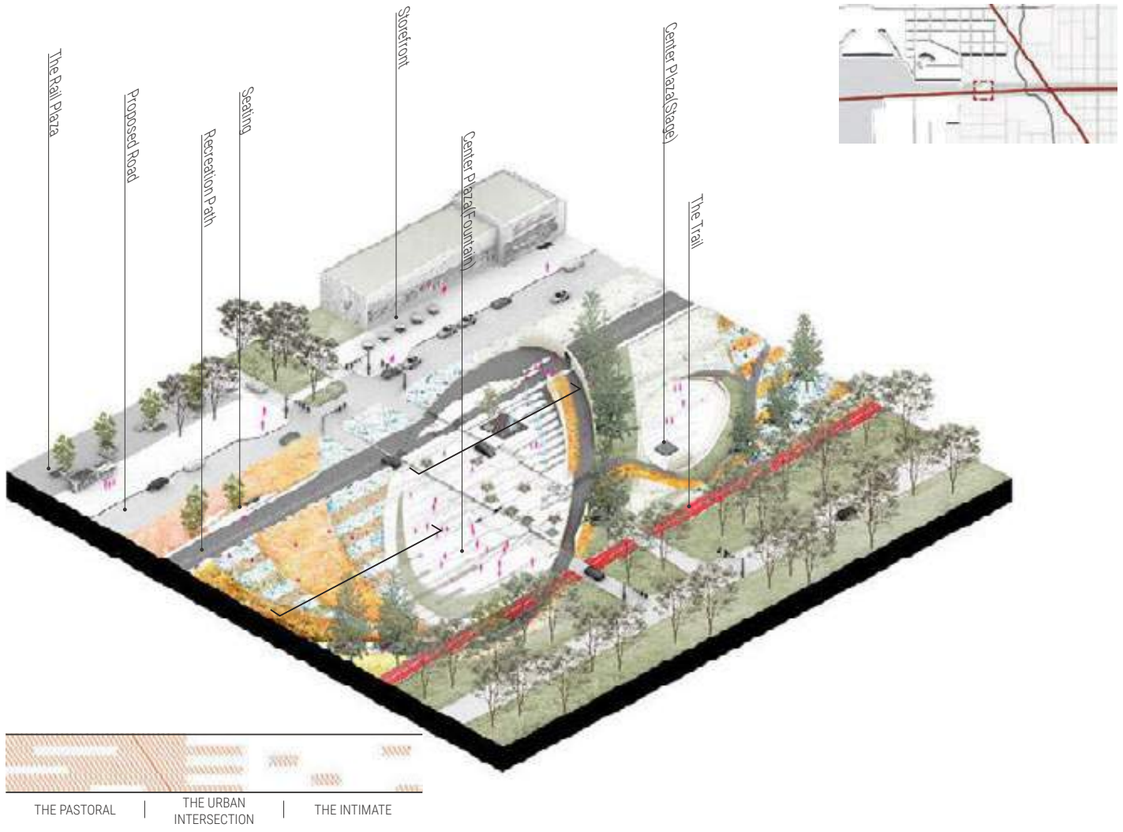

Sedum
Hylotelephium spectabile



PLAY FIELD (CHESS)

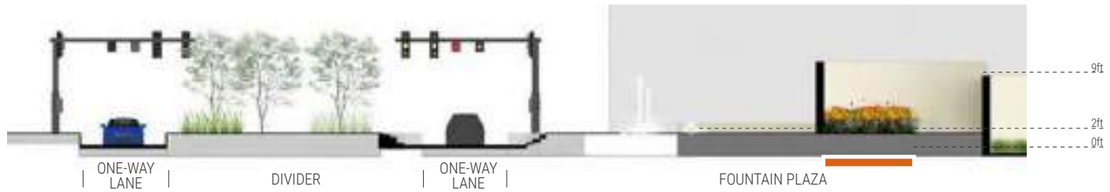
INTERSECTION

At the climax of the trail, color bands and the white bands of the milkweeds extend through each other, the landscape of the connection is interweaved. The fountain plaza is the most lively and broadest place on the connection, facilitating public gatherings.



THE PASTORAL | THE URBAN INTERSECTION | THE INTIMATE

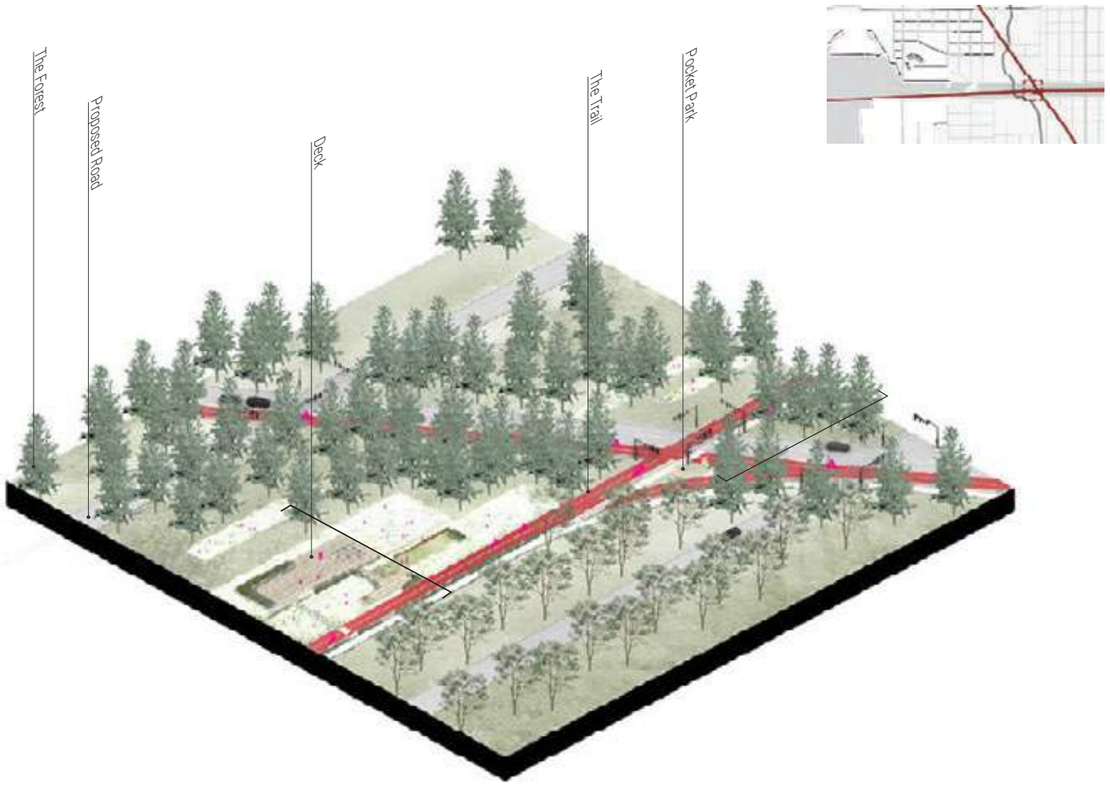
CENTER PLAZA



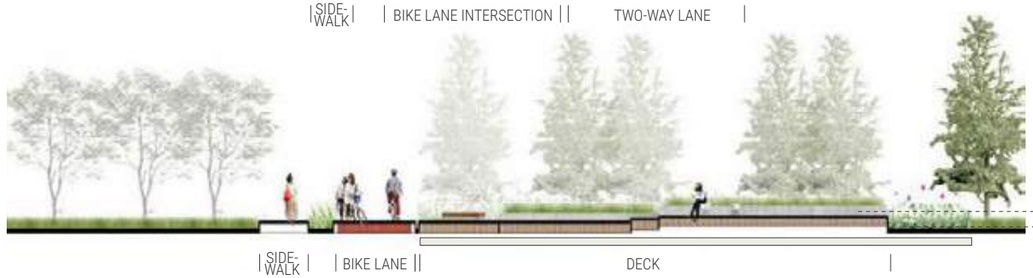
ONE-WAY LANE | DIVIDER | ONE-WAY LANE | FOUNTAIN PLAZA

THE INTIMATE

At the corner of the trail, the connection extends deep into the creek park. Surrounded by the woods, the atmosphere turns intimate and silent. Calm white milkweeds are the dominant plants embellishing the green. Wood decks are arranged to create a relative private space for small group gatherings or personal contemplation.



SIDE-WALK | BIKE LANE INTERSECTION | TWO-WAY LANE



SIDE-WALK | BIKE LANE | DECK

RACCOON RIVER RECREATION

SPORTS FIELD

THE RAIL PLAZA

INNOVATION CENTER

AFFORDABLE HOUSING

NEW INDUSTRY

PLAY FIELD

RECREATION PATH

CIVIC INSTITUTION

CENTRAL PLAZA

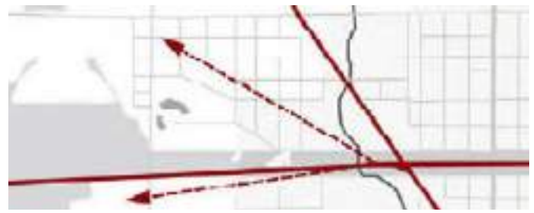
POCKET GARDEN

RACCOON RIVER RECREATION

THE TRAIL

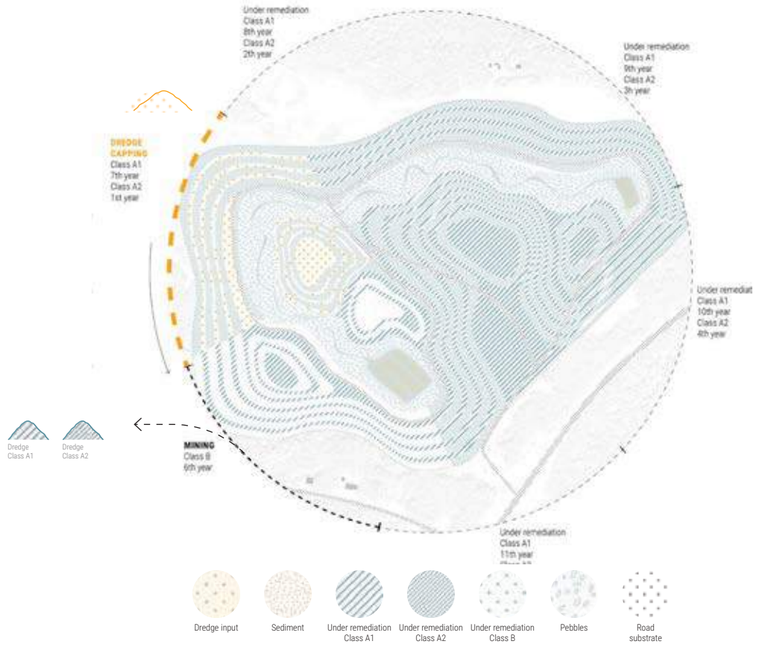
VIBRANT-PERRY ACKNOWLEDGMENT

I'd like to thank the following contributors for project inspiration. This design is only possible through an interdisciplinary and participatory process that includes community members, leaders, and entrepreneurs.
City of Perry *for facilitating conversations, reviews, and supporting survey.*
City of St. Louis, Catherine Werner *for inviting class to MonArch migration event and introducing the concept of biophilic cities.*
50+ community members and leaders *for reviews and suggestions at La Poste during final review.*
Part ***students*** *from urban design and landscape landscape architecture department, Iowa State University for collaborative broad research of the city.*
Benjamin Schirtcliff *for instruction and making this studio happen.*



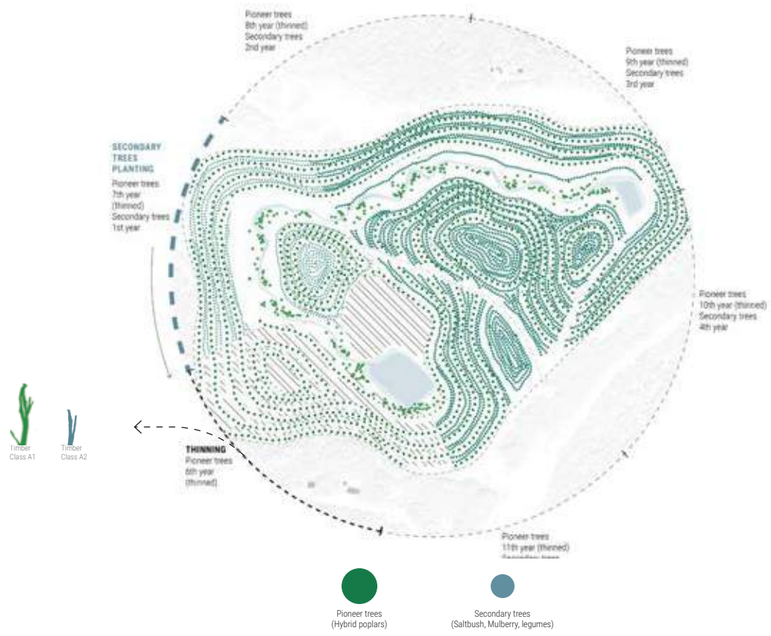
Substrate Plan

5th year / 12yrs cycle



Tree plan

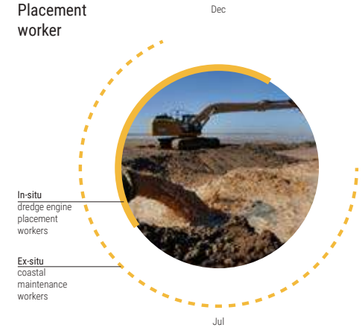
5th year / 12yrs cycle

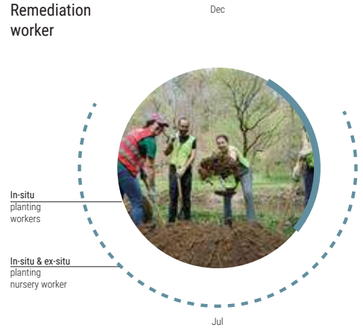


Cyclic dredge engine works with 3-year dredging cycle and 12-year remediation planting cycle in the quarry near the Cape Cod Canal

Soft Infrastructure, Cape Cod, MA

Dredge Engine





Core III

From Off-Shoring to Near Shore:
Littoral Landscapes at Work

Instructor

Amy Whitesides

Individual Work

9/2020 - 12/2020, Academic

Dredging constitutes a sedimentary infrastructure essential to coastal landscape functioning, as beach nourishment and habitat restoration. In the Cape cod canal and Buzzards Bay area, clean dredged material from the Canal and PCB contaminated dredge from the Bay are critical resources that are currently taken off site to far offshore dumping grounds.

The project focuses on the cape cod canal dredge maintenance capacity and its catalytic potential for revitalization and coastal protection through the proposal of The Dredge Engine, a local aggregates business catalyzed and diversified by localized dredged materials management.

Site A is an in-situ quarry. Divided into six zones, the quarry works under a mining-and-restoration cycle that incorporates both clean and contaminated dredge. In three-year cycles, two zones of the quarry would be at work remediating contamination and generating clean soils and timbers.

Site B is an ex-situ site, a representative of the dredge beneficiary uses when transported offshore. An offshore storm damage reduction dune belt is built with the material. The belt is built by marsh defense on the seabed and the nourishment on the existing beach frontier. Both placements are built on the dredge construction and enable a natural sediment accretion process.

Contact: Amy Whitesides Email: awhitesides@gsd.harvard.edu

DREDGE AT CAPE COD CANAL

32’ MLLW Maintenance dredging at cape cod canal

15,000 average cubic yards (cy) of clean sand and gravel per year

Shoals needed to be dredged across the history

Sandy coastal beach

SITE A

IN-SITU DREDGE ENGINE

East Sagamore Shoal
To be dredged to 34’

EAST MOORING BASIN

East Mooring Basin Shoal
To be dredged to 32’

200

South Breakwater Shoal
To be dredged to 38’

West Sagamore Shoal
To be dredged to 37’

East Mooring Basin Channel Shoal
To be dredged to 38’

DREDGE TRANSPORTED NEARSHORE

400

Buzzards Bay Shoal
To be dredged to 32’

500

SITE B

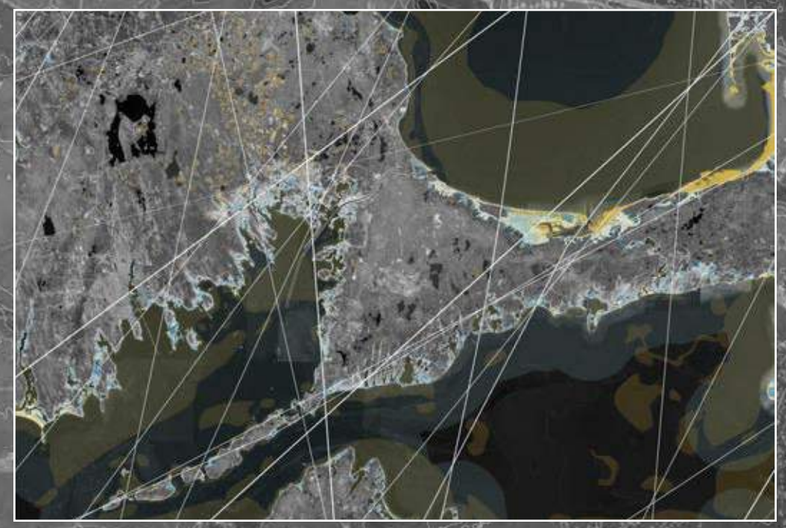
600

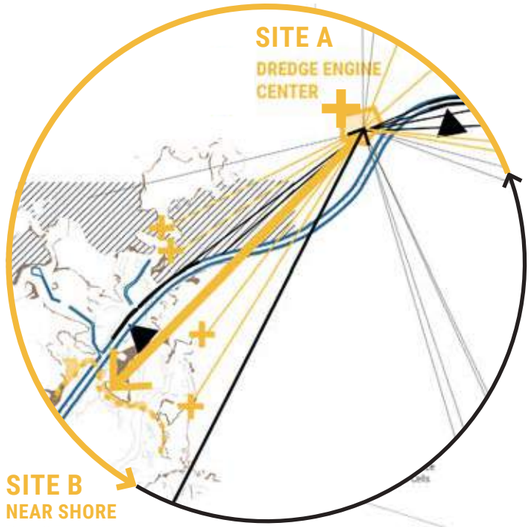
Onset Shoal
To be dredged to 37’

DREDGE TRANSPORTED OFFSHORE

500

RISKS FACING CLIMATE CHANGES





EXISTING OFF-SHORING DREDGE TERRITORY

Dredge type

Navigational & Maintenance dredging

Cape cod canal and surrounding channels

PCB dredging

Superfund sites around Buzzards Bay

Disposal type

Open Water Disposal Sites

Cape Cod Canal Disposal Site

Cleveland Ledge Disposal Site

Near shore Placement

Springhill Beach

Town Neck Beach

N

Maintenance dredge site
15,000 cy/y

Superfund dredge site
75,000 cy/y

Superfund Area

Disposal site

Disposal Area

Salt sandy beach

Channel

Boston Harbor
Cap CAD Cells

Cape Cod Canal
Disposal Site

Cape Cod Bay

East Sagamore Shoal
To be dredged to 34'

South Breakwater Shoal
To be dredged to 38'

Town Neck Beach

Springhill Beach

Onset Shoal
To be dredged to 37'

2005 Cape Cod Canal
Disposal Survey Area

Cleveland
East Ledge

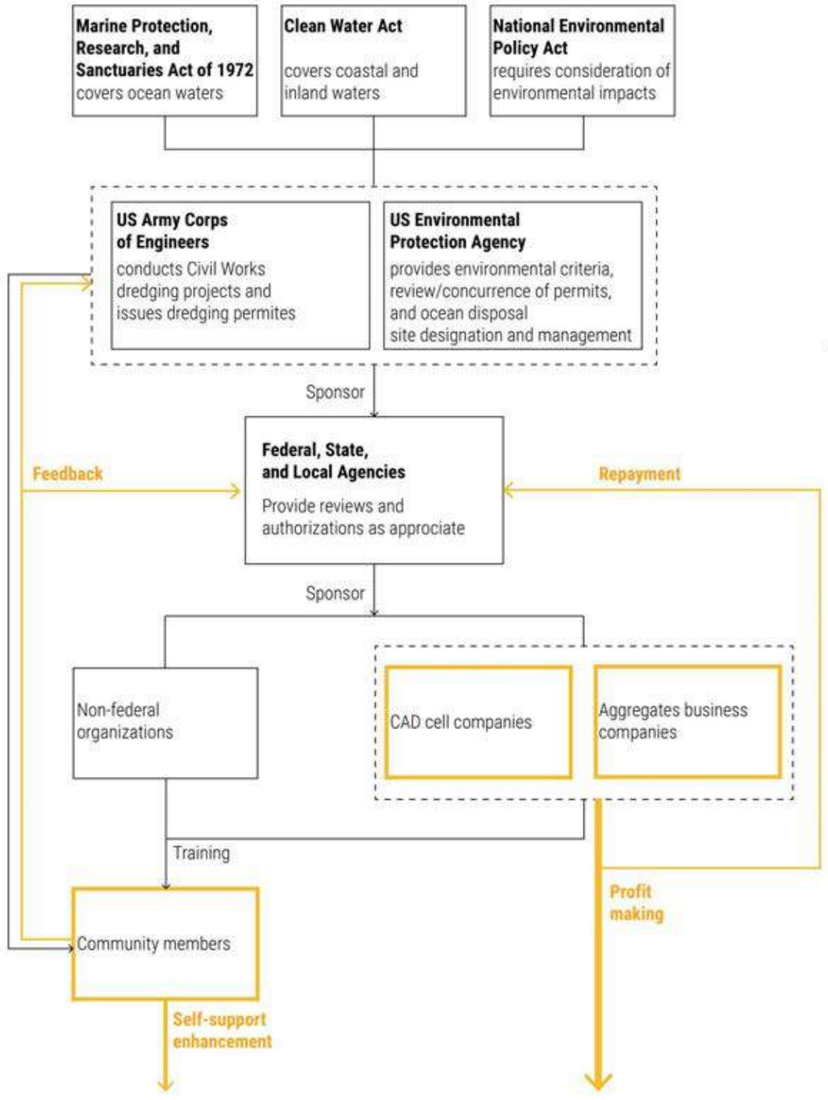
Historical
Disposal Site

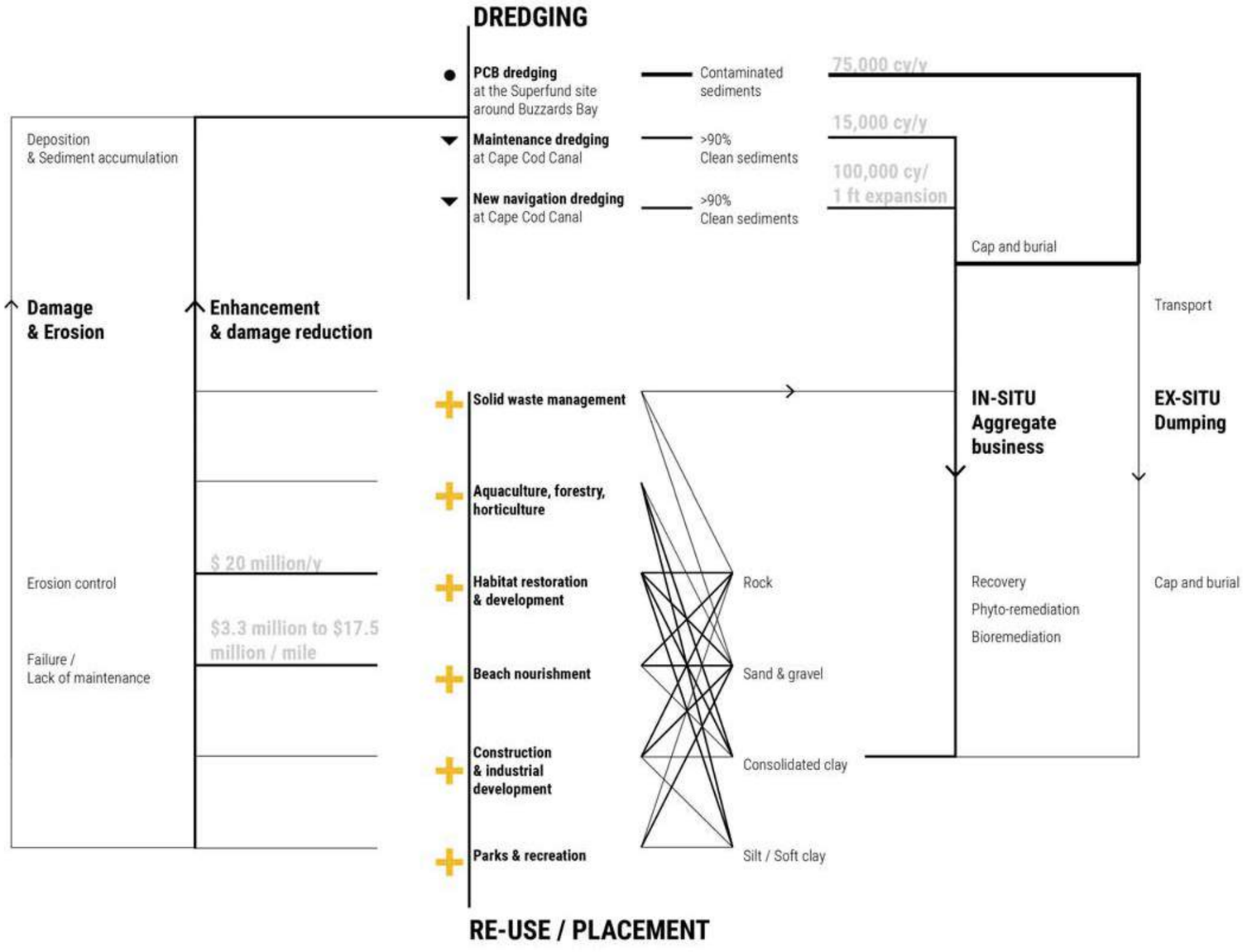
Cleveland Ledge
Disposal Site

MA CZM
Candidate Site1

Buzzards Bay

FROM OFF-SHORING TO NEAR SHORE DREDGE CYCLE





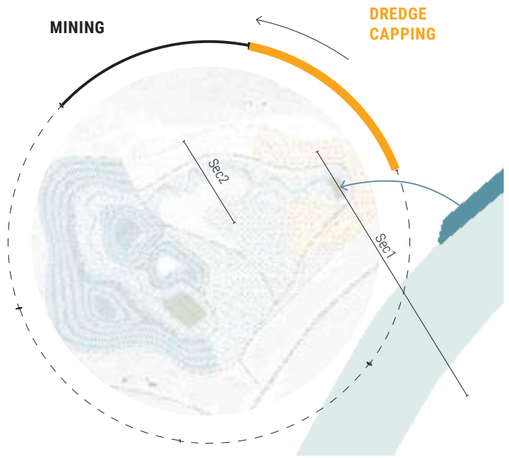
70%→**35%** Federal

30%→**65%** Non-federal

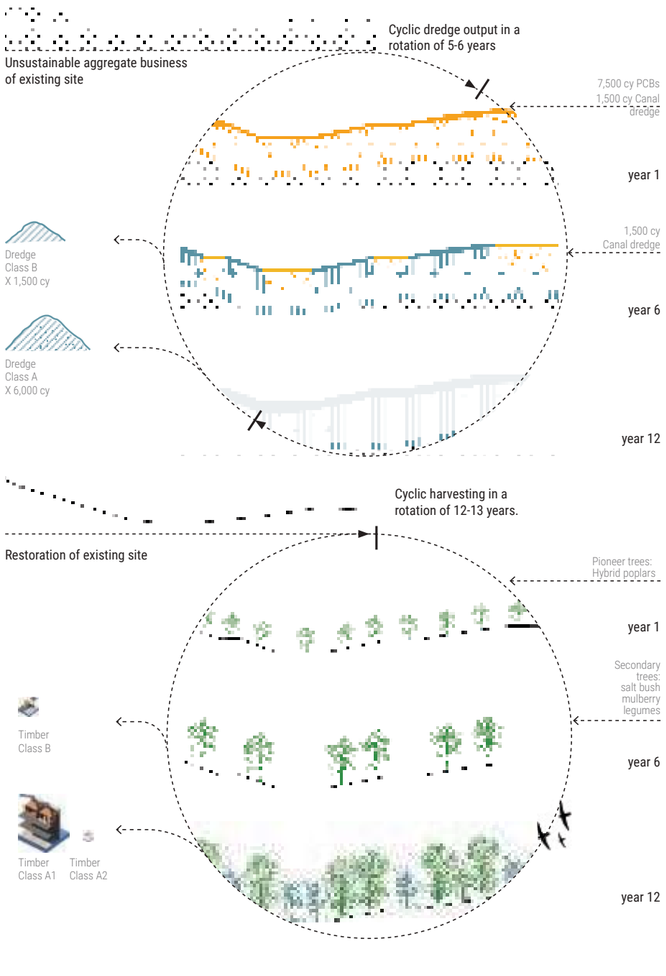
a localized labor, a diversified aggregates business, a quickened geology

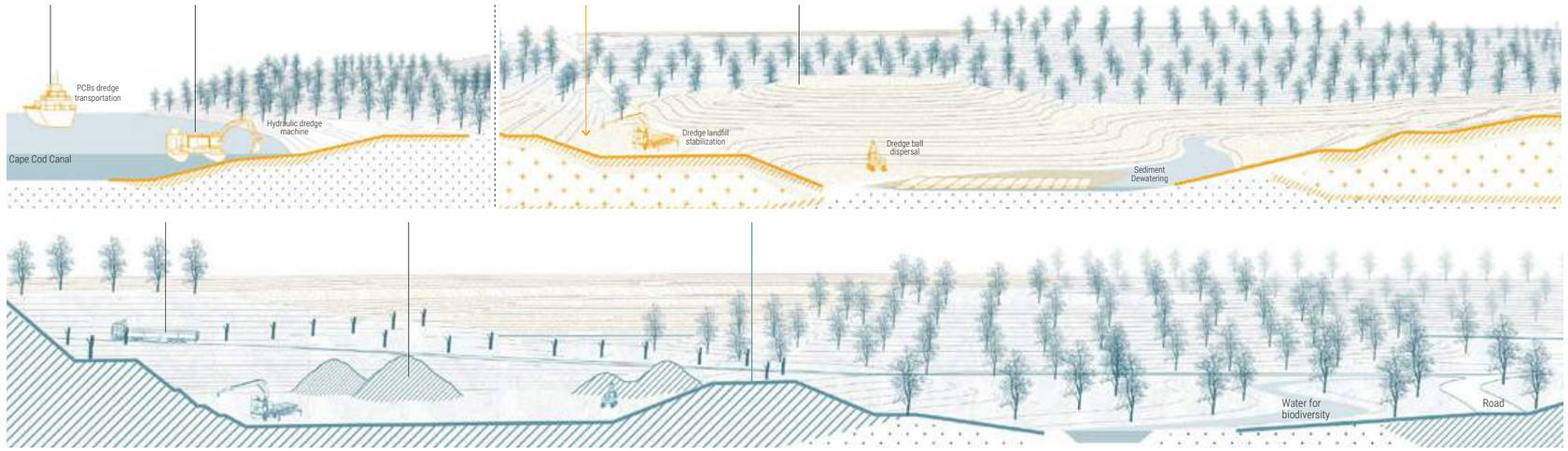
SITE A | CYCLIC DREDGING AND MINING

Cyclic zoning

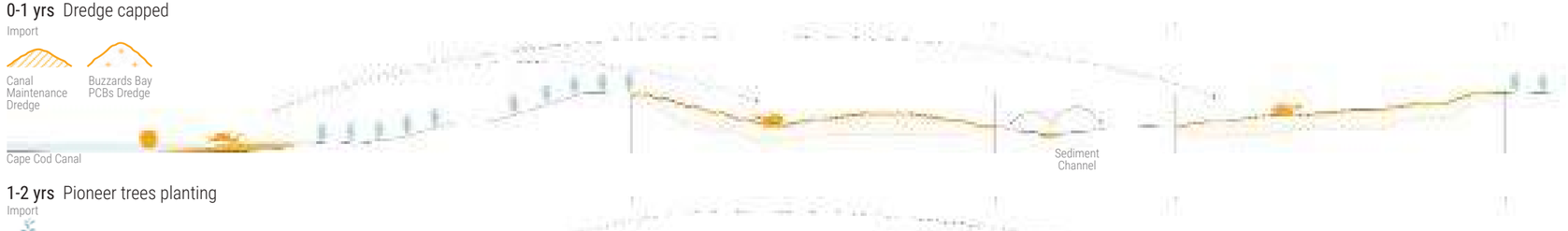


Phasing





0-1 yrs Dredge capped



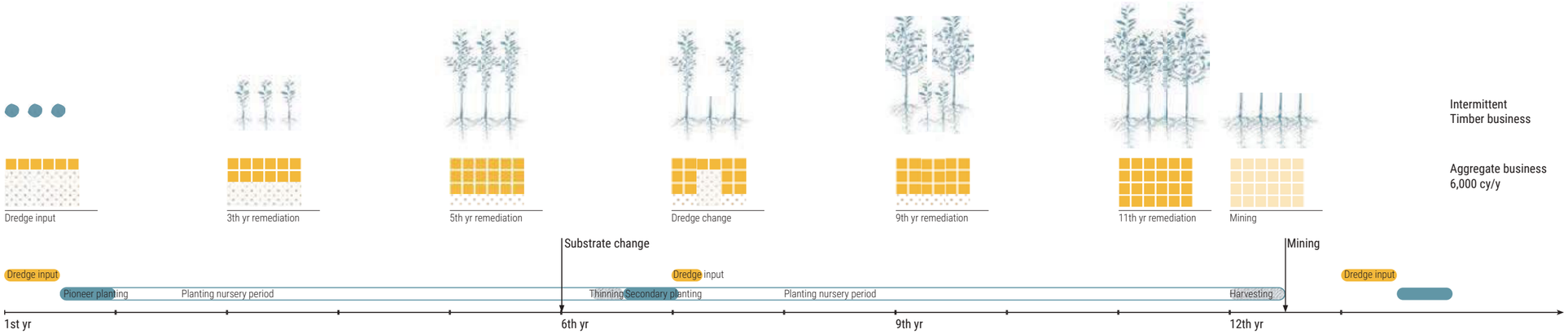
1-2 yrs Pioneer trees planting

5-6 yrs Dredge changing, trees young stand thinning

12-13yrs Trees harvesting

13yr Mining, dredge output

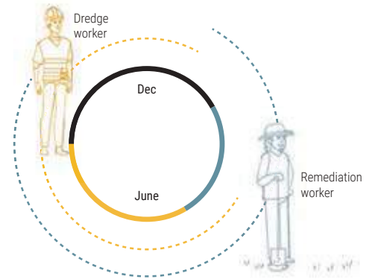
SITE A | DREDGE CYCLE MANAGEMENT



Intermittent
Timber business

Aggregate business
6,000 cy/y

Year-round job opportunities
for local labor



2nd yr
Nursery planting

1st yr
Nursery planting

1st yr
Dredge Placement

Sediment diversion

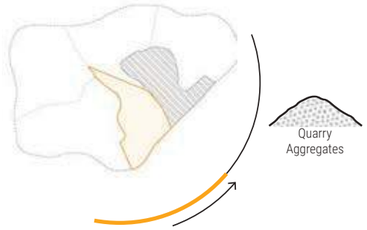
Yrs
Nursery planting

SITE A | CYCLIC PLAN AT WORK

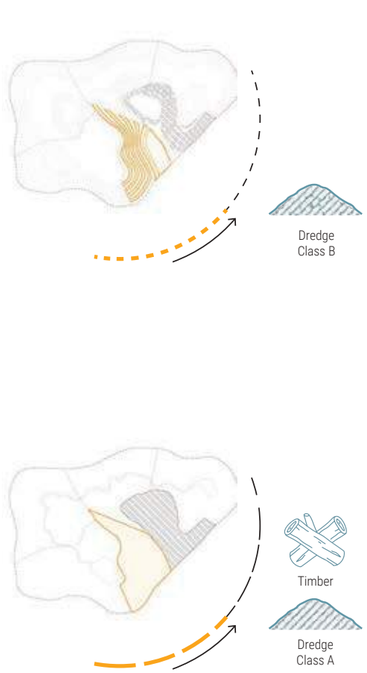
MATERIAL CYCLE

DREDGE & AGGREGATE BUSINESS

From Aggregates business



To Dredge Business



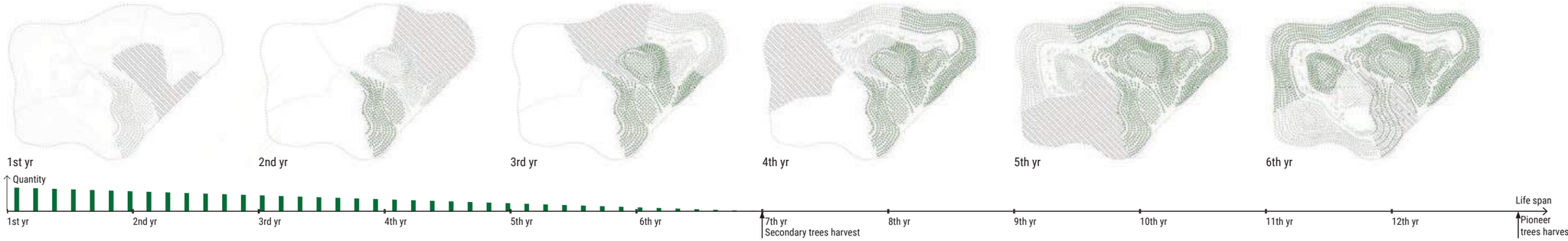
BIODIVERSITY CYCLE

REMEDIATION & HARVESTING

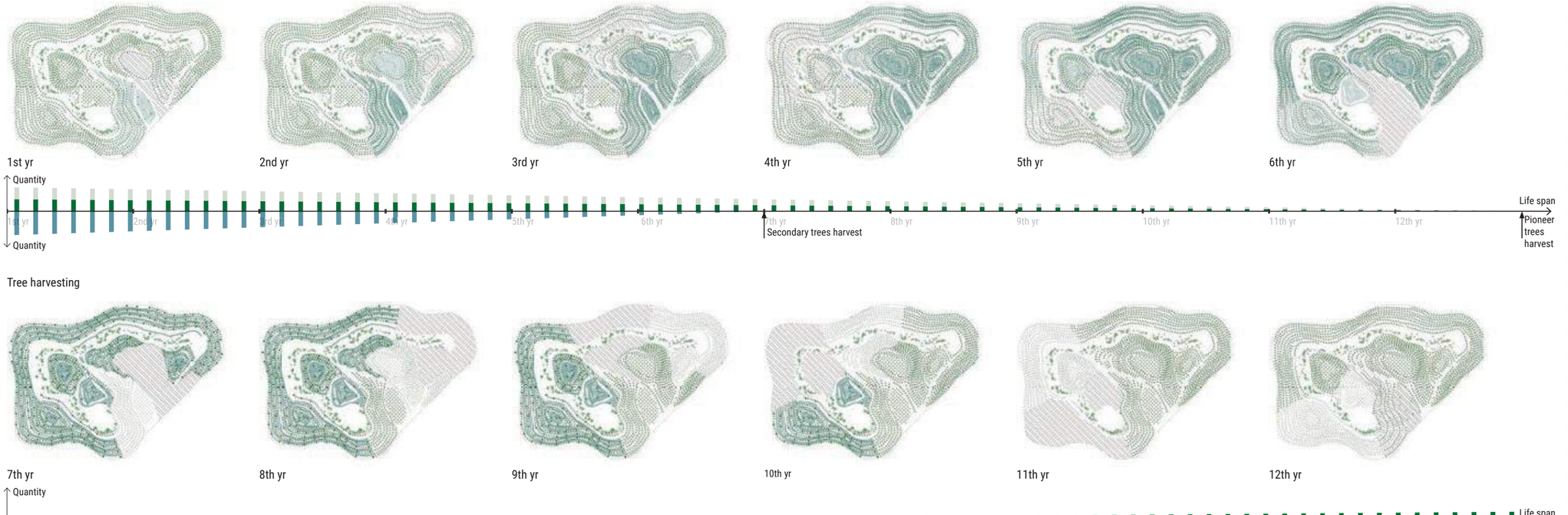
Pioneer trees (thinned)

Secondary trees

Pioneer tress planting



Young stand thinning



Tree harvesting

SITE B | STORM DAMAGE REDUCTION BELT

Located at the channel's neck of the canal, dredge builds near shore storm damage reduction belt. One strategy is marsh buffer on the seabed and the other is the frontier dredge dune extension of existing beach.

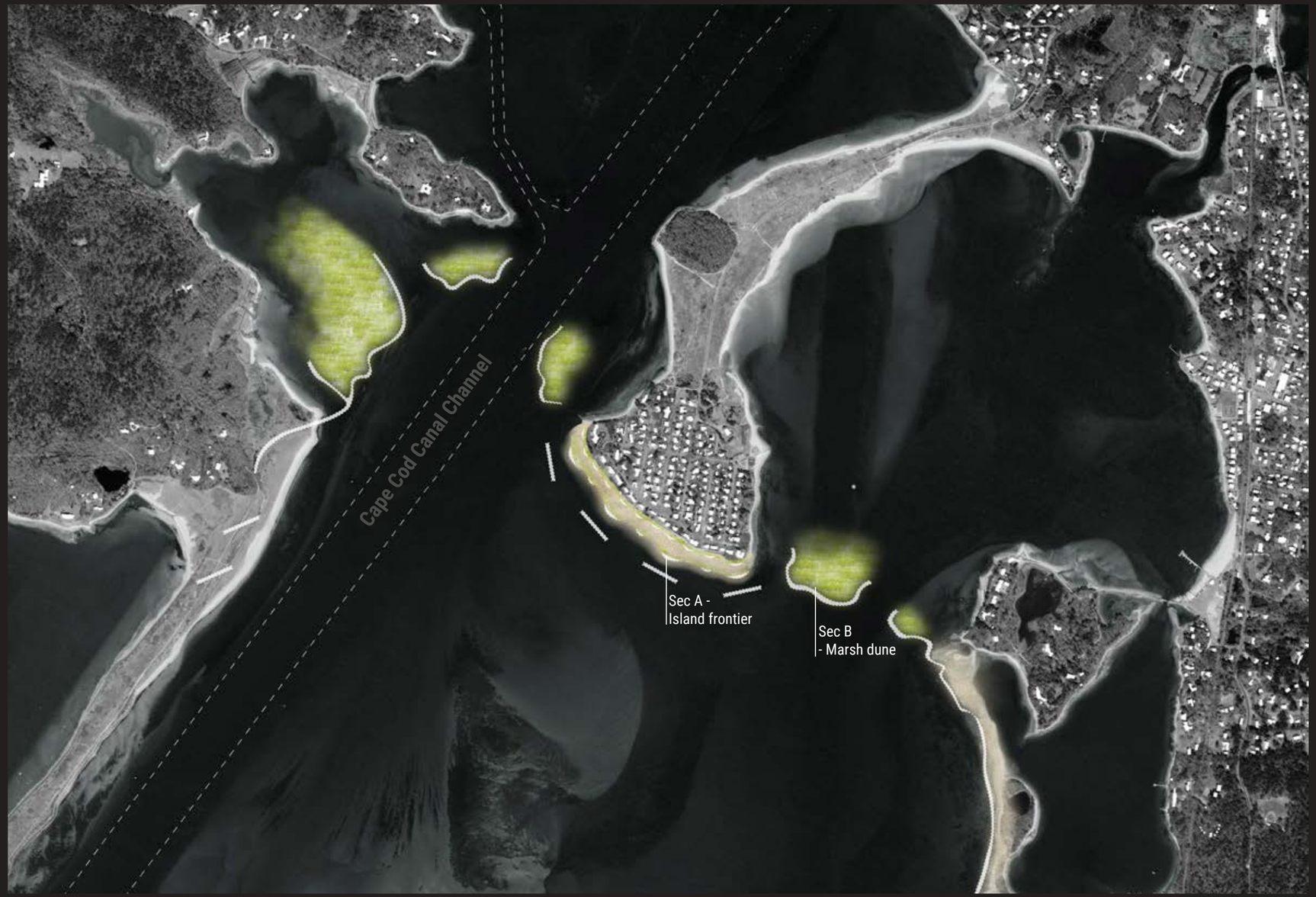
Context mapping

Sea Level Rising

2’ 4 6’ 8’

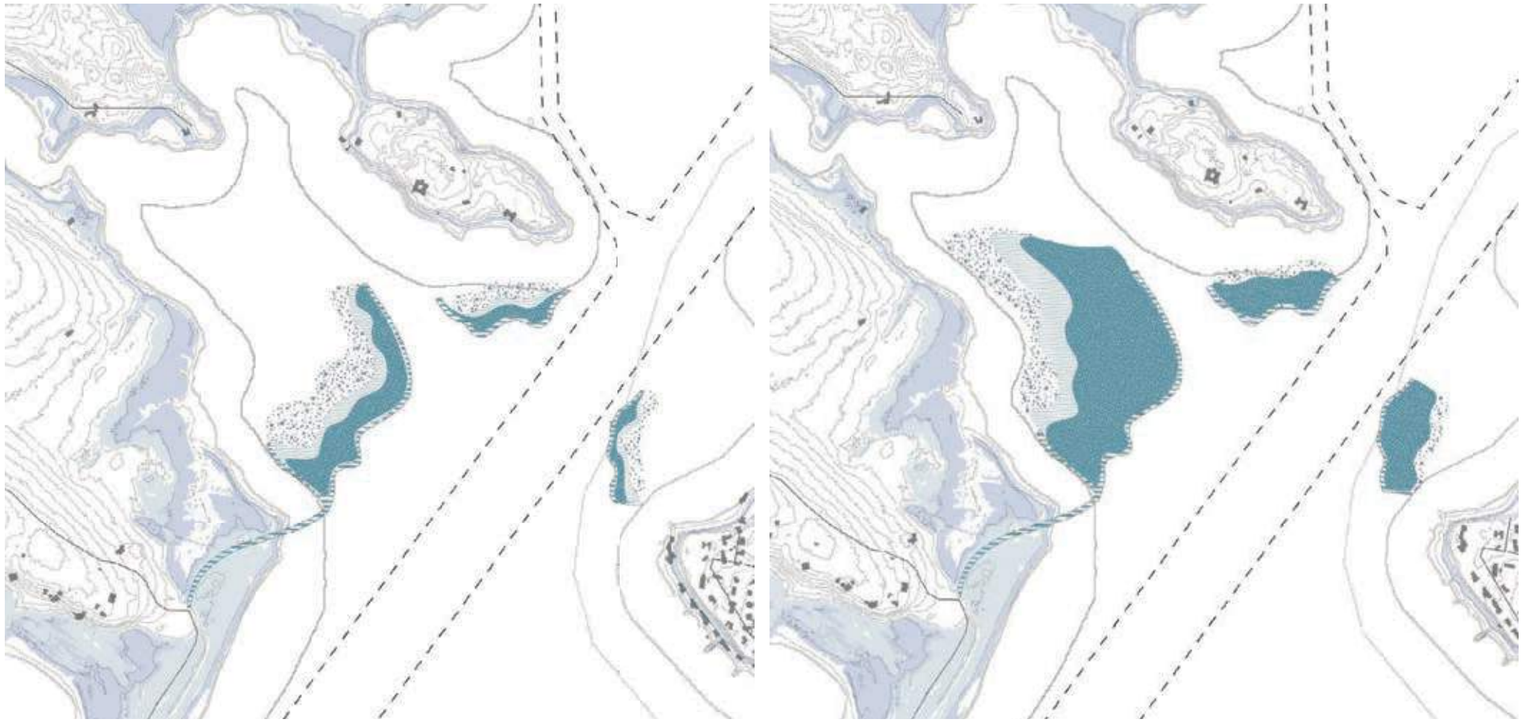
Dredge fill region Dredge construction Marsh area

Master plan

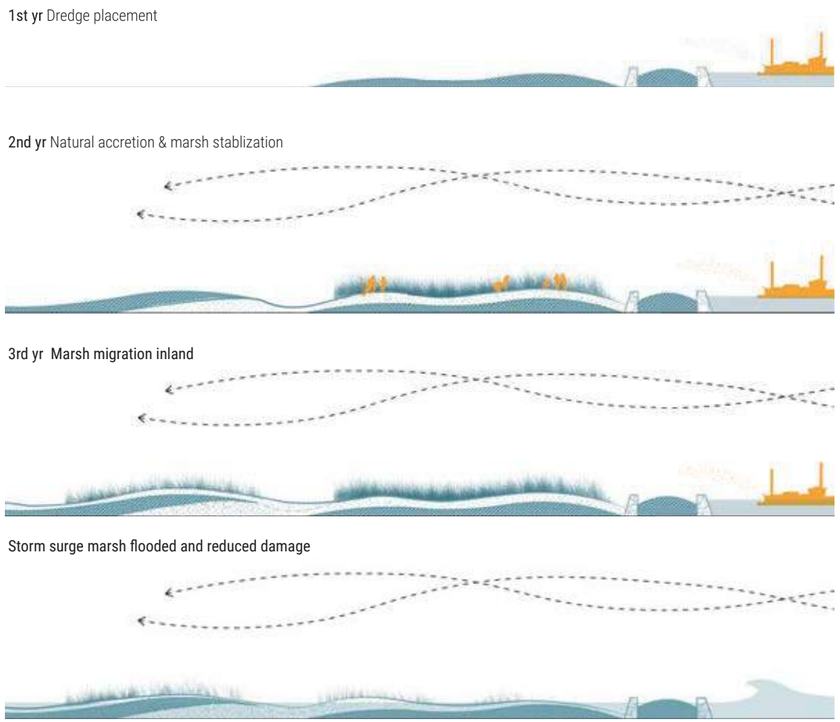


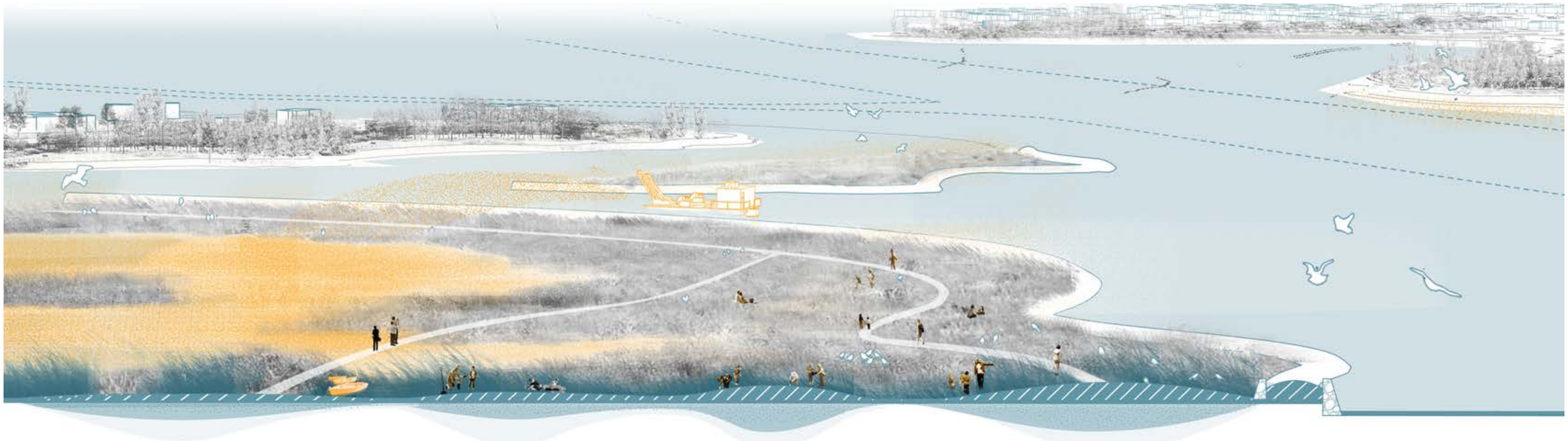
SITE B | MARSH BUFFER AT THE CANAL'S NECK

Seabed Serial Plans



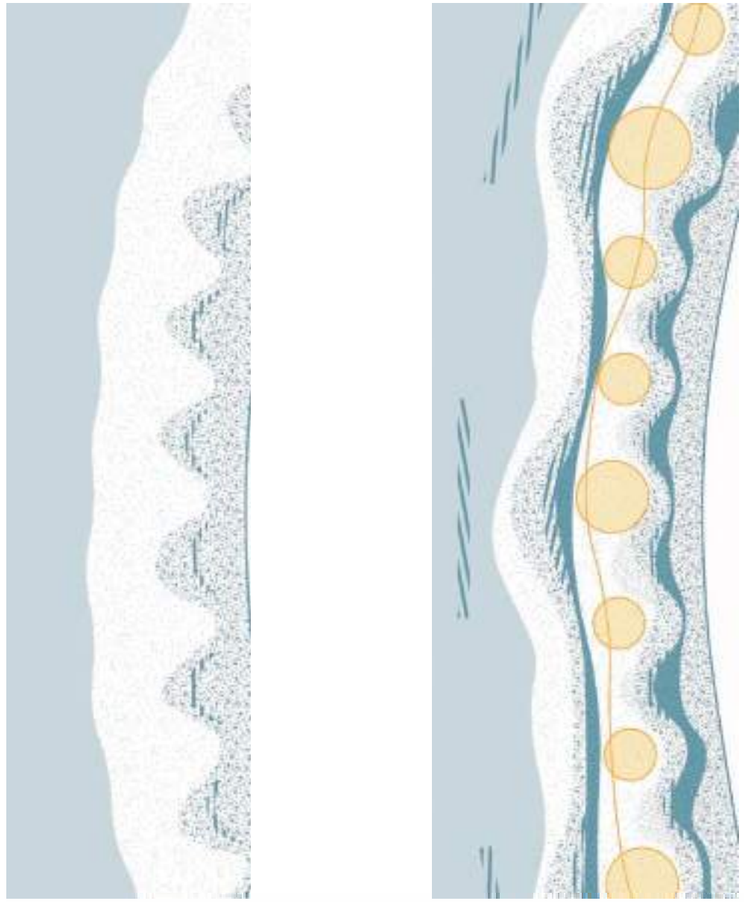
Dredge as marsh wetland engine



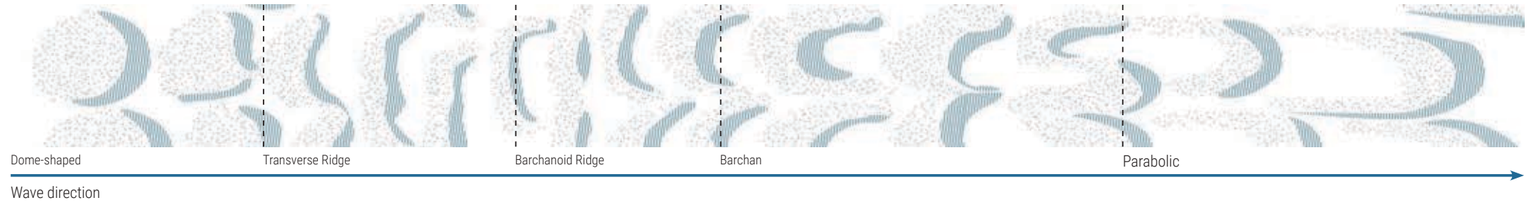


SITE B | DREDGE FOR DUNE CONSTRUCTION

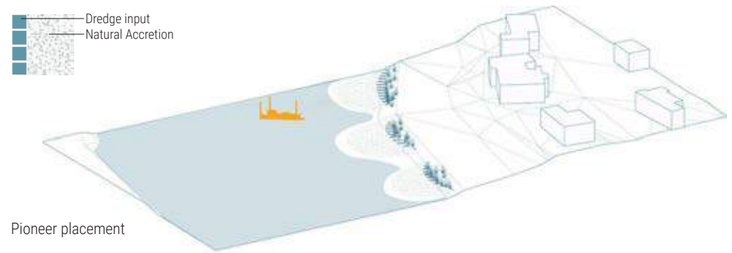
Coastal Beach Serial Plans

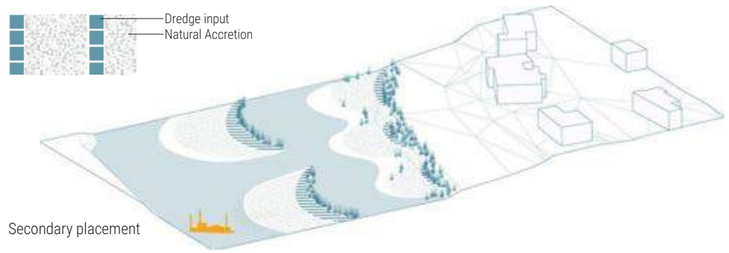


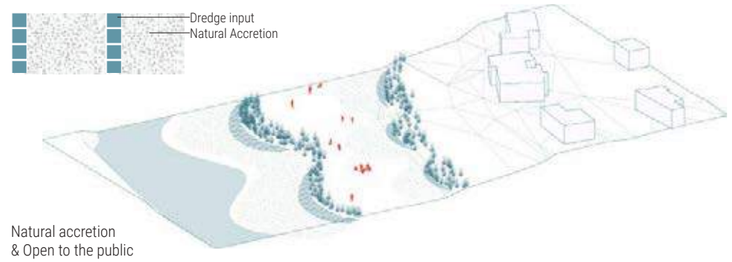
Dune Typology

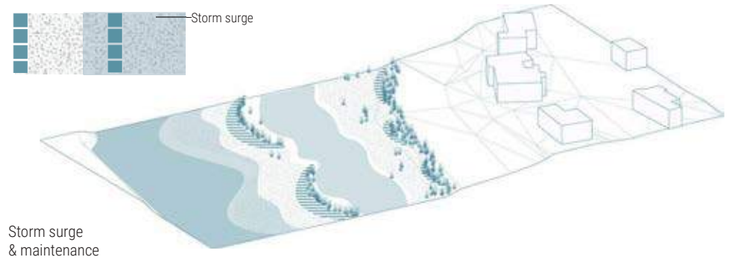


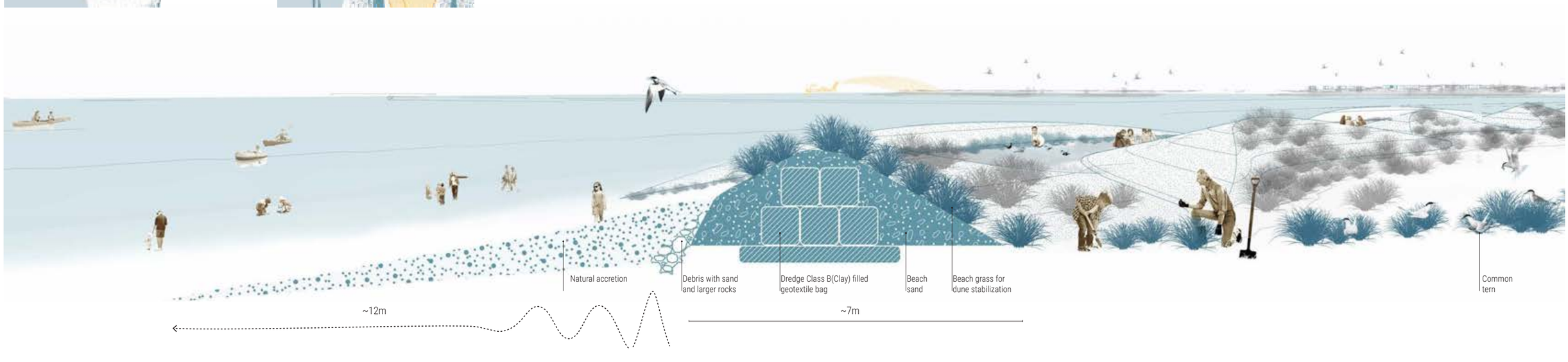
Dredge as coastal sand engine







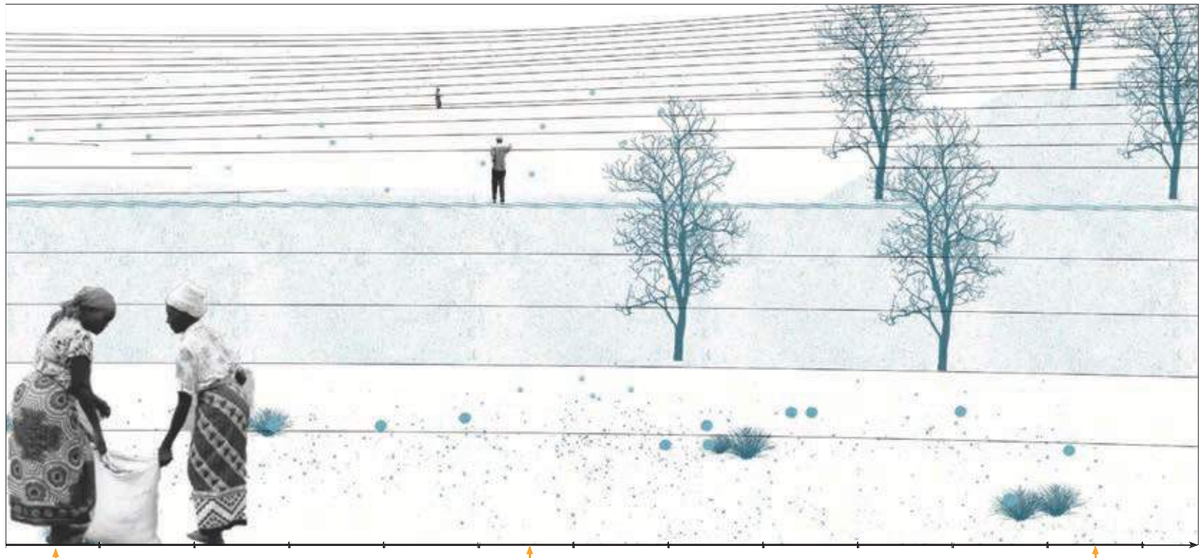




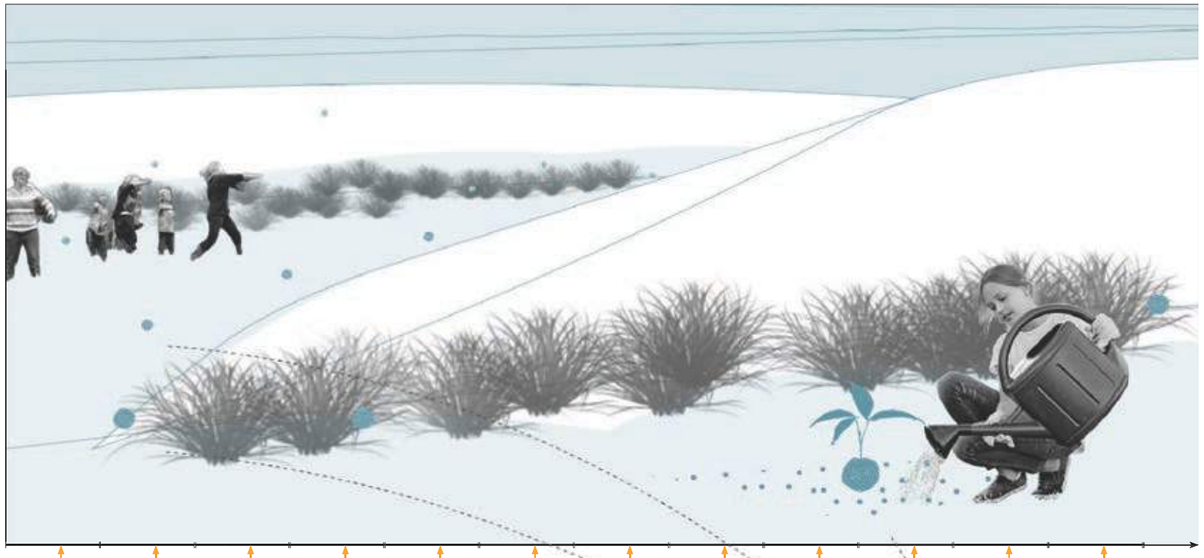
FUTURE KIT | DREDGE BALL COMPOSTER

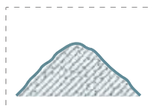
Dredge ball has the merit of easy to disperse and their seeds are under clay protection. The dredge ball composter kit would be used both in site A for production and site B for a vivid dredge class to the community.

Site A - During remediation - Labor-Dispersing dredge ball



Site B - After storm - Community - Involvement





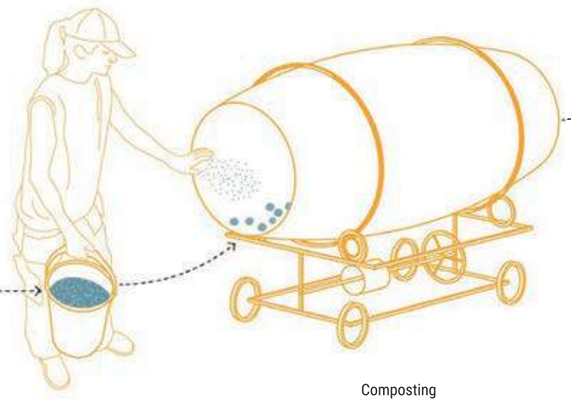
Dredge Class A
(Compost)

+

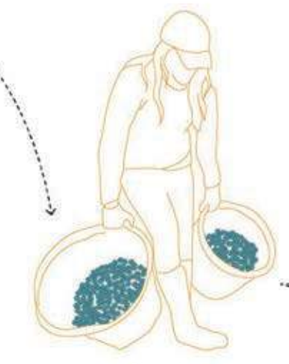
Dredge Class B
(Clay)

+

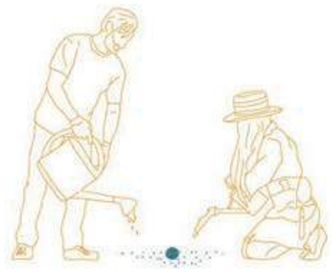
Seed



Composting

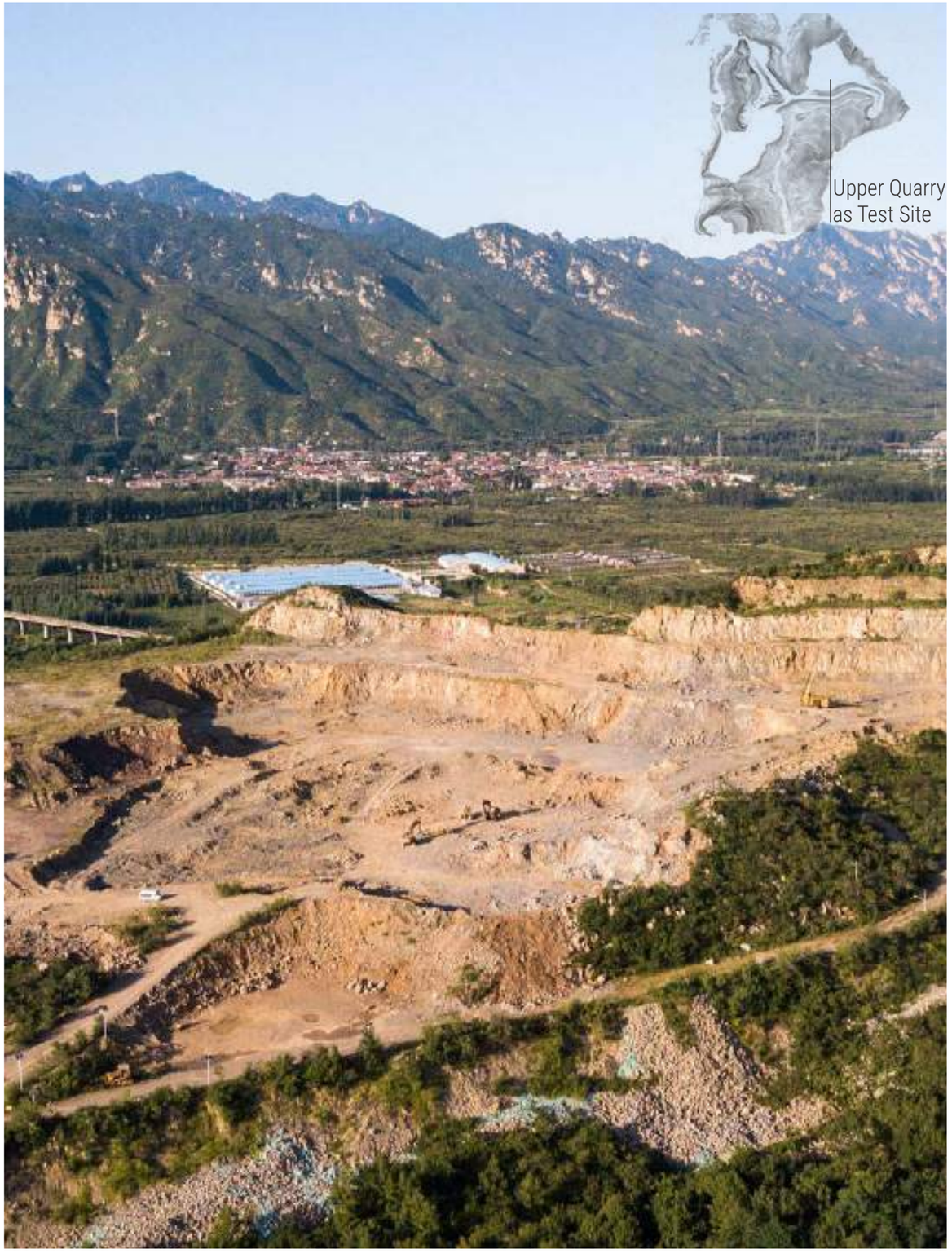


Dispersing
Site A



Watering dredge ball
Site B

Throwing dredge ball
Site B



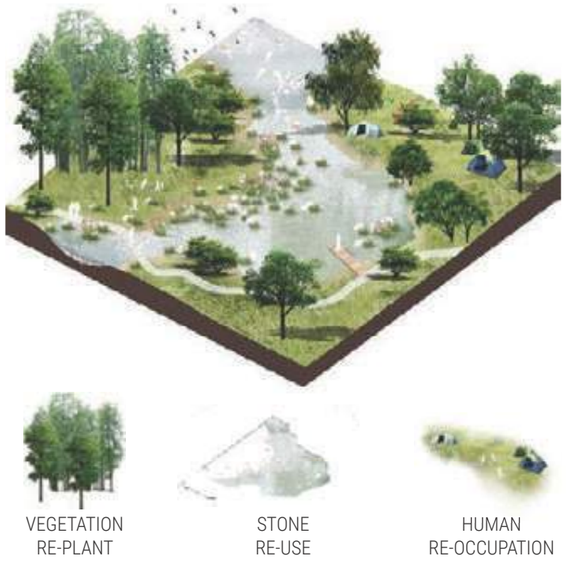
Ecological Restoration, Beijing, China

Back to Green

Instructor
Peichen HAO

Individual Work

10/2019 - 12/2019, Academic

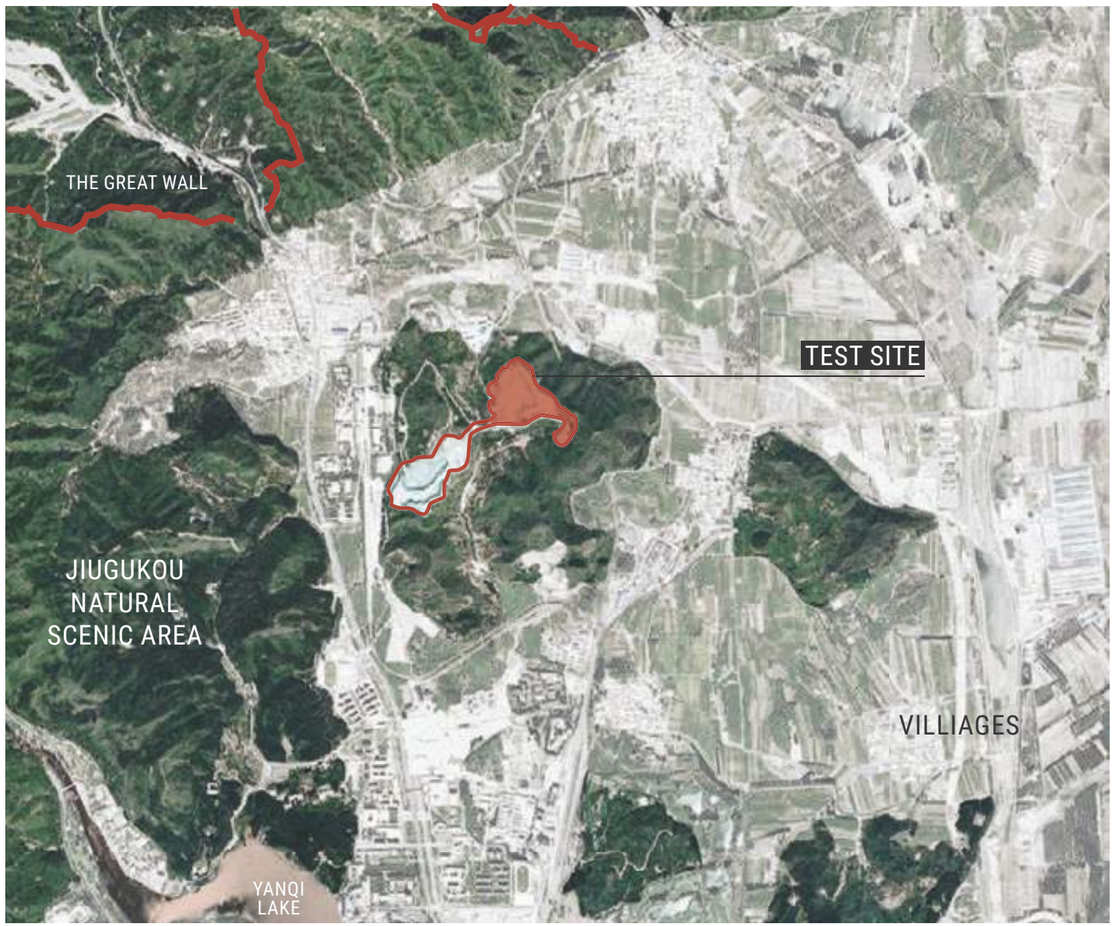


At the south foot of Mt. Yan, the quarry is situated in an archaic landscape where the local ecology is directly linked to regional topography and the climate. The two quarries had been extracted by Beijing Xingfa Cement Co., Ltd since last the decade. Like the history of quantities of quarries, the quarry has experienced extraction, abandonment, and redevelopment, accompanied by the strong construction need and development of ecological awareness. Faced with the huge scar on the landscape, this restoration study aims for a solution for quarries with similar ecological features and **the upper quarry** is taken as the test site.

EXISTING CONDITIONS AND POTENTIALS

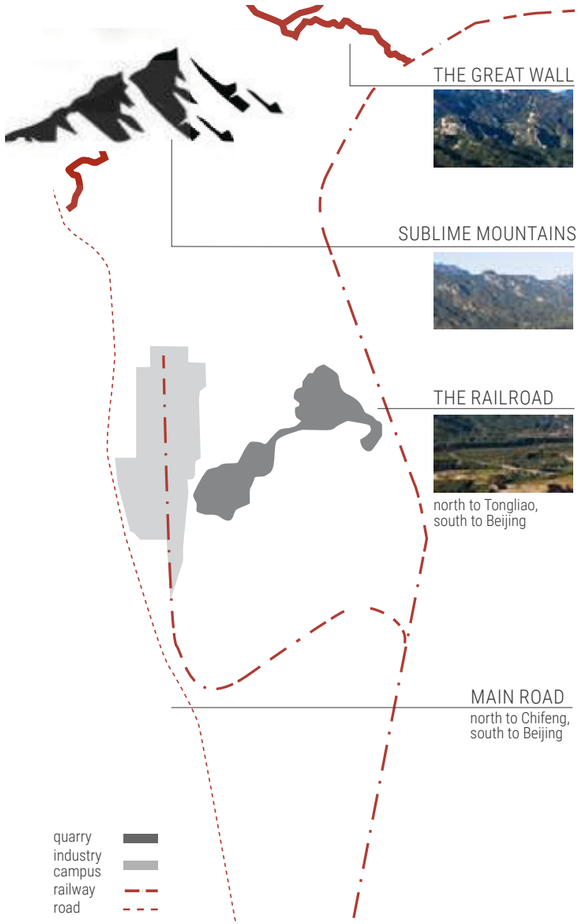
The three main tasks of quarry restoration are to replant vegetation respecting local topography and climate, to reuse floating stone left by extraction while ensuring the cliff stability, and to create space and route for human reoccupation.

1 Ecological Feature for Restoration



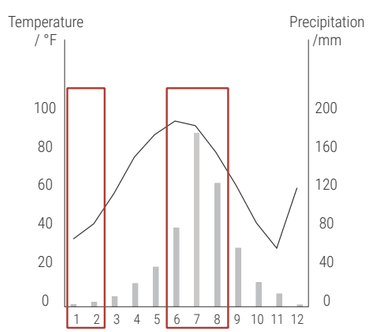
2 Stone Reuse & Cliff Instability

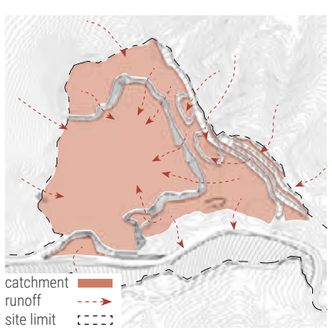
3 Significant View & Accessibility



Climate of Huairou District, Beijing

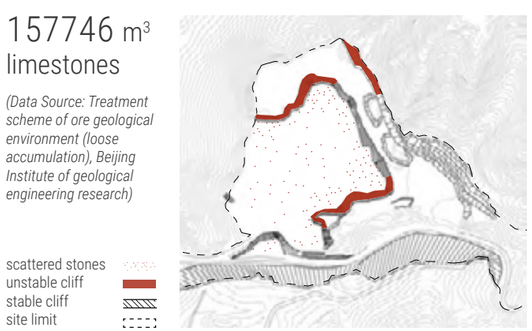
*Climatic potential for **ephemeral pond,** a micro habitat rich in biodiversity*

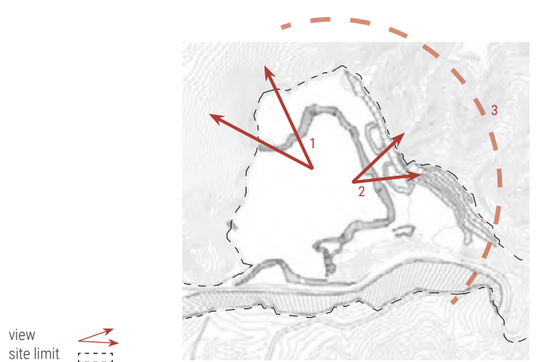




157746 m³ limestones

(Data Source: Treatment scheme of ore geological environment (loose accumulation), Beijing Institute of geological engineering research)

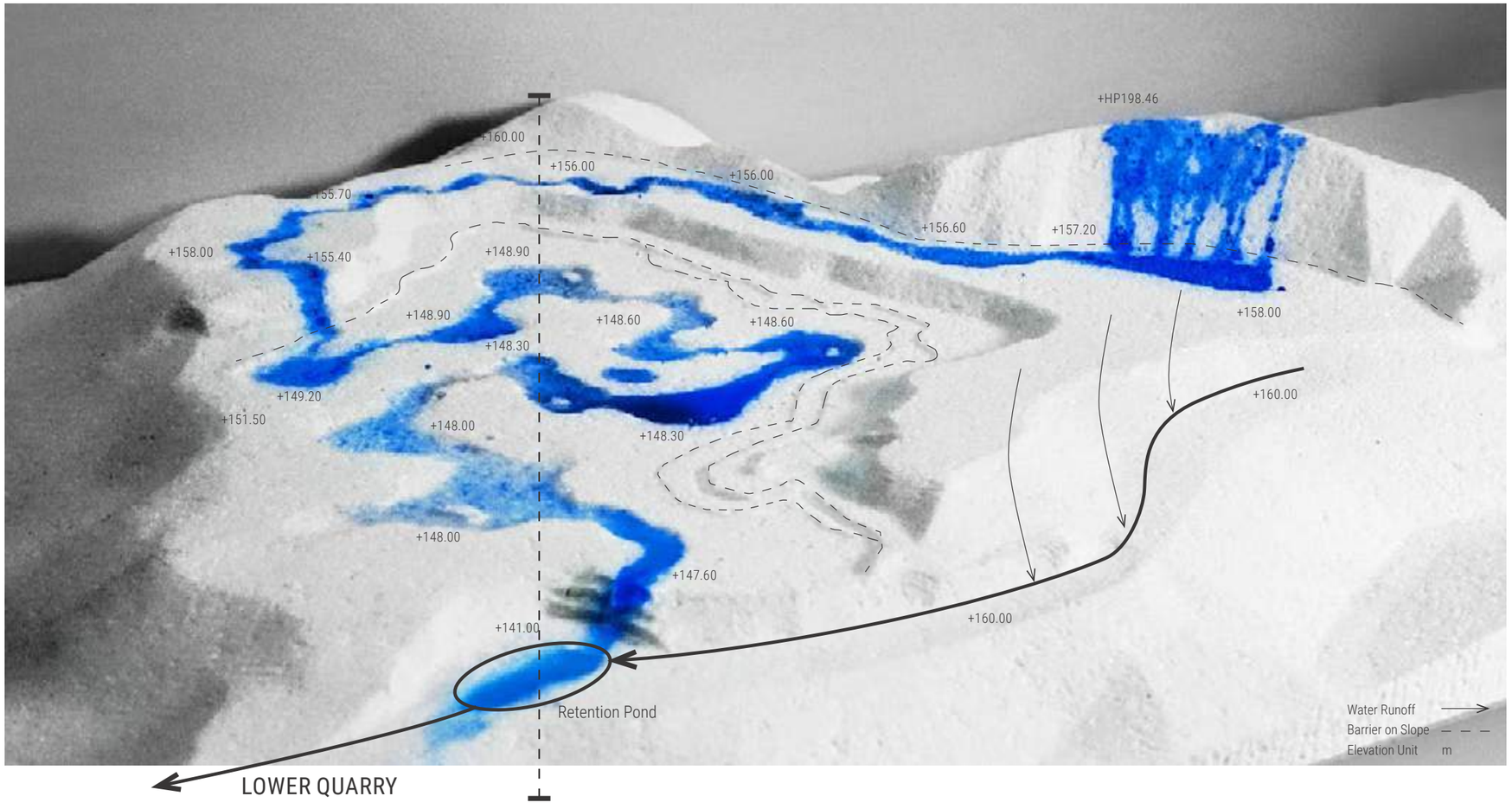




FRAMEWORK

Ephemeral ponds are constructed by floating stones as activators for vegetation restoration. Remediation species would firstly emerge around ephemeral ponds, fostering future diversity restoration.

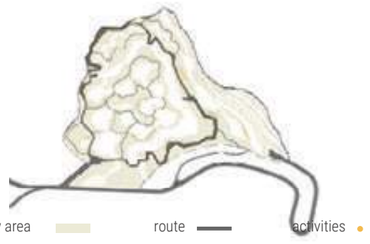
Hydrological Cycle



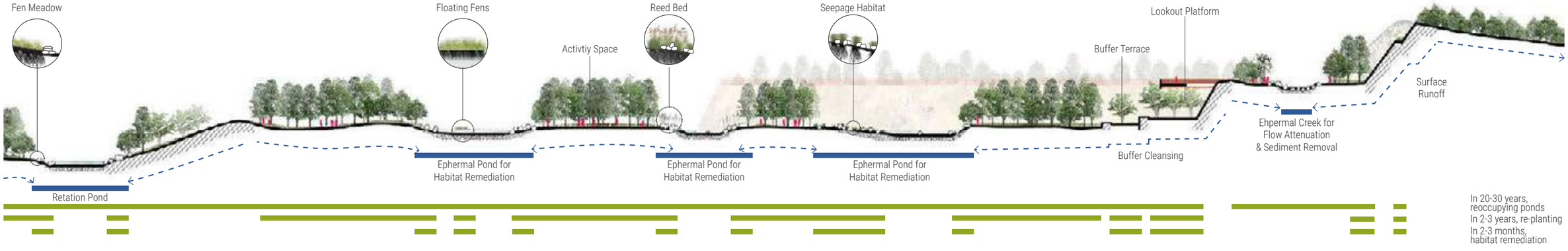
1 Vegetation Re-plant

2 Stone Re-use

3 Human Re-occupation



Green Activation



TASK I RE-PLANTING

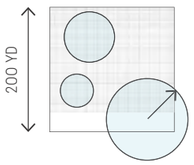
This study looks into the best planting process at community scale for vegetation diversity restoration. Based on the ecological feature research of the local environment, shrub-dominated woodlands would occupy in the long term.

PREPARATION

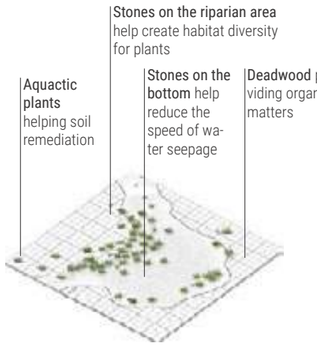
Ephermal ponds construction for habitat creation

Habitat Remediation Species

CONSTRUCTION DENSITY



MATERIAL

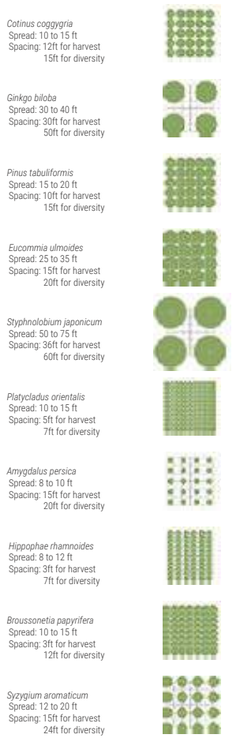


ORIGINAL PLANTING

Pioneering species planting

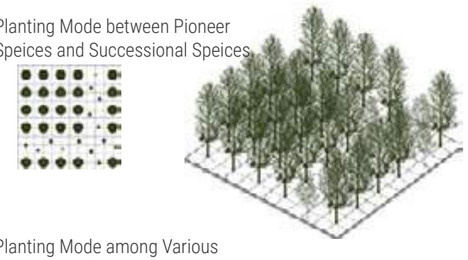
Pioneering Species | Local Species

SPACING

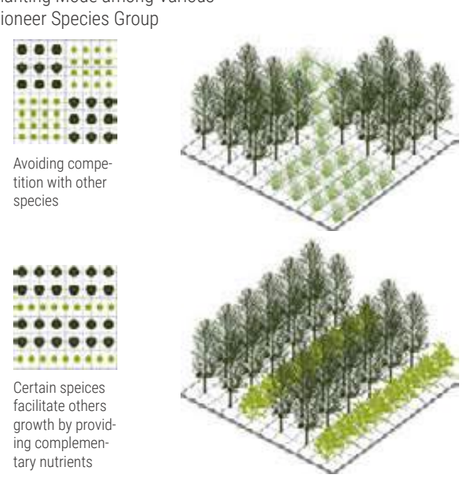


ORIGINAL PLANTING MODE

Planting Mode between Pioneer Speices and Successional Speices

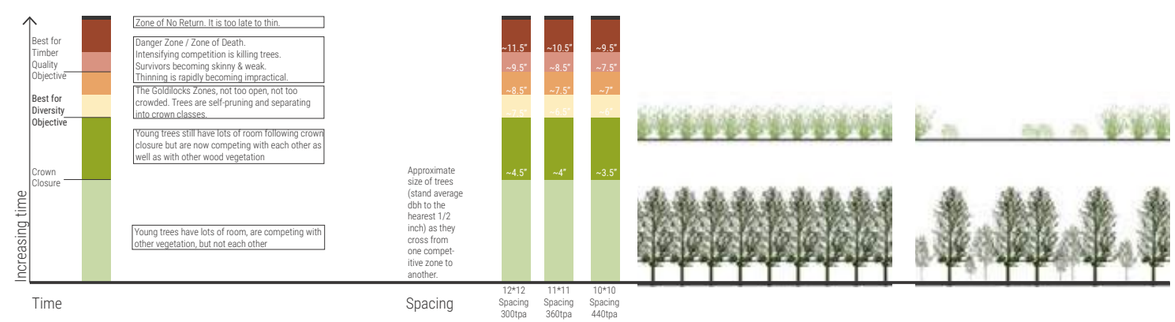


Planting Mode among Various Pioneer Species Group



Avoiding competition with other species

Certain speices facilitate others growth by providing complementary nutrients



THINNING

YOUNG STAND THINNING (YST)

MATURING STAND THINNING (MST)

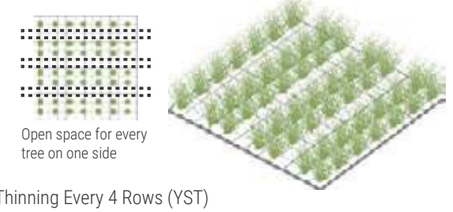
NATURAL SUCCESSION

Natural succession when certain level of diversity is reached

Versatile

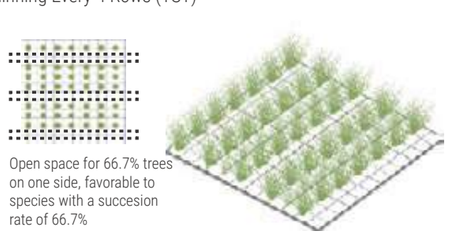
THINNING MODE

Thinning Every 3 Rows (YST)



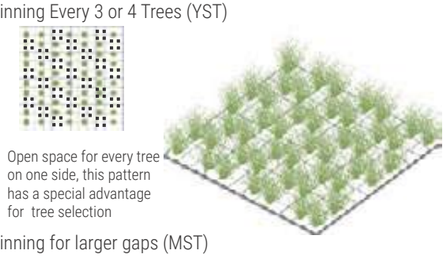
Open space for every tree on one side

Thinning Every 4 Rows (YST)



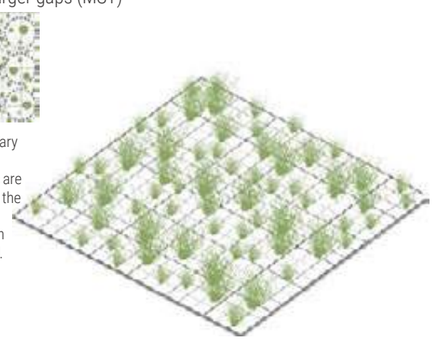
Open space for 66.7% trees on one side, favorable to species with a succesion rate of 66.7%

Thinning Every 3 or 4 Trees (YST)



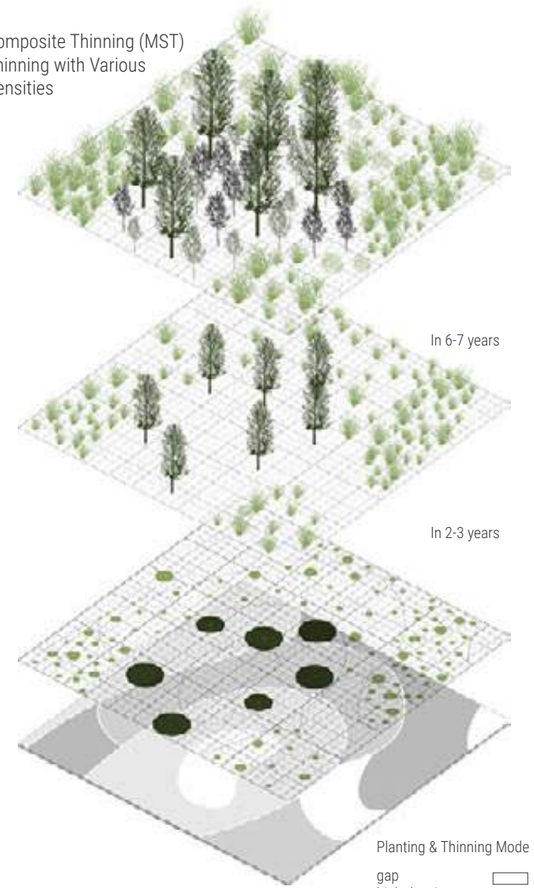
Open space for every tree on one side, this pattern has a special advantage for tree selection

Thinning for larger gaps (MST)



In each auxiliary circle, three pioneer trees are preserved. In the remaining space, no thin implemented.

Composite Thinning (MST) Thinning with Various Densities



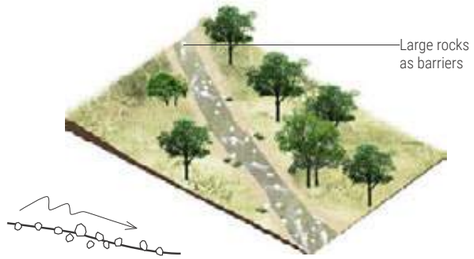
DIVERSITY RESTORATION FOR NATURAL SUCCESSION

TASK II STONE RE-USE FOR RESTORATION

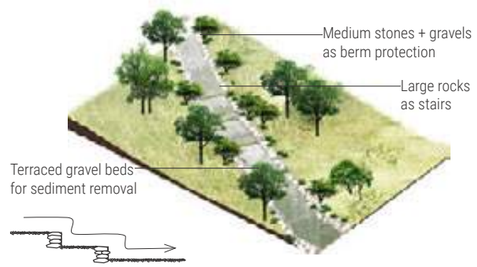
Tons of floating stones at site would be classified as large rocks, medium size stones and small stones, and reused for restoration as well as stone features, furniture and pavings.

DRAINAGE TREATMENT

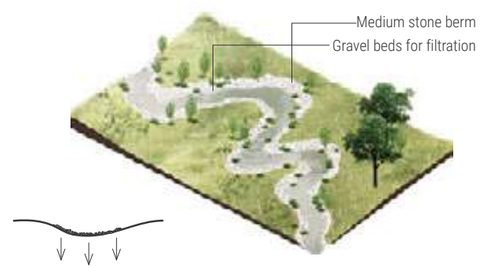
FLOW ATTENUATION



SEDIMENT REMOVAL



FILTRATION

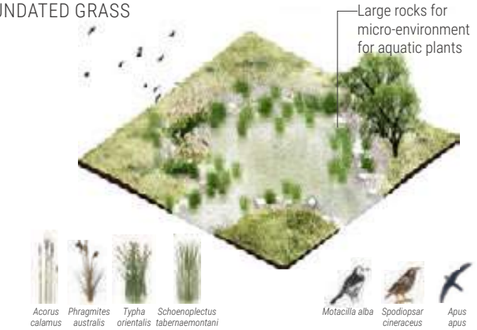


CLEANSING

UPSTREAM — DOWNSTREAM

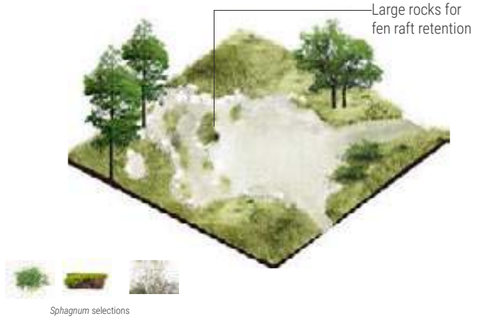
HABITAT GENERATION

REED BEDS & TEMPORARILY INUNDATED GRASS



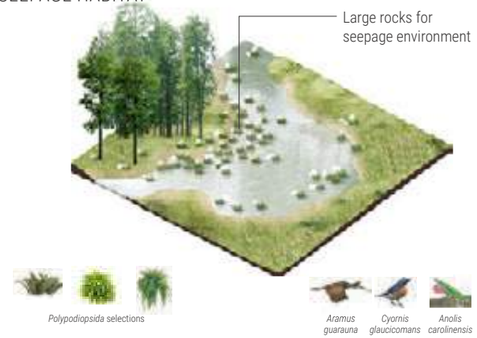
-Good bird habitat -Deeper water tolerance
-Peat producing, which forms a substrata for future fen development

FLOATING FENS



-Reduction of open water -Area beneath floating mats rich in aquatic life
-Water quality improving -Peat Producing -Increase in mineral recovery

SEEPAGE HABITAT



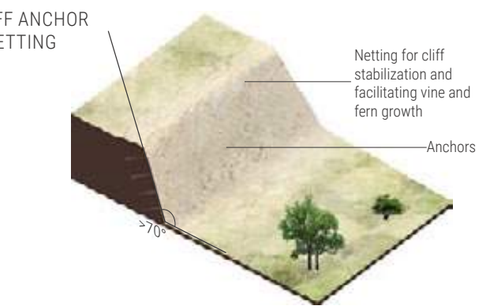
-Rare, and high in conservation value -Water quality improving
-High in insect and animal diversity

FEN MEADOW

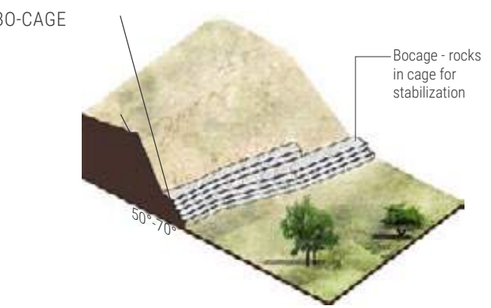
-Peat and mineral accumulation -Easiest to form

CLIFF PROTECTION

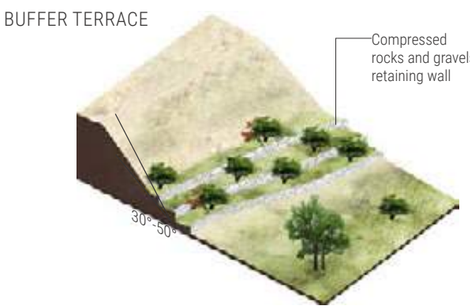
CLIFF ANCHOR & NETTING



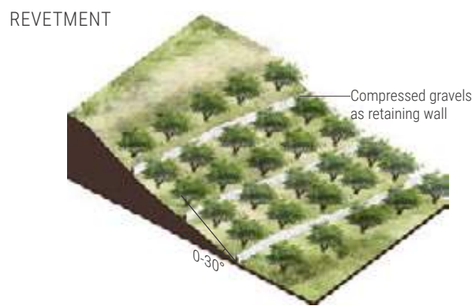
BO-CAGE

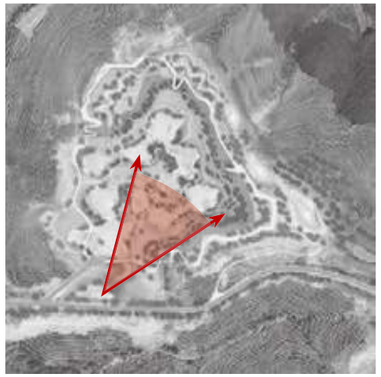


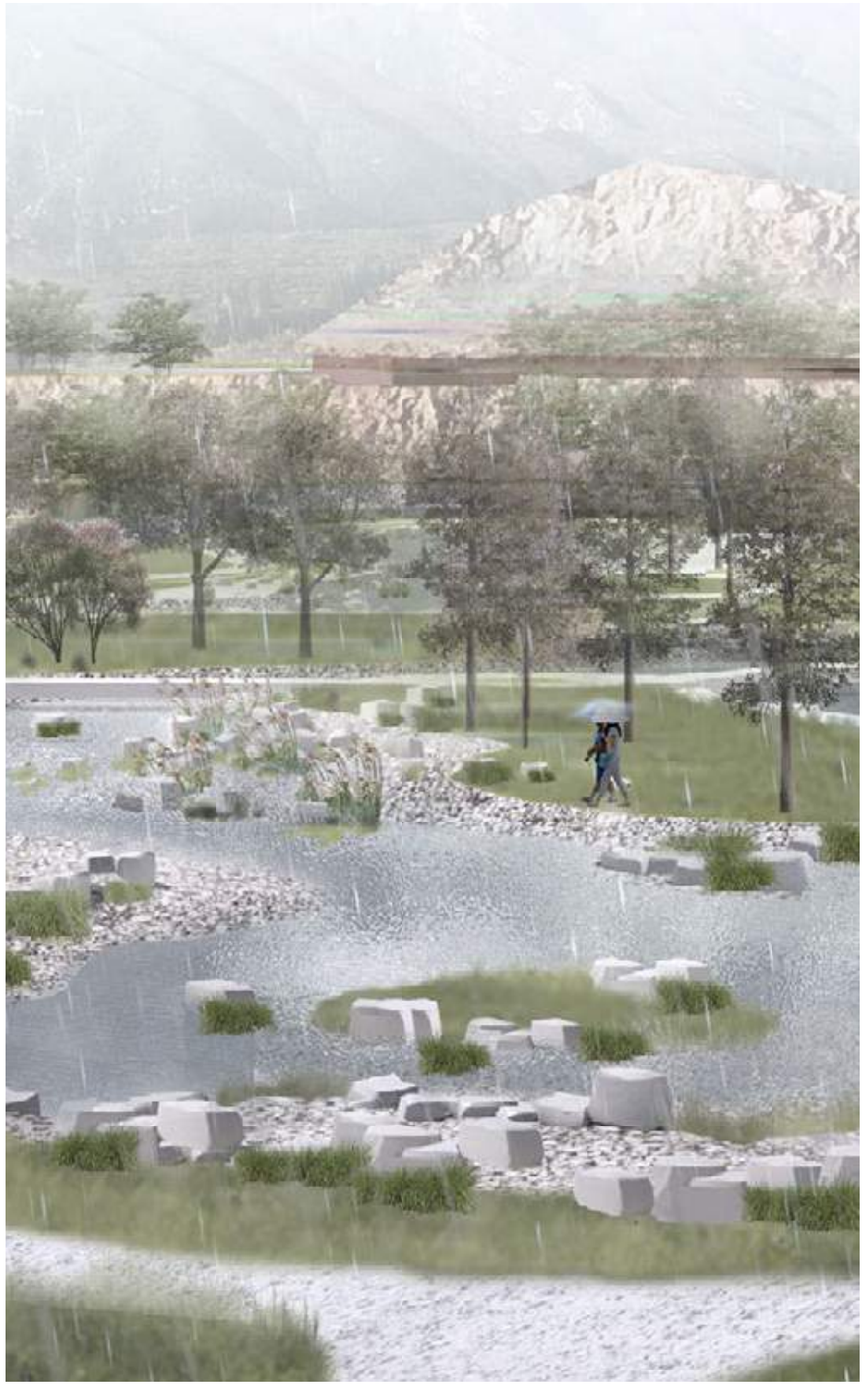
BUFFER TERRACE



REVETMENT





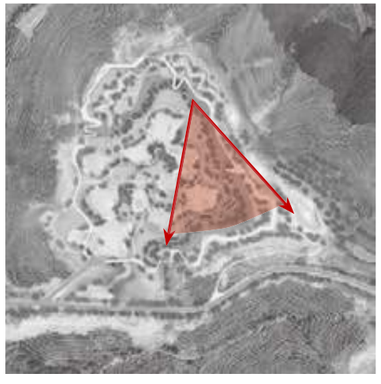


TASK III RE-OCCUPATION
WET AND DRY

Ponds are ephemeral.

On drought and relative dry days, people would gather in the pond, rocks and gravels would serve visitors as furniture to play with.

On flooding or rainy days, ephemeral ponds emerge, embracing restoration and providing temporal wetland scene to the visitors.



TASK III RE-OCCUPATION PRESENT AND FUTURE

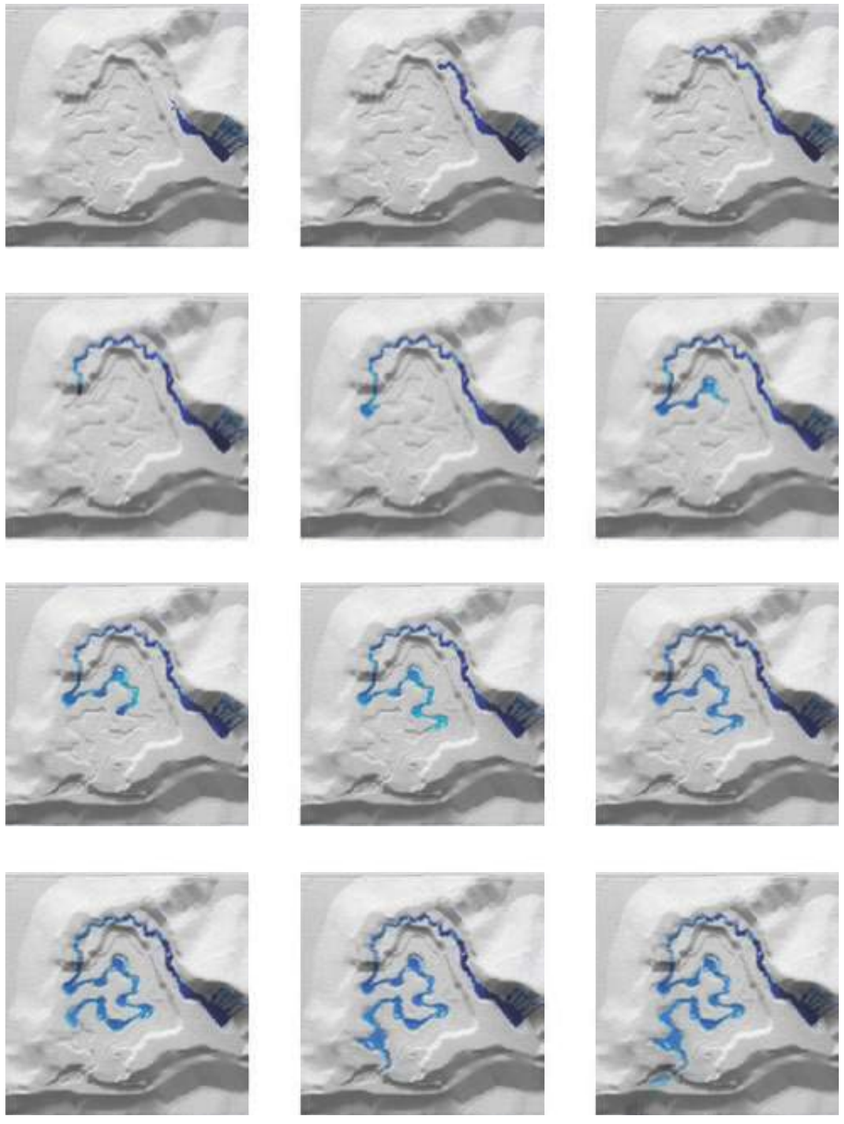
In the earlier phase, present visitors enjoy the lawn freely around the ponds and creeks.

As the restoration goes by, vegetation would reoccupy the gravel beds, future visitors would tour the regreened quarry along the path.

PLAN

❶ Vehicle Path ❷ Recreation Path ❸ Lookout Platform ❹ Lookout Platform ❺ Ephemeral Pond ❻ Terrace
❼ Drop Water ❽ Activity Space ❾ Drop Water ❿ Retention Pond ⓫ The Great Wall Lookout

Simulation Experiment of Runoff



Wasteland mobilized by landscape elements

Industrial Revitalization, Nanjing, China

Mobile Market on the Track

Instructor
Ning XU

Competition
TEAMZERO 2017

Individual Work

08/2017 - 09/2017, Academic

The competition brief asked to capture the sensory experience (sight, hearing, touch, smelling, etc) of a wasteland in the familiar environment.
The site is located on Dama Road, Xiaguan District, Nanjing, a commercial street built in the 1900s when Nanjing was the capital of the Republic of China. The street once experienced the prosperity of the opening ports. As space loses its identity due to the warfare, economy shift and transportation evolution throughout history, the proposal is to not only bring back public activities into a waste courtyard but also revoke historical senses in the current context, recalling an almost lost period of prosperity, which once identifies the city of Nanjing. This memory would further help maintain a larger scale memory connection by the transportation between the old city and the Yangtze River.

TIMELINE

Vicissitudes over time along the Dama Road, Xiaguan District.

Site ✚

1903 OPENING PORT
1ST PROSPERITY

1939 WWII
DESTRUCTION

1972 RAILROAD
2ND PROSPERITY

2005 TRANSPORTATION SHIFT
DECAY

2018 NEW PLANNING
REDEVELOPMENT

1842
Treaty of Nanjing
with Qing government
Xiaguan as the opening port

1927
Capital Plan,
1st urban planning
in China

World War II 1930s-1940s
Xiaguan as the boarding port
to the Nanjing battlefield
Destruction due to the warfare, explosion

[**Decay of Xiaguan district** for transportation shift
Decay of Nanjing for capital shift]

2016
Master plan of Xiaguan District
Redevelopment of the commercial
street, Dama Road

1900s
Intense port building ,
especially by foreigners

1908
Shanghai-Nanjing Railway built
Nanjing West Railway Station built
1909
Railway of Jiangsu Province built

1933
Ferry-train lines connecting Beijing and
shanghai, Tianjin and Nanjing open

1968
Nanjing Yangtze River Bridge built
New Nanjing Railway Station built causing traffic decline of Nanjing
West Railway Station
Railway-Ferry stopped functioning

2012
Nanjing West Railway Sta-
tion stopped functioning

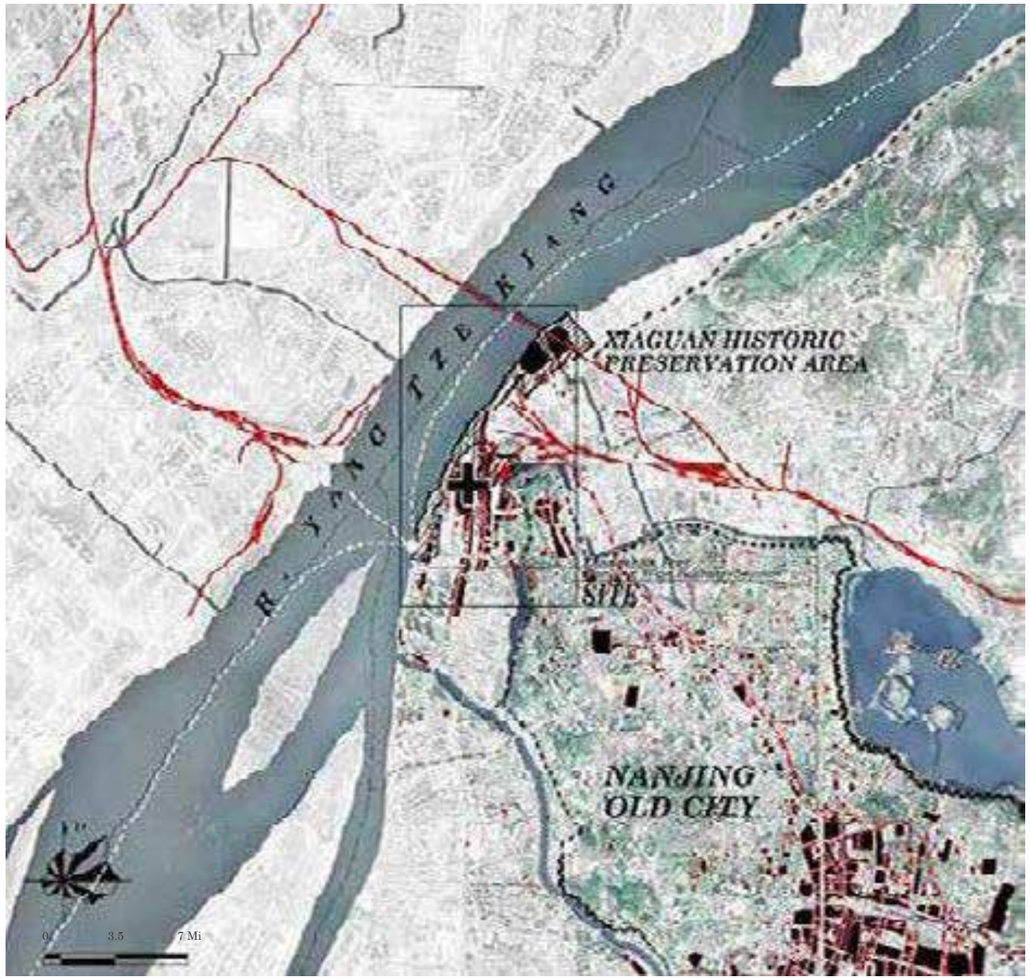
MING DYNASTY
(c.1405)
Departure of maritime silk road

1900s-1930s
Establishment of the Business Bureau for
municipal construction and related munici-
pal facilities and institutions

1900 — 1999

the Republic of China,
Nanjing as capital

the People's Republic of China,
Beijing as Capital



MAPPING & PALIMPSEST

A memory connected by the transportation between Nanjing old city and the Yangtze River.

railway (in use or existing) (abandoned) — city wall (existing) (destroyed) — ferry way — old city block — railway station — ferry station

Commerce

1842, Xiaguan opened as trade port, bringing commercial vibrancy along R. Huimin, a historical creek of R. Yangtze.

Historical Layer
commercial context
commercial street
city wall

Existing Layer
commercial context
commercial block
historical landscape
preservation area
Xiaguan district

Industry

Historical transportation and freight network, and industrial relics near the port.

Historical Layer
industrial context
road
railway
ferry way
city wall

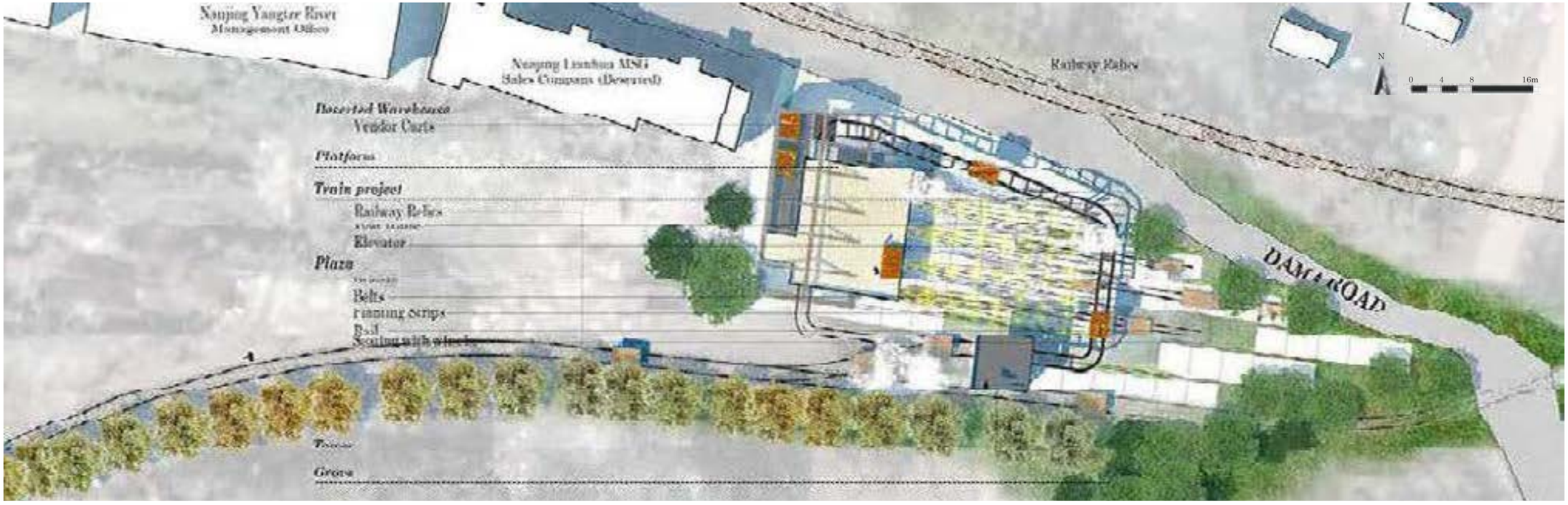
Existing Layer
industrial context
industrial block
road
railway
historical landscape
preservation area
Xiaguan district

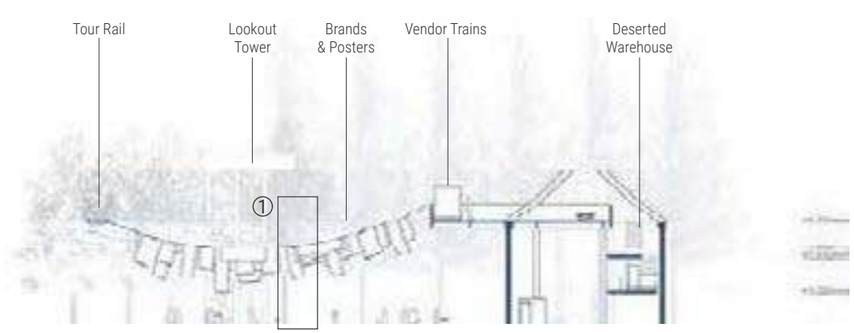
Living

Neighborhoods were developed following the prosperity of Xiaguan District.

Historical Layer
neighborhood context
farm field
water body
city wall

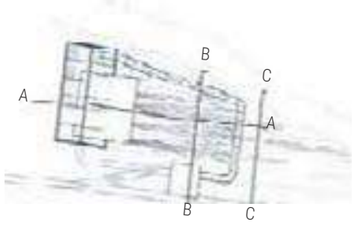
Existing Layer
historical landscape
preservation area
Xiaguan district

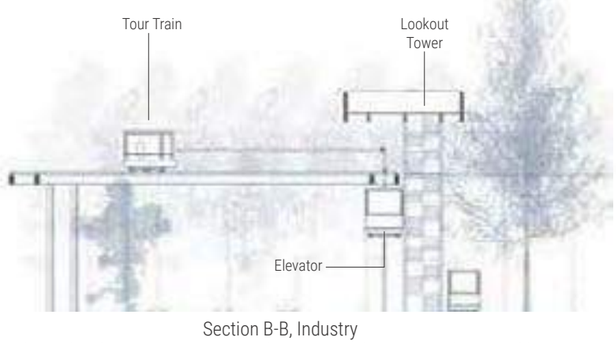




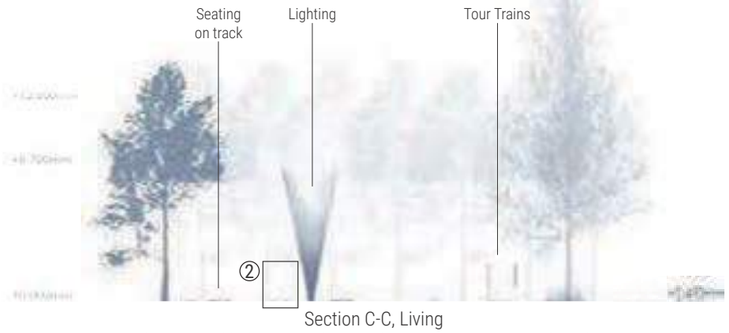
Section A-A, Commerce
Historic commerce signs and vendor trains create a retrospective space for visitors.

① Hanging Republic of China era brands and posters to remind an image of history





Section B-B, Industry
An industrial style train tour activates the space and provide a glimpse of history.



Section C-C, Living
Recreational seats and lightings in the woods creates a moment of meditation next to Nanking's special prosperous history.

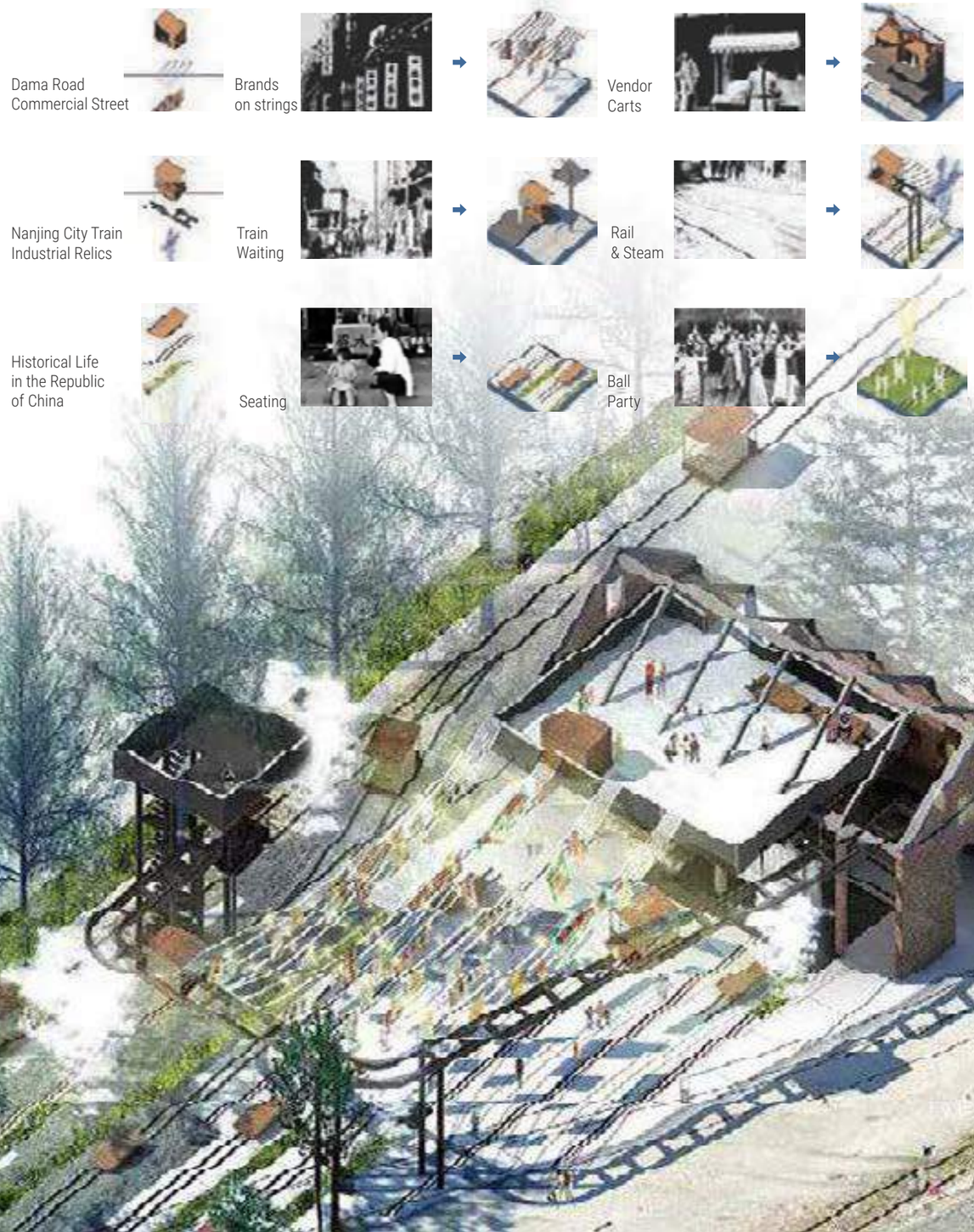
② Seating on track

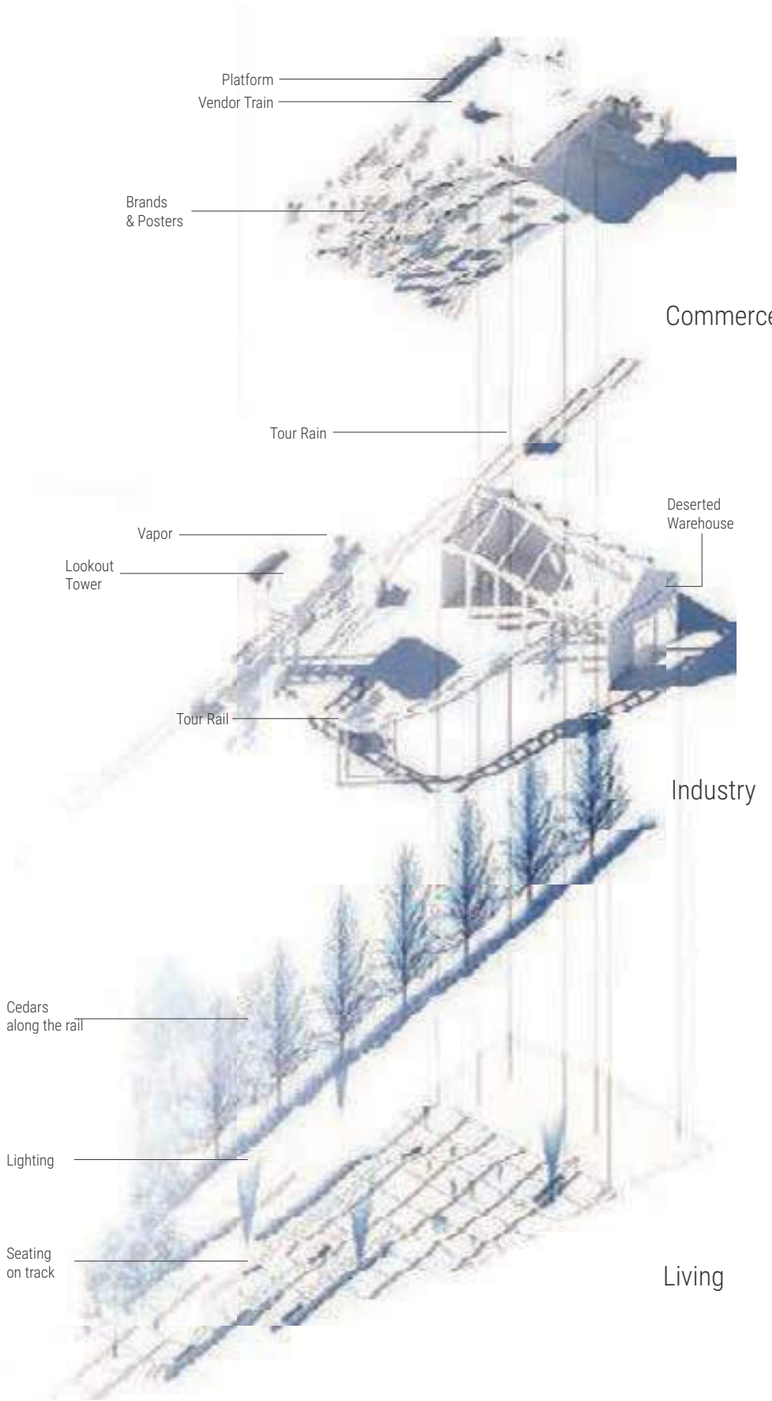
PLAN & SECTION

A composite landscape of historical elements

YESTERDAY ONCE MORE

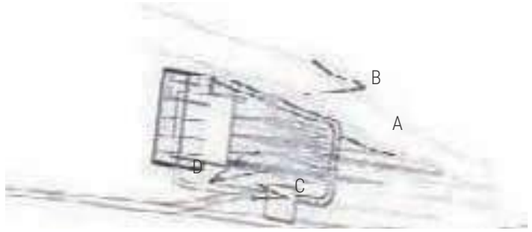
Elements with recollection and their originality in historical photos





SCENARIO

Nanjing is a city famous for its historic and cultural identity. Temporal recollections at various times of the day revoke a memory connecting the past to present as well as connecting Nanjing old city to the Yangtze River.



7:00 AM Grove

3:00 PM Train Tour

9:00 PM Plaza

6:00 PM Tower

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