

SUNSET PARK BOTANICAL GARDEN

STUDIO 
OCTOPUS

Alice Fang, Yaxin Jiang, Tung Nguyen, Angela Sun

We are team Studio Octopus. Our study of Sunset Park led us to understand that the current neighborhood houses unideal living conditions; a landscape presently dominated by industry, truck traffic, air pollution, and lack of pedestrian access to the waterfront. Through developing community and educational spaces, we will improve the livelihood of the neighborhood. The research center we are developing is a new typology for botanical garden that tests resilience to flooding and climate change, so we can study how our natural and urban systems respond. The garden will mitigate stormwater, enhance air quality, and add tremendous value to real estate to Sunset Park by displacing and redistributing current underused buildings.




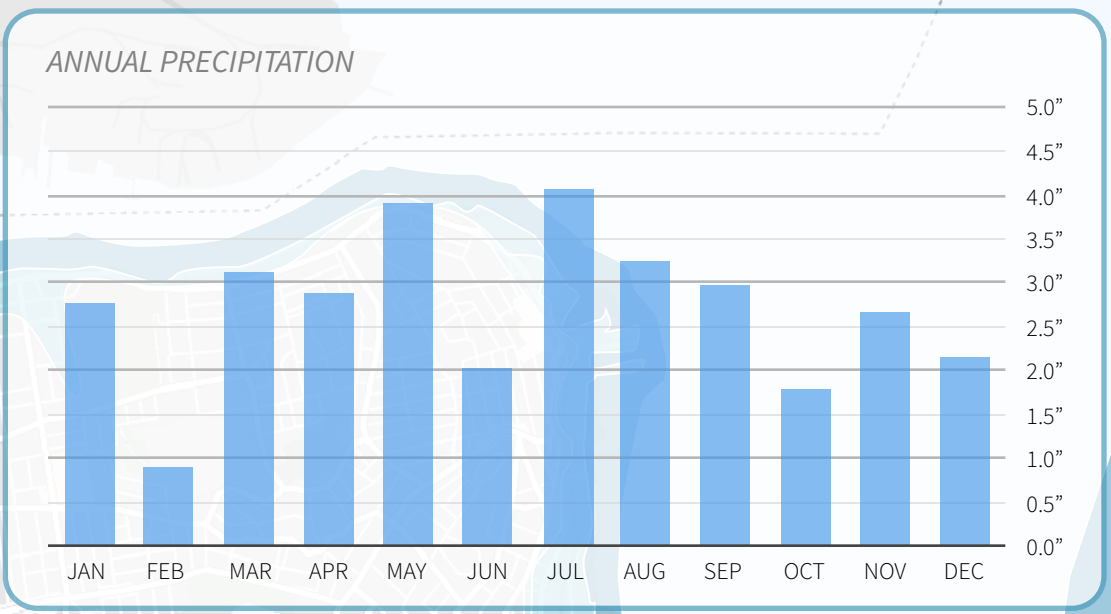
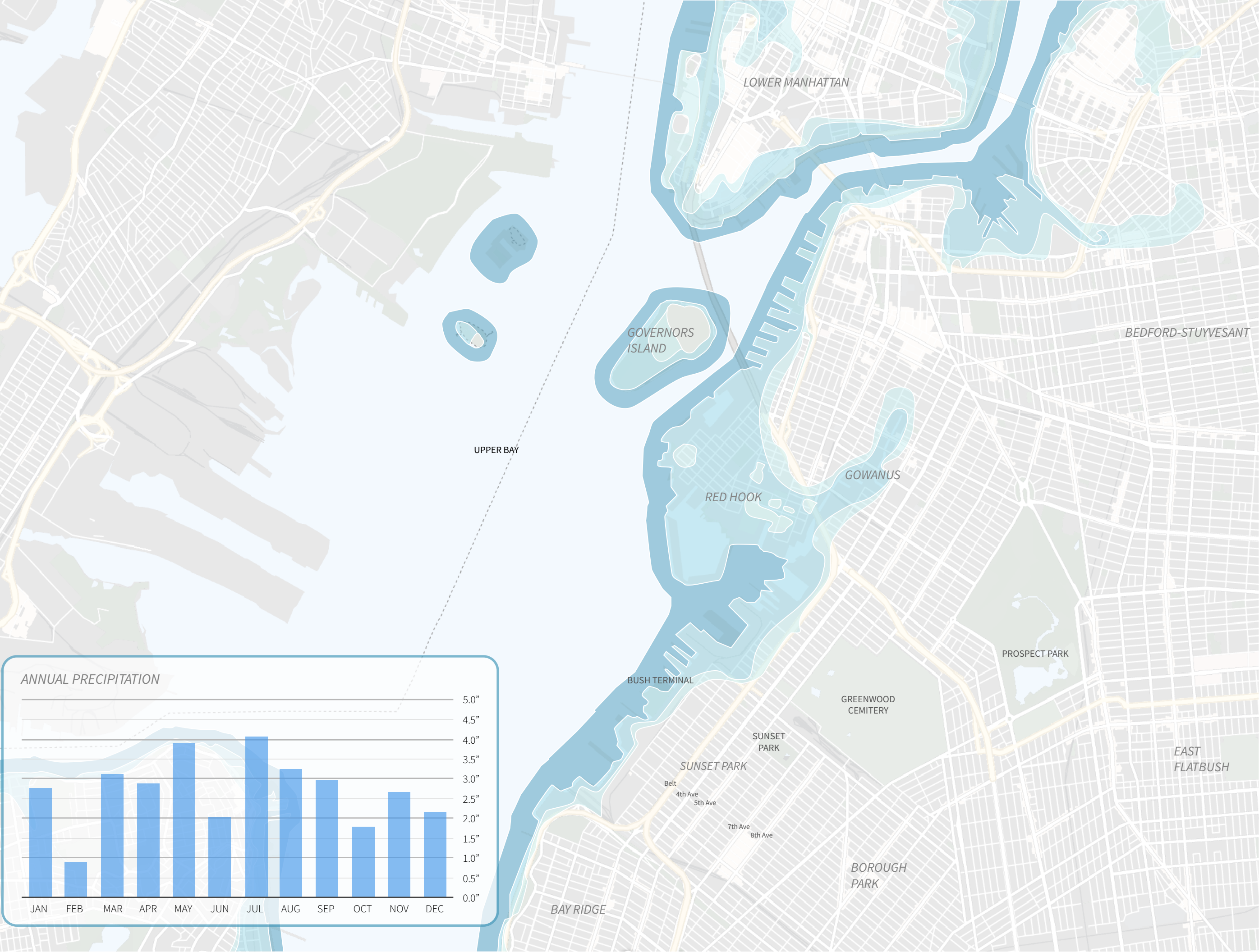
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WATER AND RAINFALL

Precipitation
■ Precipitation

Flood Insurance Zones
■ V Zone
■ A Zone
■ X Zone

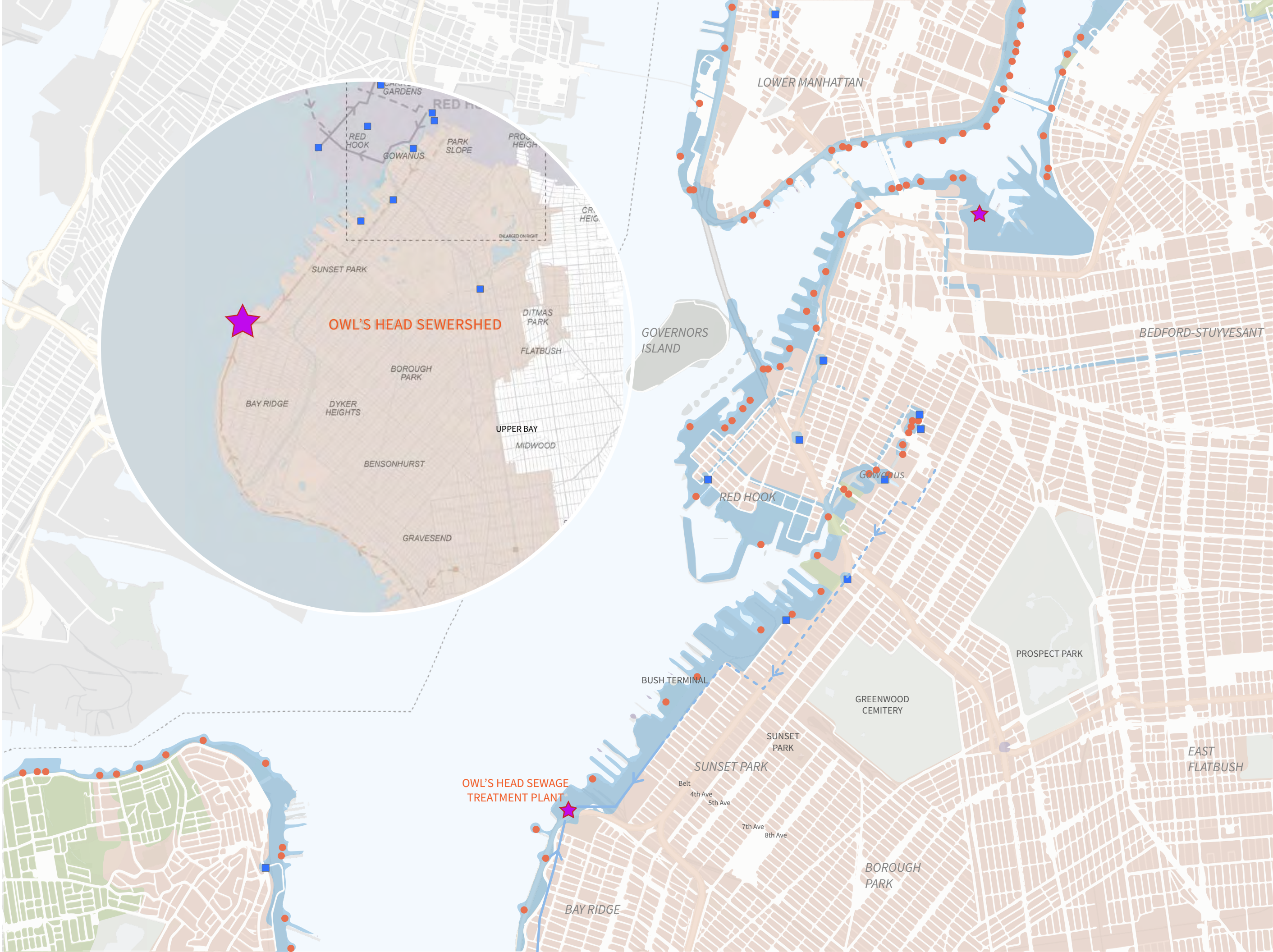
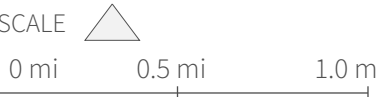
SCALE 
0 mi 0.5 mi 1.0 mi



SEWER DRAINAGE

Water drained into and from the Gowanus Canal is heavily polluted, one of the worst in the US. While there are efforts to improve the drainage system, there when it rains heavily in Brooklyn, sewage overflows into the waterway, and residents in nearby neighborhoods are urged not to shower or do laundry to minimize the amount of water carrying garbage through the system. On sunny days, the air is putrid and the water's surface is slick with pollutants.

- Sewer Features**
 - ★ Wastewater Treatment Plant
 - Outfall
 - Pump Station
 - Interceptor Lines
 - - Force Mains
- Sewer System**
 - Combined
 - Direct Drainage
 - Separate
 - Other



PEOPLE AND HEALTH

The area along the water near Bay Ridge and the Brooklyn Army Terminal is a large complex of warehouses, offices, piers, docks, cranes, rail sidings and cargo loading equipment in Sunset Park. These conditions facilitated an unhealthy air quality in the area that affects the residents and the workers in the area. The socio-economic condition in the area combined with the air pollution is reflected in the asthma rate on the population.

Percentage below the poverty line (%)

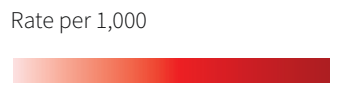


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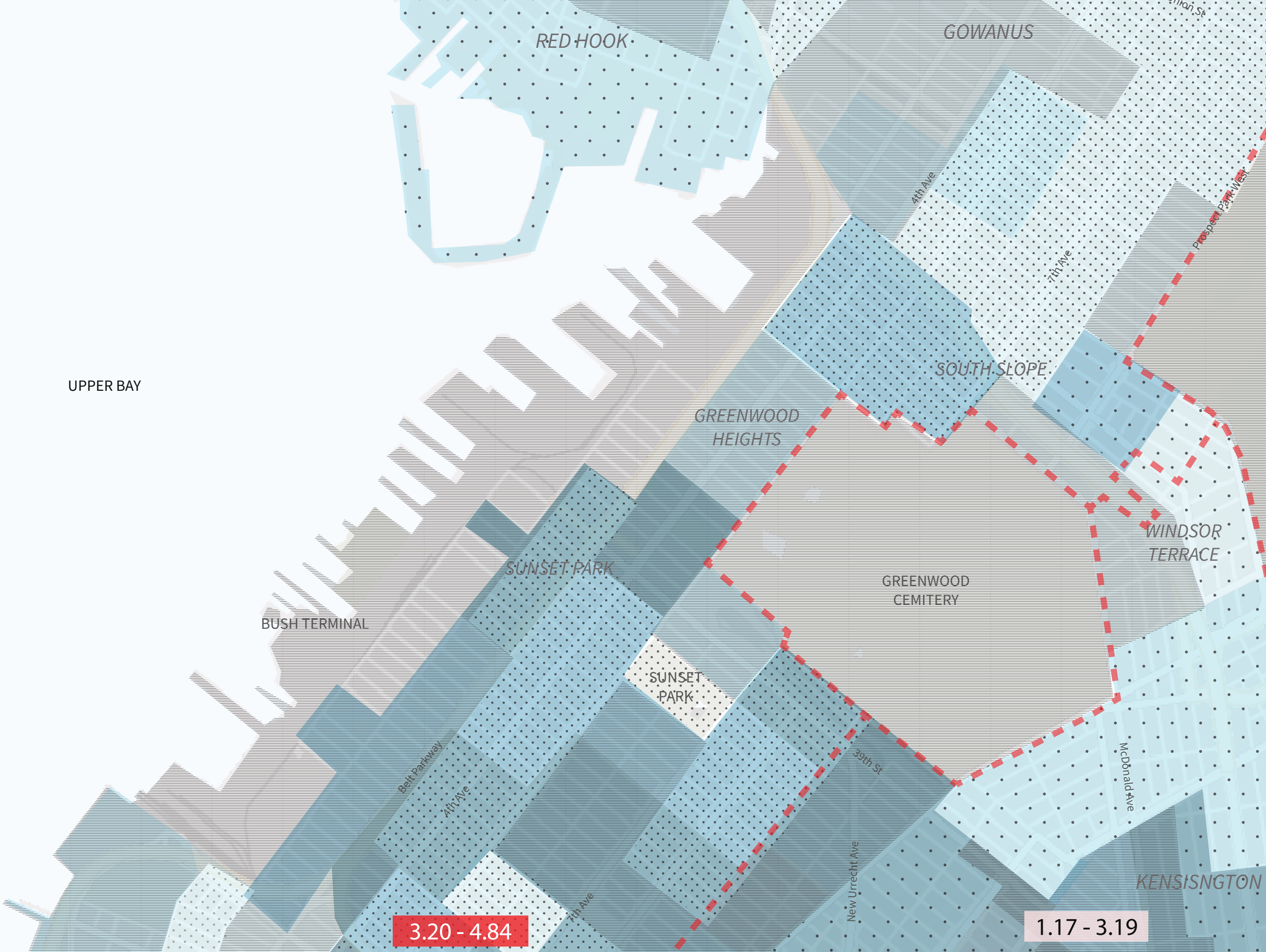
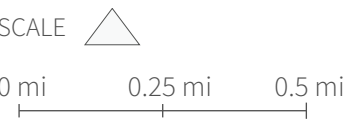
Poverty thresholds in 2012

\$23,283 Family of four
\$11,495 Individual under 65

Asthma Hospitalization Rates of Children Aged 0-14



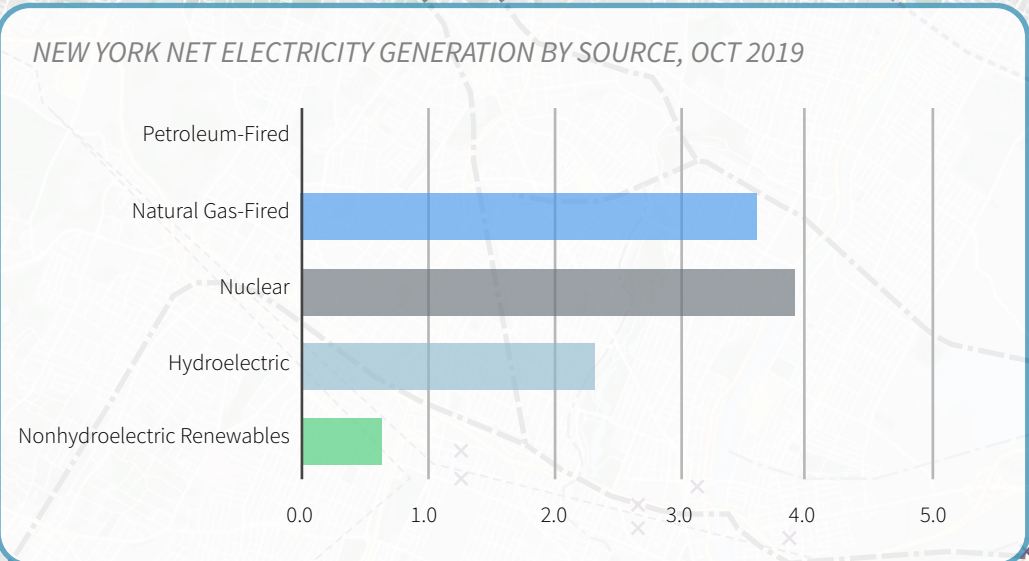
- ### Air Quality
- Hazardous
 - Very Unhealthy
 - Unhealthy
 - Unhealthy for sensitive groups
 - Moderate
 - Good



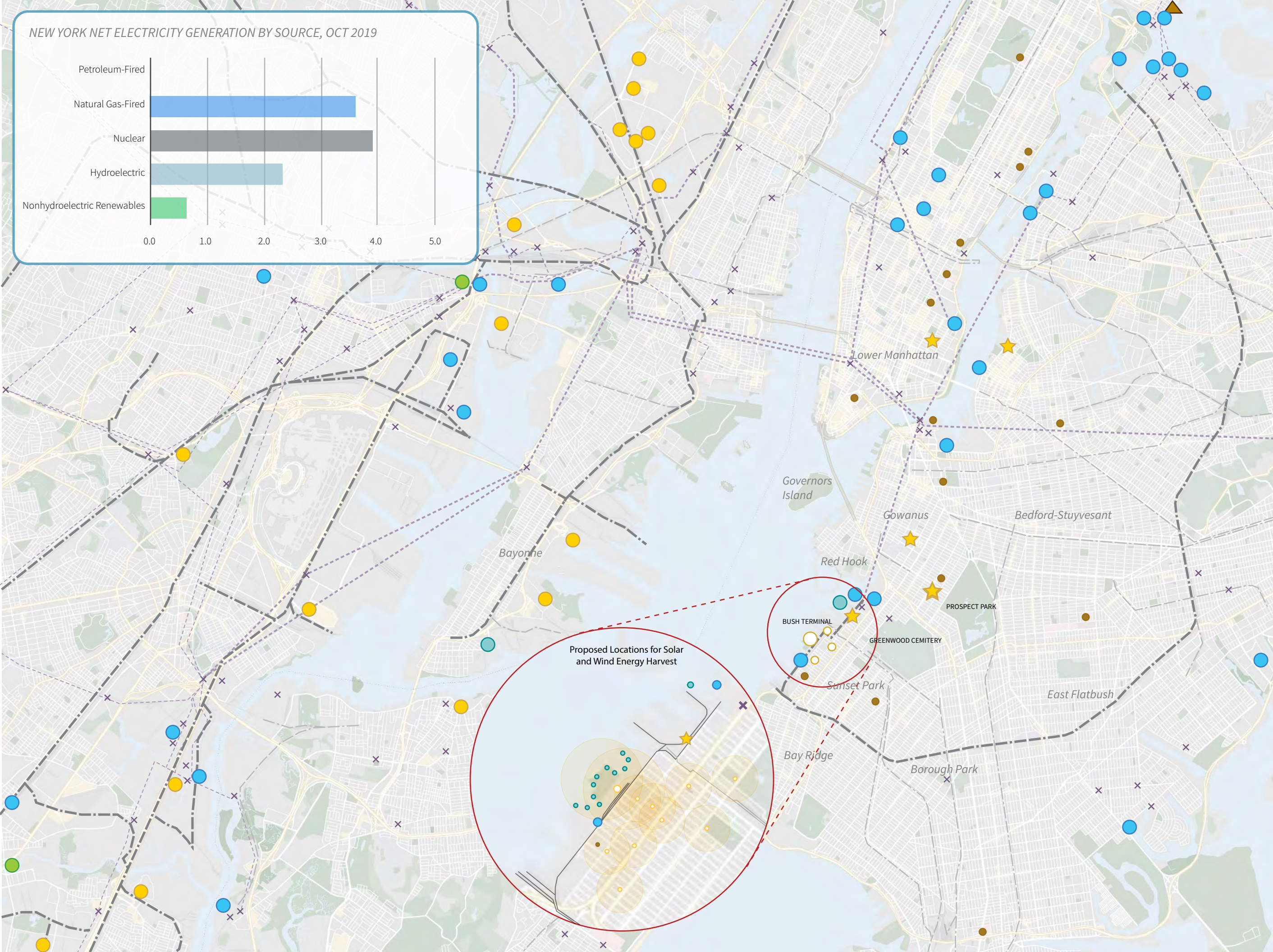
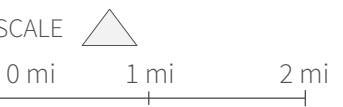
Electricity Generation and Transmission

Electricity Generation Types
 Natural gas, nuclear power, and hydroelectricity have provided more than nine-tenths of New York State's net generation since 2012. More than half are natural gas-fired powerplants, one-fourth hydropower, the rest renewables - primarily wind, solar and biomass, though few solar or wind power plants are located in Brooklyn.








Transmission and Import
 New York has the capability to exchange electricity with neighboring grids, which is vital to power reliability and system efficiency. New renewable energy generators around industrial City include a wind turbine and renovated factories with solar panels installed on roof. Our proposal of a dual system harvesting solar and rain would be a good add on to this developing zone.

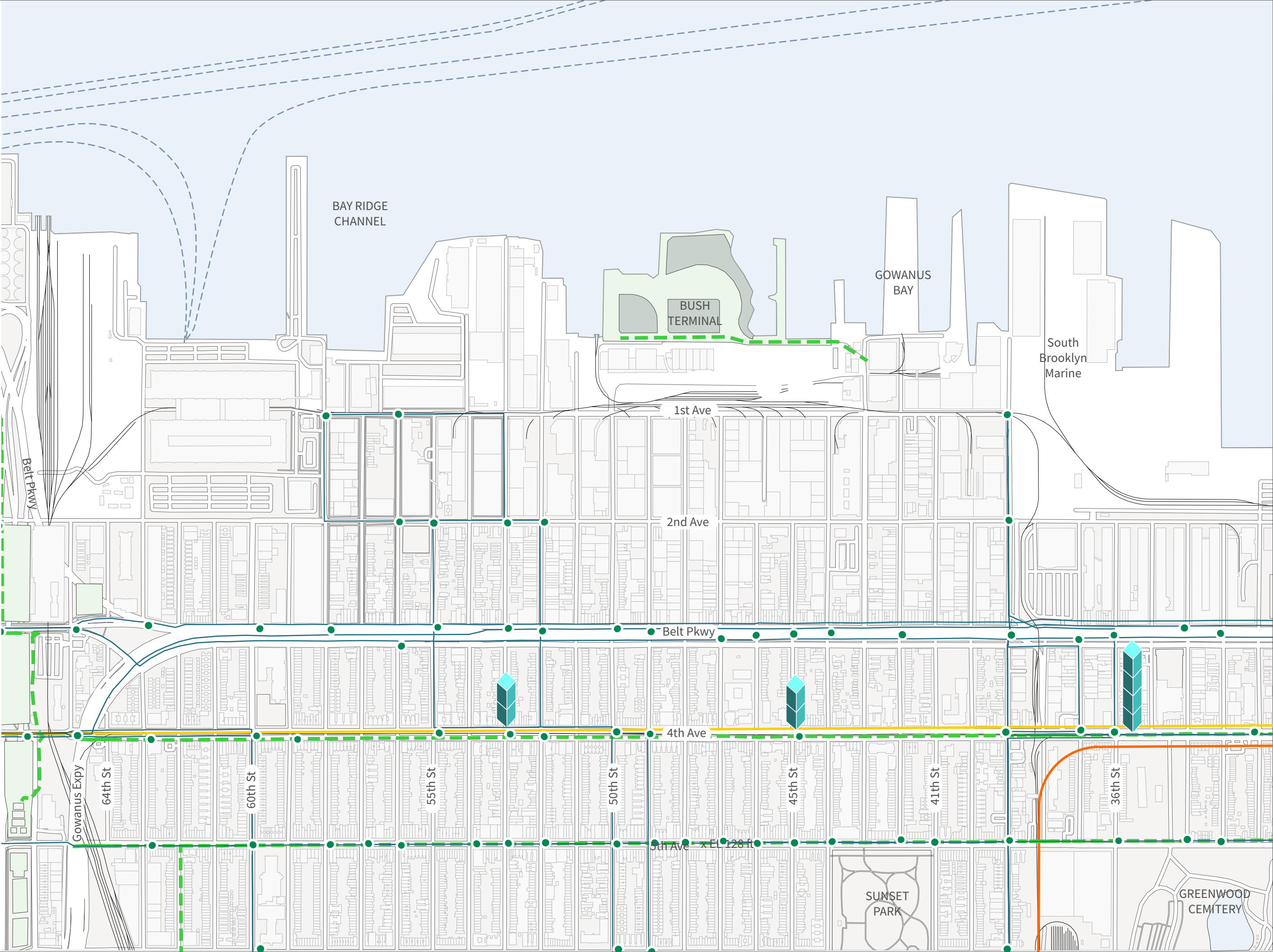
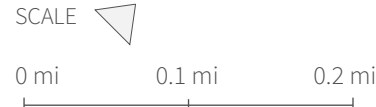


- Freight Railway
- Other Railway
- × Electricity Substations
- Electric Transmission Lines
- Proposed Solar Installation
- Solar Power Plant
- Natural Gas Power Plant
- Petroleum Power Plant
- Biomass Power Plant
- Wind Power Plant

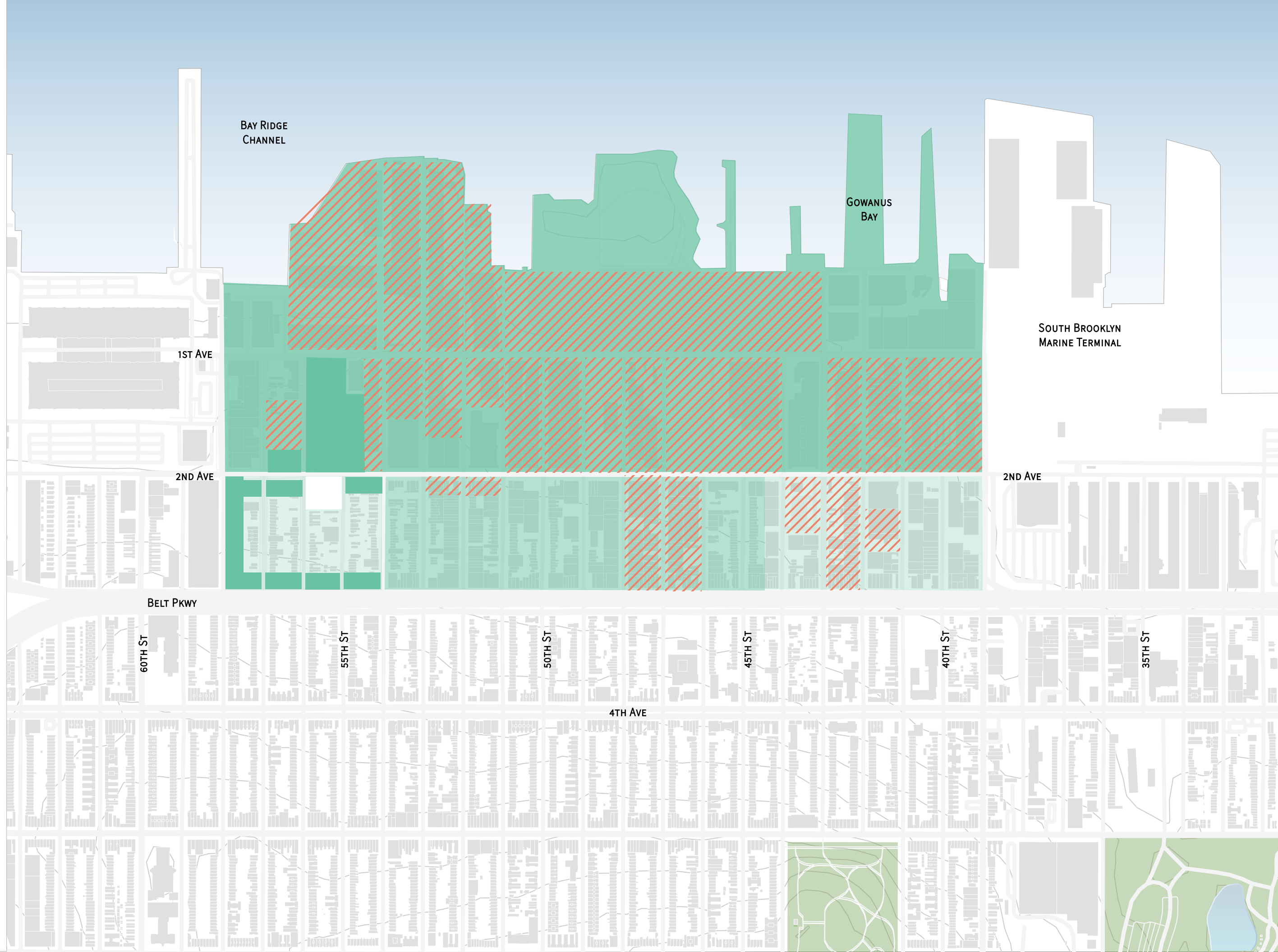


MOBILITY

- Transportation
-  1M Subway Ridership
 -  Bus stop
 -  R Line
 -  BDFM Line
 -  Bike lane
 -  Bus Routes
 -  Ferry Routes

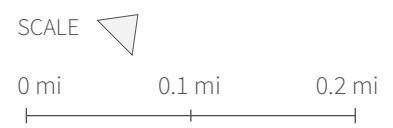


FAR ANALYSIS



ZONING	COMMERCIAL FAR	RESIDENTIAL FAR
M1-2	2	2
M1-2 D	2	2
M3-1	2	2
R6 B	2	3
C1-3	2	3

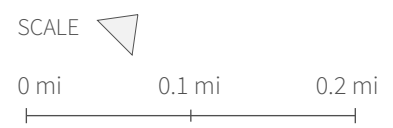
UNDER-DEVELOPED



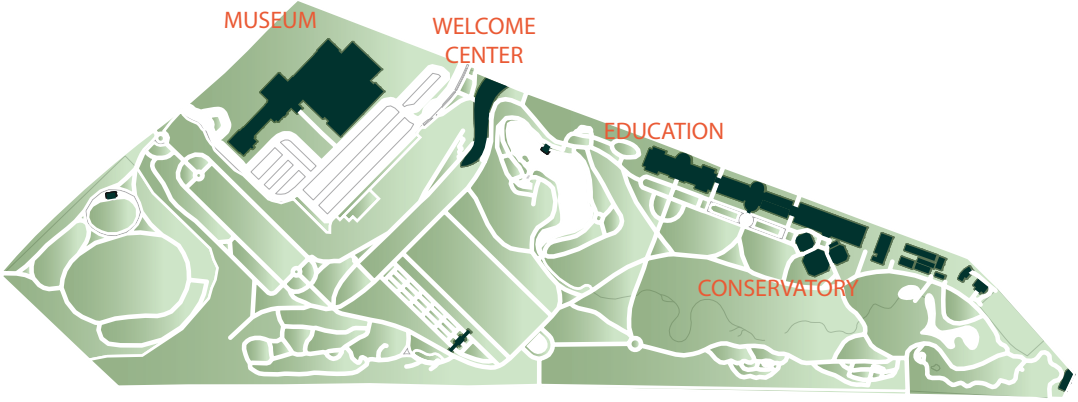
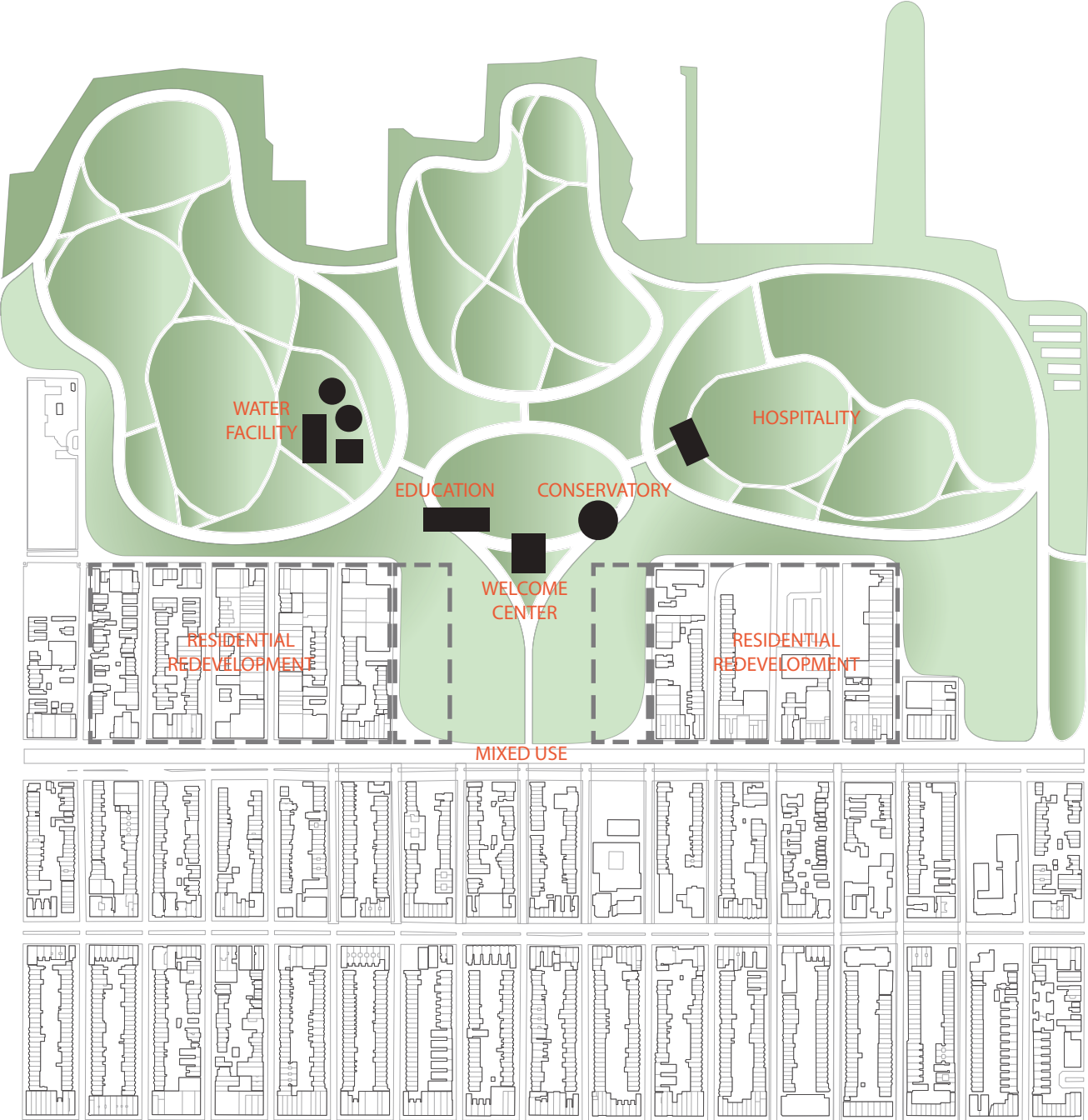
FAR ANALYSIS



- REPLACED WITH NEW RESIDENTIAL
- EXISTING BUILDINGS WILL BE DEMOLISHED
- MAXIMUM FAR



PROPOSED WATERFRONT BOTANICAL GARDEN
134 acre, Brooklyn, New York



BROOKLYN BOTANICAL GARDEN
52 acre, Brooklyn, New York



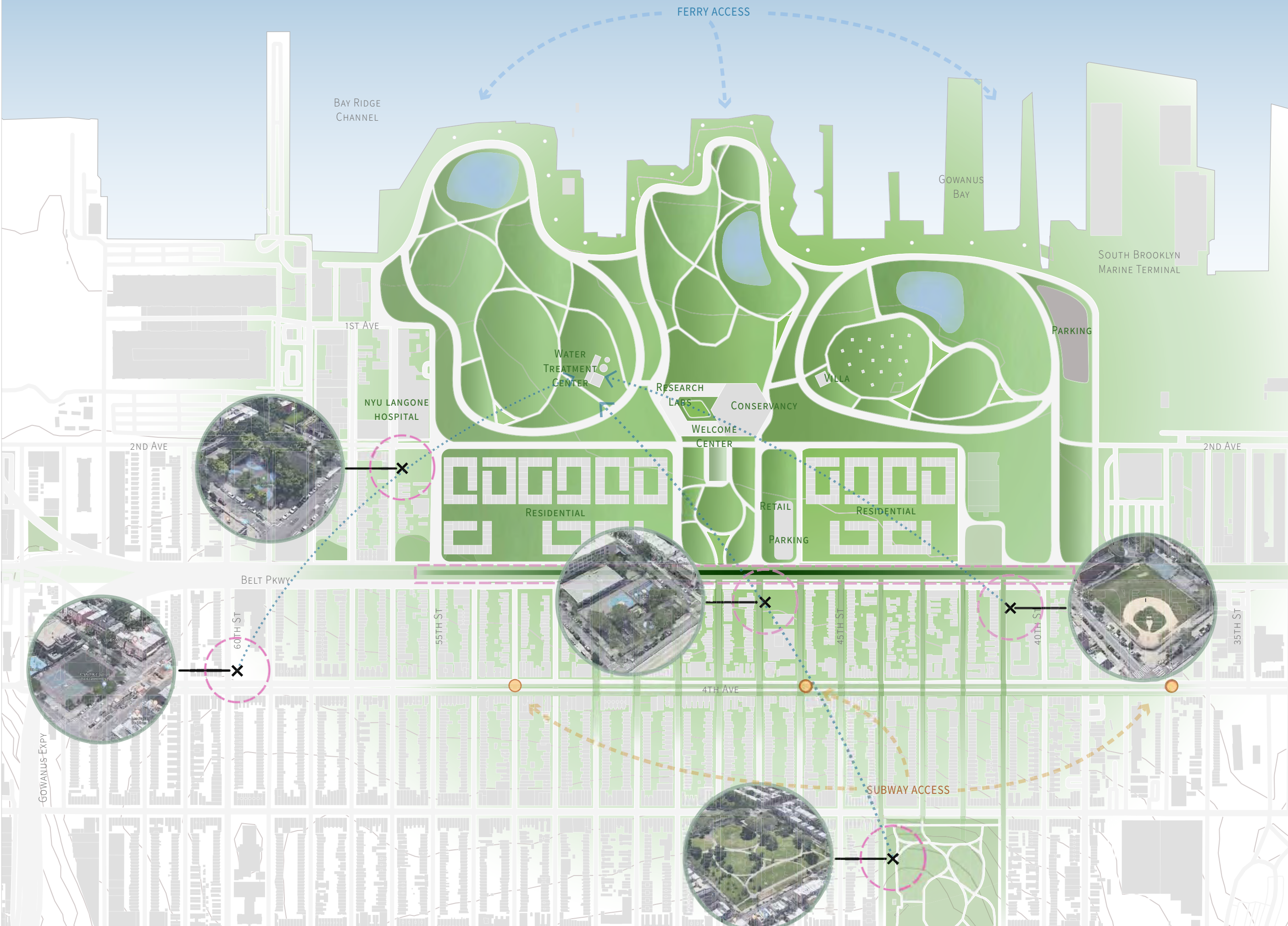
DALLAS WATERFRONT GARDEN
66 acre, Lakewood, Dallas








87 acre, Longwood, Philadelphia







- PROPOSED GREEN PEDESTRAIN ZONE 
- FLOW OF WATER 
- PROPOSED ZONE FOR INTERVENTION 
- WATER TREATMENT NODE 
- SUBWAY STOP 



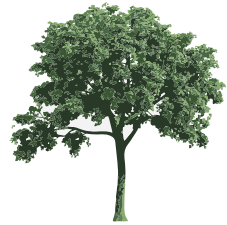
AIR CLEANING TREES

GREEN SPACES ARE A SOURCE OF WELLNESS FOR ALL LIVING BEINGS, INCLUDING HUMANS. IN CONURBATIONS THEY CAN HAVE MANY FUNCTIONS, INCLUDING THE REDUCTION OF "HEAT ISLANDS" WITH CONSEQUENT DECREASES IN TEMPERATURE AND POLLUTANTS, AND THEIR ABILITY TO ABSORB ATMOSPHERIC CO₂.



HACKBERRY (CELTIS OCCIDENTALIS)

A fast-growing plant that can grow up to 20-25 metres. It's particularly suited to absorbing carbon dioxide (3,660 kilos in 20 years) and effectively capturing pollutants.



ELM (ULMUS AMERICANA)

This columnar tree is also large and can grow up to 30 metres. It too can transform thousands of kilos of CO₂ into biomass, with a medium-high potential of absorbing pollutants.



WHITE ASH (FRAXINUS AMERICANA)

A large deciduous tree that can exceed 30 metres in height. It is fast-growing especially in its early years and can store over 3 tonnes of CO₂ in 30 years. This is also an excellent plant to reduce pollutants.



BASSWOOD (TILIA AMERICANA)

A tall variety, one of the ancestors of the common linden. Lindens are typically planted in cities and gardens. This variety is excellent in capturing CO₂ and effectively reducing smog.



WHITE OAK (QUERCUS ALBA)

A tall tree of the Fagaceae family that can even reach 35 metres in height. It absorbs large amounts of carbon dioxide (4,000 tonnes) both if planted in a city or park.

COASTAL GARDEN

FLOWERS ARE RESILIENT TO SALT, EROSION AND CHANGE IN CLIMATE. THEY NOT ONLY ATTRACT POLLINATORS, BUT ALSO ADD SENSORIAL ELEMENTS TO THE BOTANICAL GARDEN BECOMING A COMMUNITY GATHERING SPACE,



SUN FLOWER (HELIANTHUS ANNUS)



BROWN MUSTARD (BRASSICA JUNCEA)



SEASIDE GOLDENROD (SOLIDAGO SEMPERVIRENS)



ROSE MALLOW (HIBISCUS MOSCHEUTOS)



VIRGINIA IRIS (IRIS VIRGINICA)



LAVENDER (LAVANDULA)

SHELTERBELTS SHRUBS

SHELTERBELTS ARE FORMED OF TALL TREES AND/OR SHRUBS WHICH REDUCE WIND SPEED CREATING SHELTER WHICH ALLOWS A WIDER RANGE OF PLANTS TO BE GROWN, PROVIDING SHELTER FOR POLLINATING INSECTS WHICH ENABLES FRUIT SET IN ORCHARDS, REDUCING MOISTURE LOSS FROM SOIL AND PLANT FOLIAGE, MINIMISING SOIL EROSION ON LIGHT SOILS, AND REDUCING DAMAGE FROM SALT-LADEN WINDS IN COASTAL AREAS.



AMERICAN HAZELNUT (CORYLUS AMERICANA)



BLACK CHERRY (PRUNUS SEROTINA)



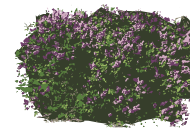
SUGAR PLUM (AMELANCHIER CANADENSIS)



SUGAR PLUM (AMELANCHIER CANADENSIS)



RED ELDERBERRY (SAMBUCUS RACEMOSA)



LILAC (SYRINGA VULGARIS)

WATER MANAGEMENT GRASS

PLANTS THAT ARE RESILIENT TO WIND AND WATER, THAT ALIVATE FLOODING THROUGH ABSORPTION OF WATER, IMPROVE WATER QUALITY BY CLEANING CHEMICALS/HEAVY METALS, AND CONTROL EROSION AND CONSERVE THE SOIL.



SWITCHGRASS (PANICUM VIRGATUM)



SALT-WATER CORDGRASS (SPARTINA ALTERNIFLORA)



LITTLE BLUESTEM (SCHIZACHYRIUM SCOPARIUM)



SALT HAY (SPARTINA PATENS)



COUCH GRASS (ELYMUS REPENS)



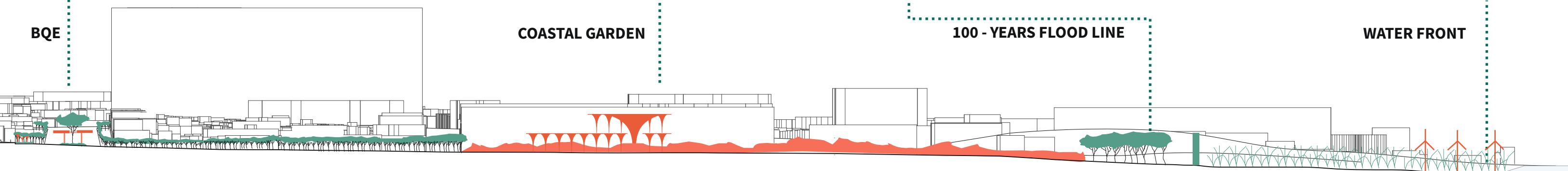
CATTAIL (TYPHA LATIFOLIA)

BQE

COASTAL GARDEN

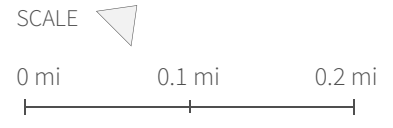
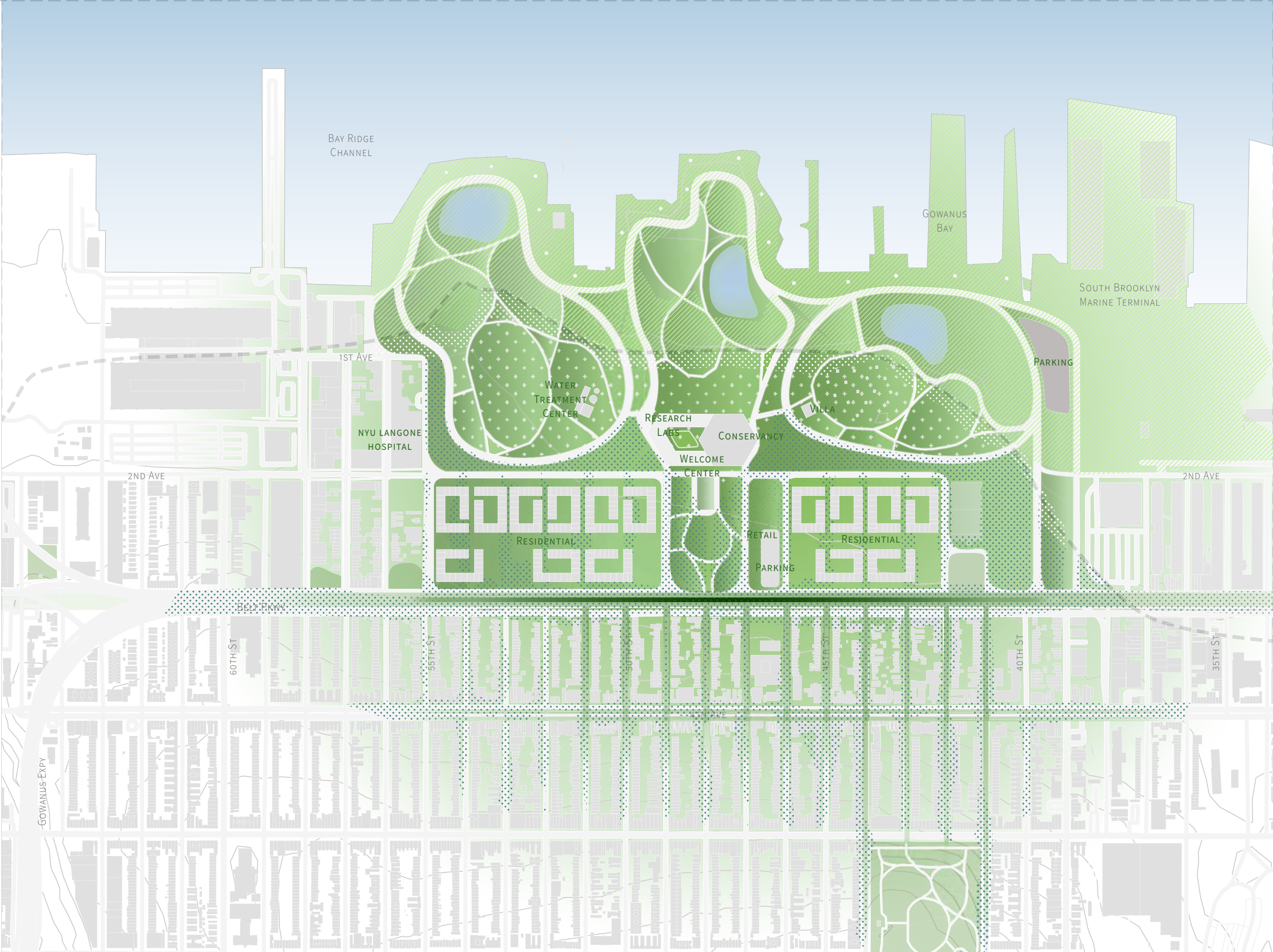
100 - YEARS FLOOD LINE

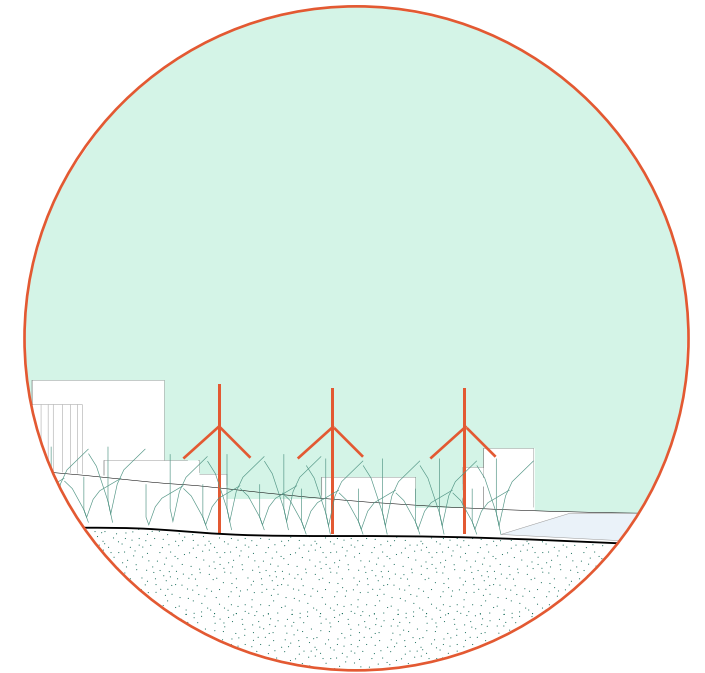
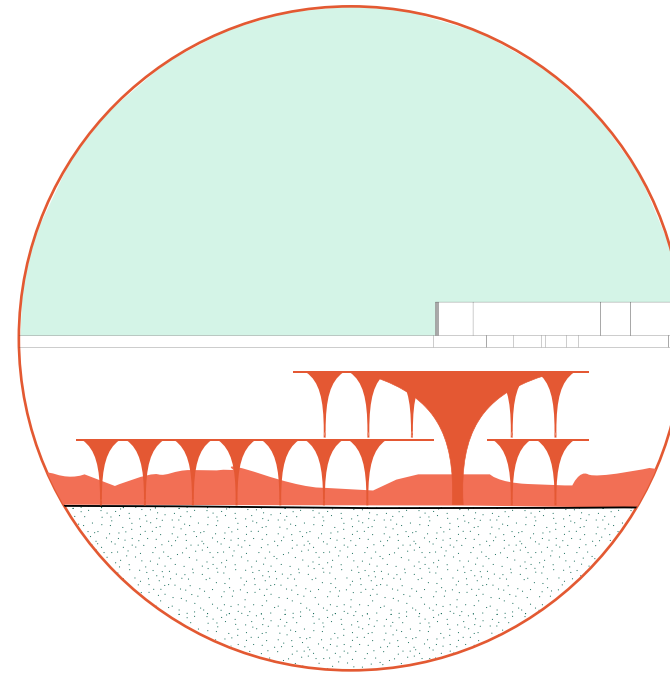
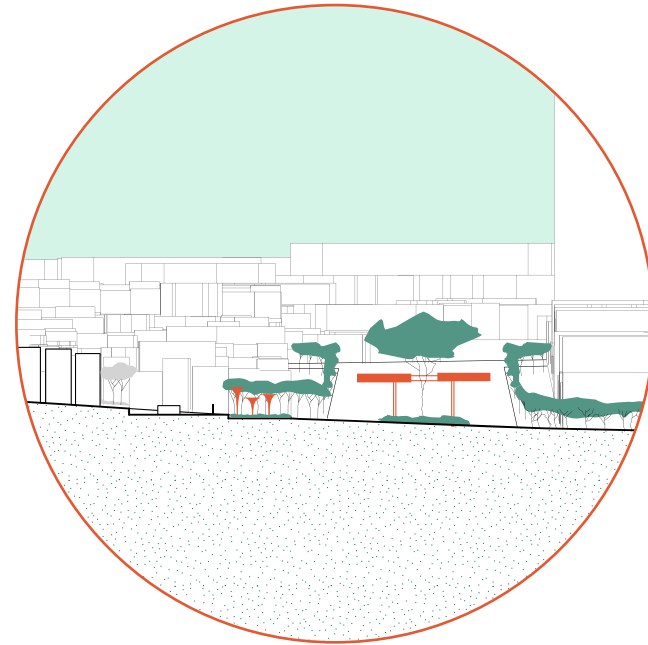
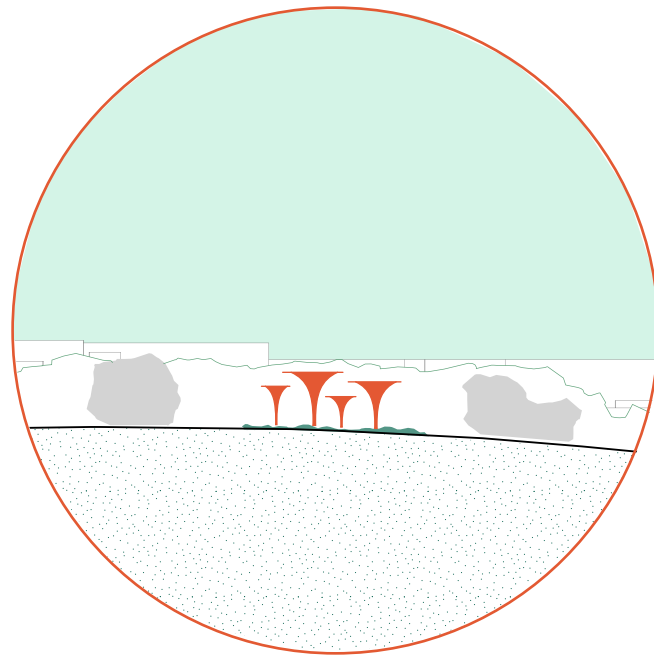
WATER FRONT



Planting Strategy

- WATER MANAGEMENT PLANTS 
- SHELTER BELTS 
- COASTAL GARDEN 
- AIR CLEANING TREES 





1 EXISTING GREEN AREAS

2 BQE

3 WELCOME CENTER + CONSERVANCY

4 COAST

WATER COLLECTION

ELETRICITY SOLAR > STREET LIGHTING

MOBILITY PEDESTRIAN

VEGETATION EXISTING

COLLECTION

SOLAR > STREET LIGHTING

CAR LANES, BIKE LANES, SIDEWALKS

PURIFICATION

COLLECTION

SOLAR AND WIND

PEDESTRIAN

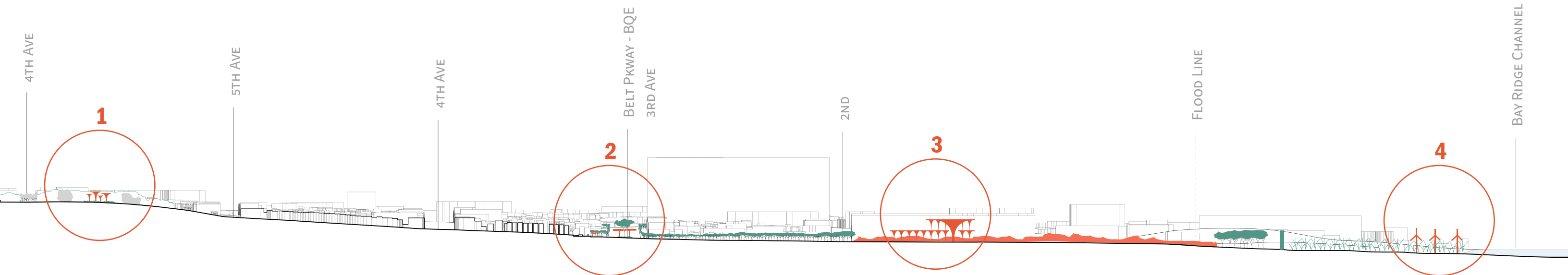
RESEARCH

FLOODING MITIGATION

WIND

PEDESTRIAN, BIKE LANES

RESILIENCE



4TH AVE

5TH AVE

4TH AVE

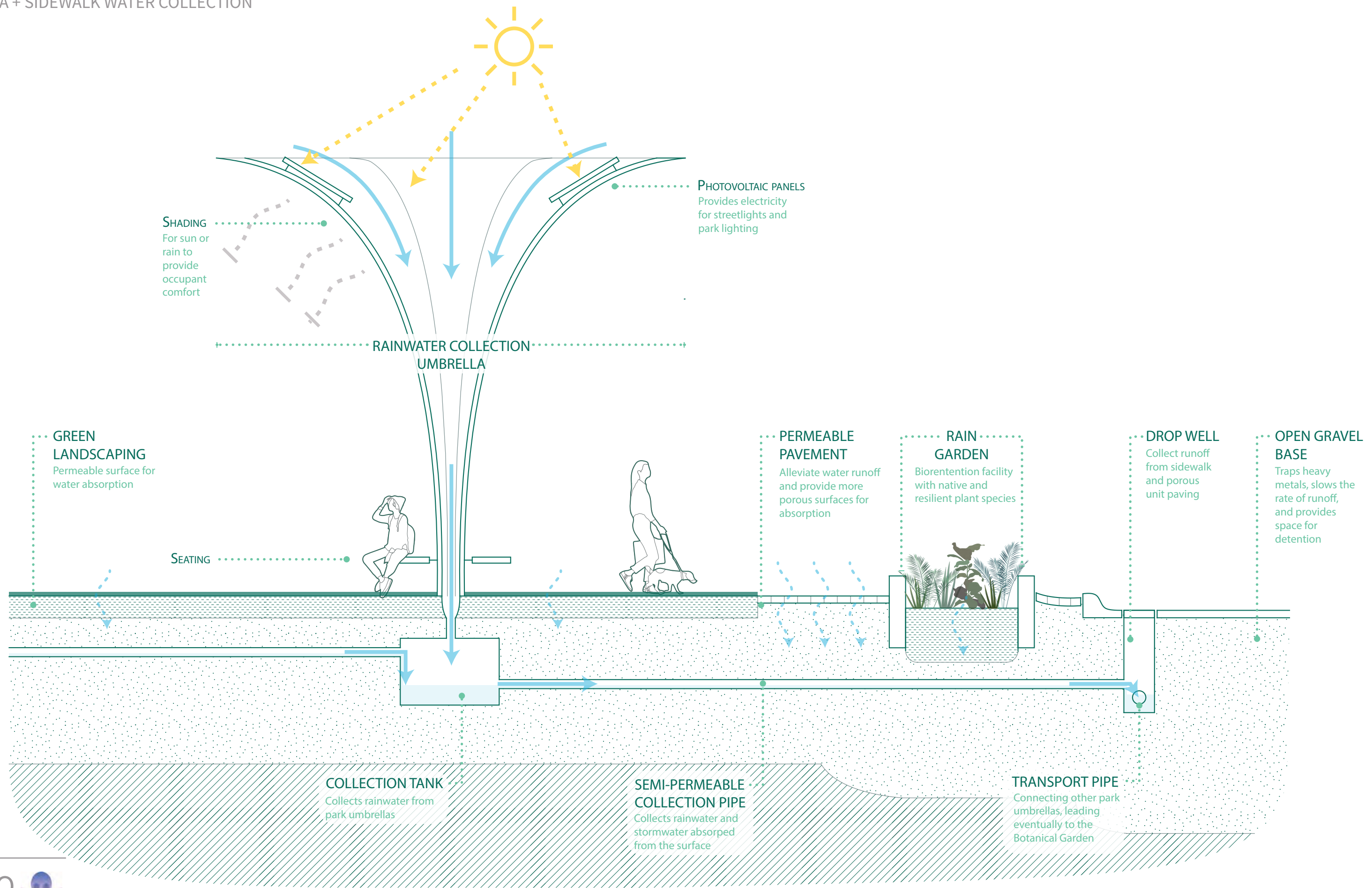
BELT PKWAY - BQE
3RD AVE

2ND

FLOOD LINE

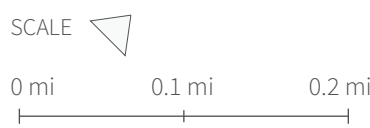
BAY RIDGE CHANNEL

PARK UMBRELLA + SIDEWALK WATER COLLECTION



PROGRAMS

- BQE RENOVATION
- MIX-USED RESIDENTIAL
- PARKING STRUCTURE
- HOTEL/VILLA
- WELCOME CENTER
- WATER TREATMENT CENTER

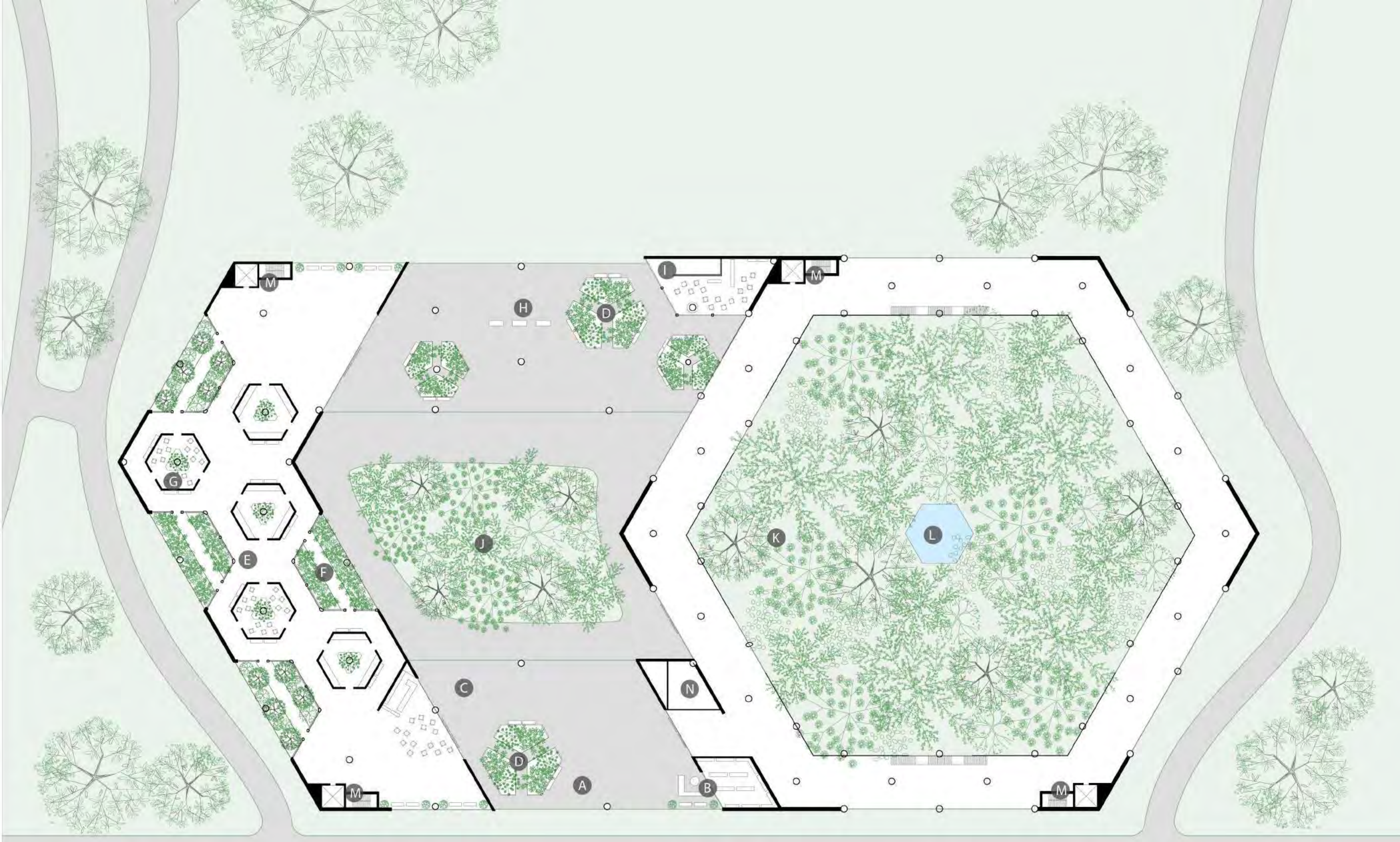
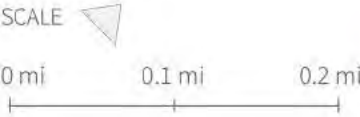


BUILDING

WELCOME CENTER
CONSERVANCY
EDUCATION CENTER
RESEARCH CENTER

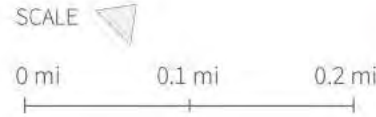
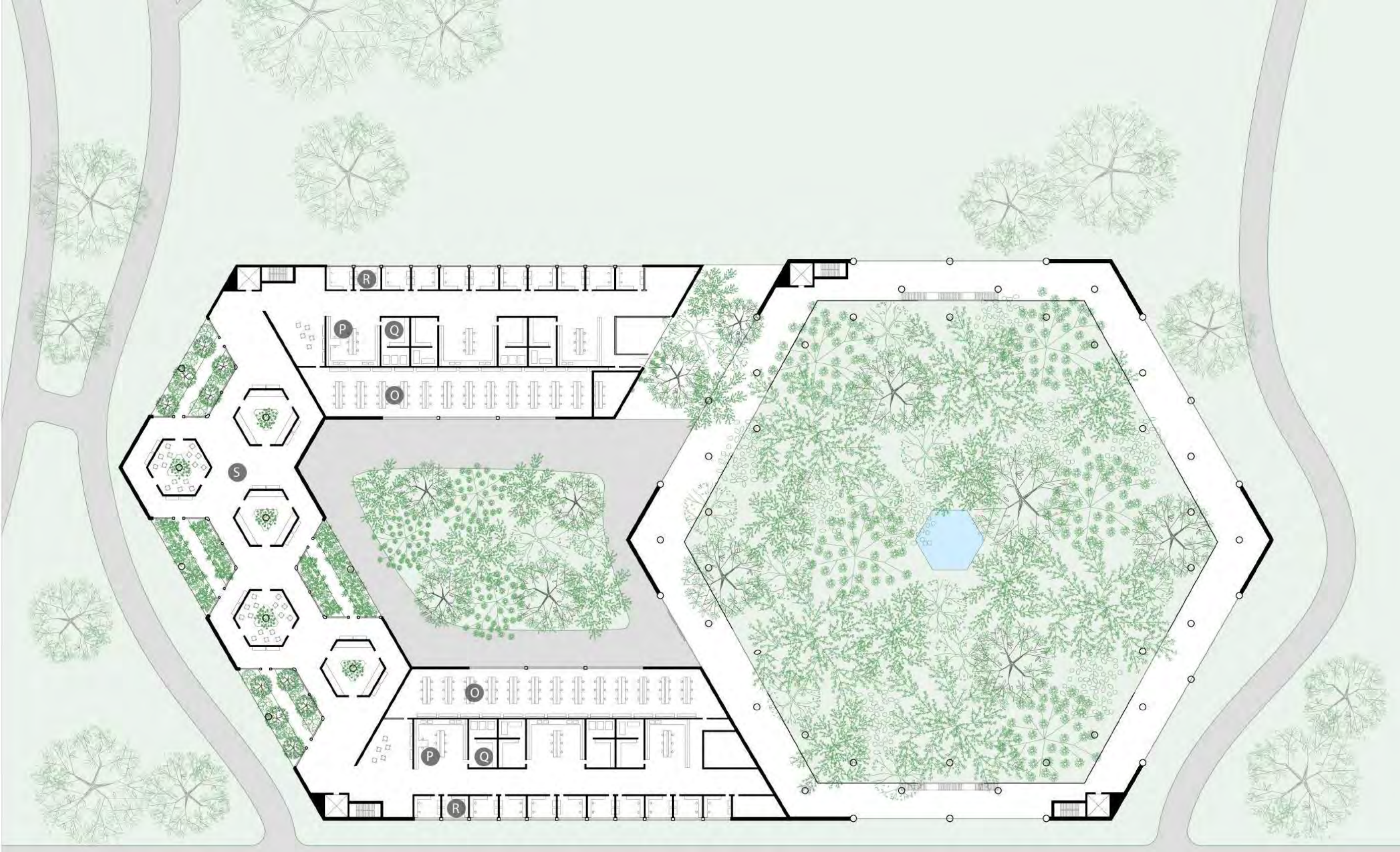
PLAN - GROUND FLOOR

- A** LOBBY/ENTRANCE
- B** GIFT SHOP
- C** CAFE
- D** WELCOME GARDEN
- E** EDUCATIONAL SPACE
- F** MUSEUM GARDEN
- G** CLASSROOM/EXHIBIT
- H** TICKET LOBBY
- I** RESTAURANT
- J** OUTDOOR GARDEN
- K** CONSERVANCY
- L** WATER TANK
- M** ELEVATOR
- N** BATHROOM



PLAN - SECOND FLOOR

- O WET LAB
- P DRY LAB
- Q FLEX SPACE
- R OFFICES
- S LOUNGE GARDEN



Building Section

- A LOBBY/ENTRANCE
- C CAFE
- D WELCOME GARDEN
- E EDUCATIONAL SPACE
- F MUSEUM GARDEN
- K CONSERVANCY
- L WATER TANK
- P DRY LAB
- Q FLEX SPACE
- S LOUNGE GARDEN

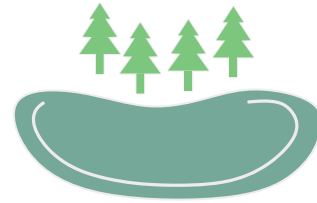




WATER

WATER STRATEGY

1. RAINWATER HARVEST THROUGH BLUE ROOF ON ROOFS OF THE RESIDENTIALS, THE BIORETENTION POOLS ALONG THE TRAFFIC AND INSIDE THE GARDEN, AND UMBRELLA-SHAPED STRUCTURES



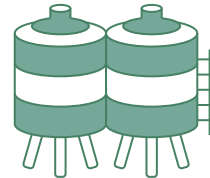
WATER RESERVOIR

2. ON SITE WASTEWATER COLLECTION AND TREATMENT TO HELP SUPPLY WATER FOR IRRIGATION USE OF THE BOTANICAL GARDENS



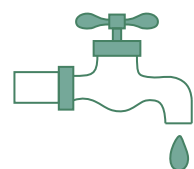
NYC WATER SUPPLY SYSTEM

3. SEA WATER FILTRATION AND PURIFICATION AS ADDITIONAL WATER RESOURCE FOR BOTANICAL GARDEN IRRIGATION

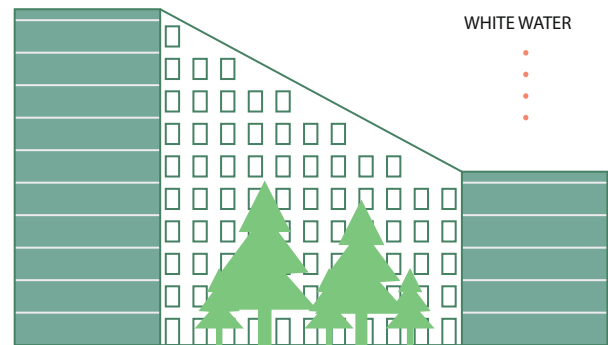


WATER TOWER

4. BIORETENTION PONDS ALONG COAST AS NATURAL WATER TANK TO MITIGATE FLOODS AND STORMS



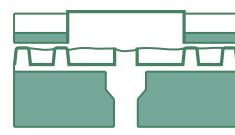
WHITE WATER



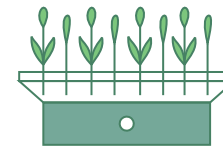
RESIDENTIAL BUILDINGS



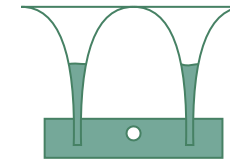
RAINWATER



WATER COLLECTION BLUE ROOF



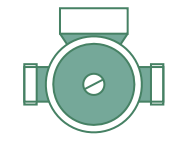
WATER RETENTION POND



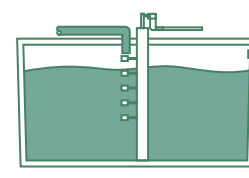
WATER CAPTURE STRUCTURE



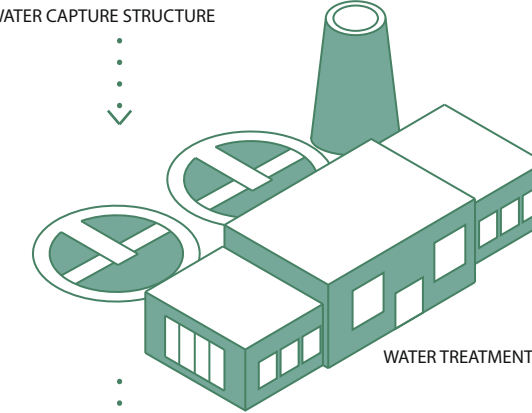
SEA WATER



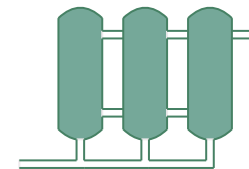
WATER PUMP



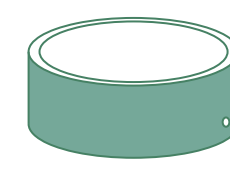
UNDERGRADE STORAGE TANK



WATER TREATMENT PLANT



WATER FILTRATION



WATER STORAGE



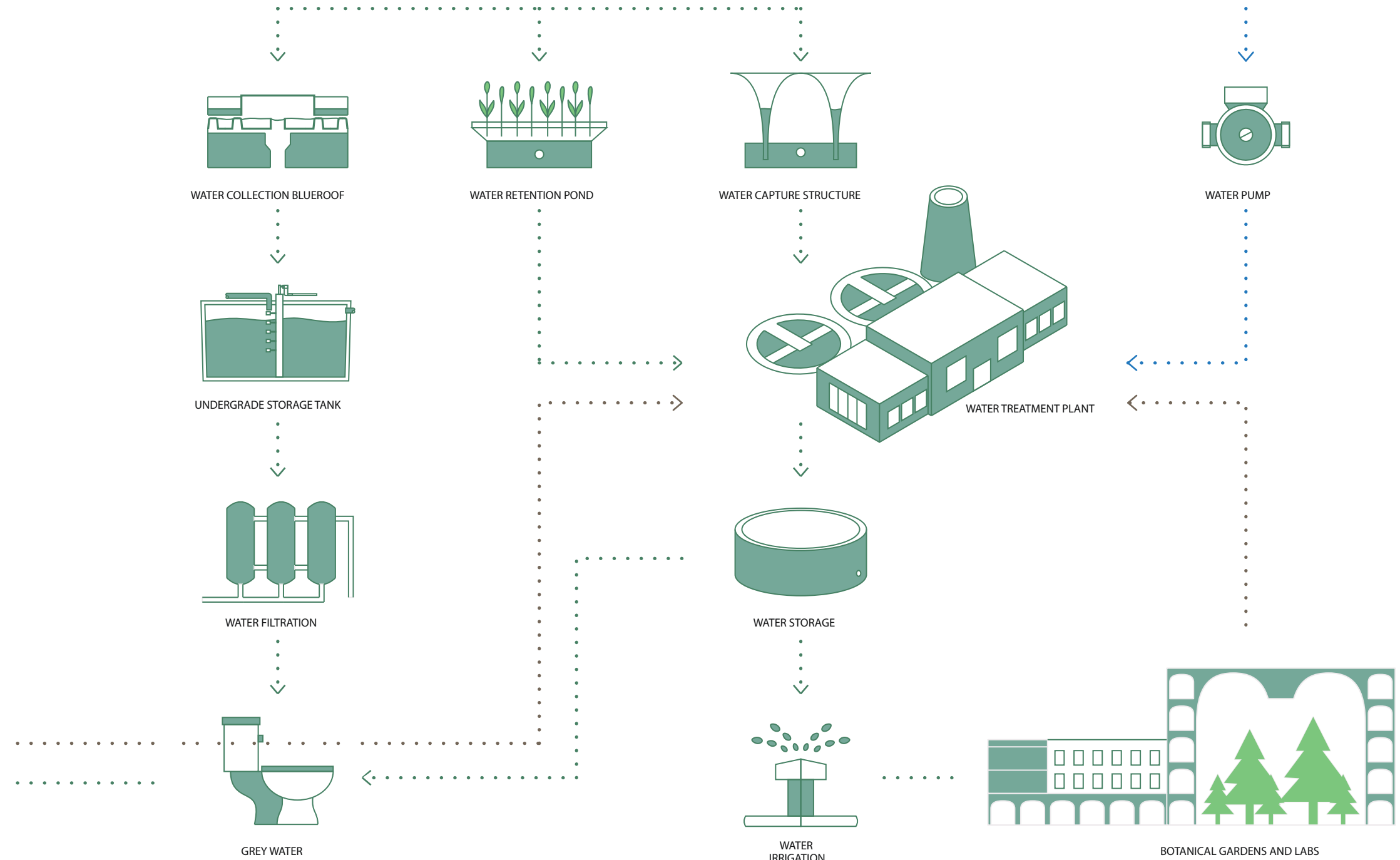
GREY WATER



WATER IRRIGATION



BOTANICAL GARDENS AND LABS



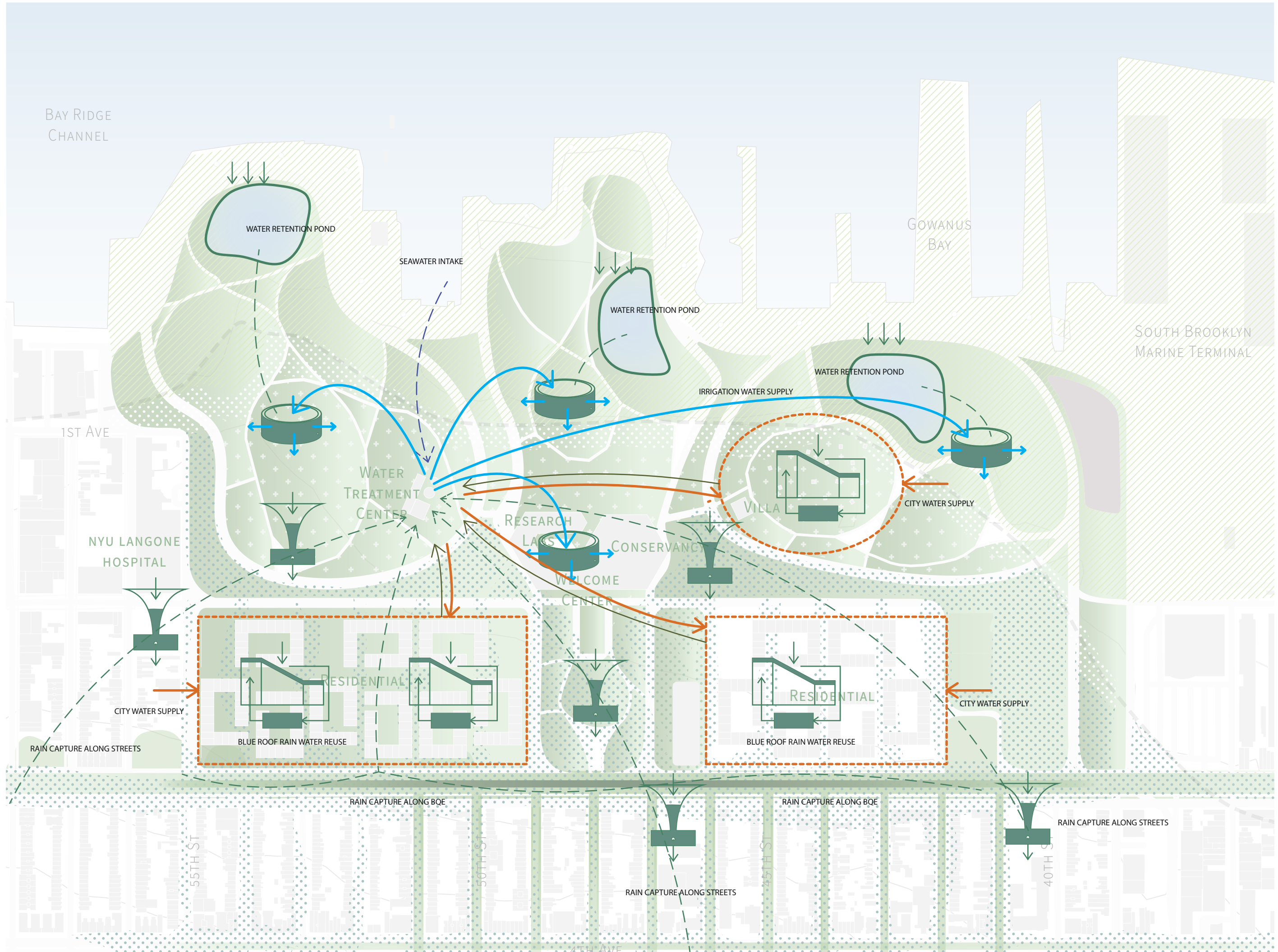
WATER STRATEGY

1. RAINWATER HARVEST THROUGH BLUE ROOF ON ROOFS OF THE RESIDENTIALS, THE BIORETENTION POOLS ALONG THE TAFFIC AND INSIDE THE GARDEN, AND UMBRALLA-SHAPED STRUCTURES

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3. SEA WATER FILTRATION AND PURIFICATION AS ADDITIONAL WATER RESOURCE FOR BOTANICAL GARDEN IRRIGATION

4. BIORETENTION PONDS ALONG COAST AS NATURAL WATER TANK TO MITIGATE FLOODS AND STORMS



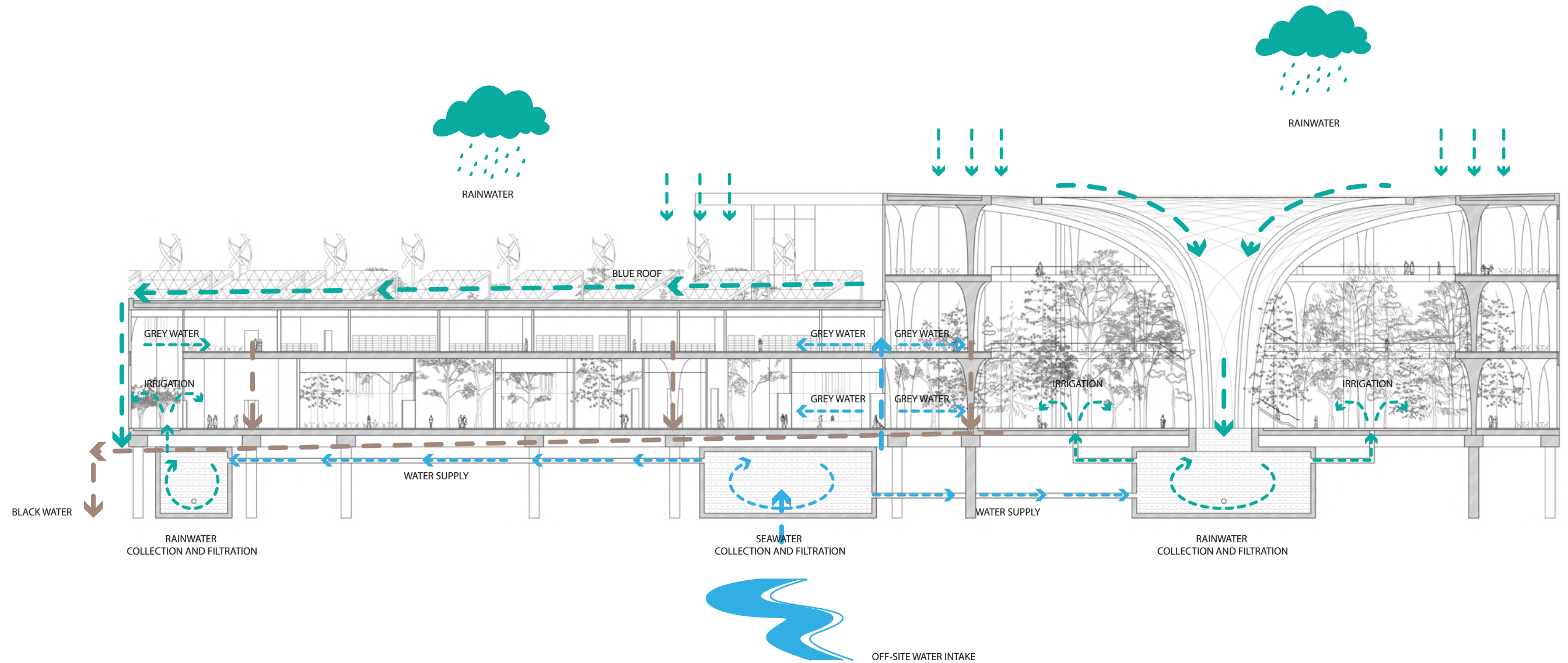
BUILDING WATER SYSTEM

1. RAINWATER HARVEST THROUGH BLUE ROOF ON ROOFS OF THE RESIDENTIALS, THE BIORETENTION POOLS ALONG THE TAFFIC AND INSIDE THE GARDEN, AND UMBRALLA-SHAPED STRUCTURES

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4. BIORETENTION PONDS ALONG COAST AS NATURAL WATER TANK TO MITIGATE FLOODS AND STORMS



ANNUAL WATER COLLECTION AND REUSE

WATER DEMAND				WATER COLLECTION			
	Area(sqf)	Water Use Intensity (WUI)(gal/sqf/yr)	Water Demand (gal/yr)		Area(sqf)	Annual Rainfall (46inch)(gal)	Maximum Runoff
Residential	4,091,340	32	130922880	BQE Road Surface	360,000	10615384.62	6369230.769
Hotel	40,000	39	1560000	Green Streets	110,000	3243589.744	1946153.846
Outdoor Garden	15,000,000	18	270000000	Blue Roof	511,400	15079743.59	9047846.154
Conservancy	100,000	16	1600000	Outdoor Garden	15,000,000	442307692.3	265384615.4
Water Treatment Plant	30,000	13	390000	Total		471246410.3	282747846.2
Office/Lab	27,000	16	432000				
Educational	16,000	13	208000				
Commercial	22,000	49	1078000				
Total			406190880	WATER RECYCLE RATE			69.610



SUNSET PARK BOTANICAL GARDEN



WATER TREATMENT CENTER

ENERGY

ENERGY STRATEGY

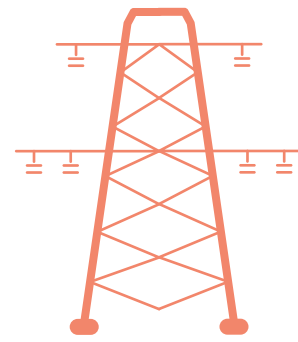
1. PHOTOVOLTAIC PANELS ON THE ROOF OF "UMBRELLA" PAVILLION

2. PHOTOVOLTAIC STREET LIGHT

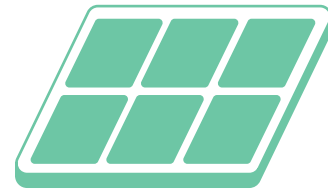
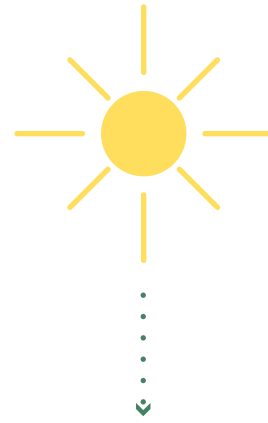
3. PHOTOVOLTAIC PANELS ON FACADE OF RESIDENTIAL BUILDINGS

4. VERTICAL AXIS WIND TURBINES

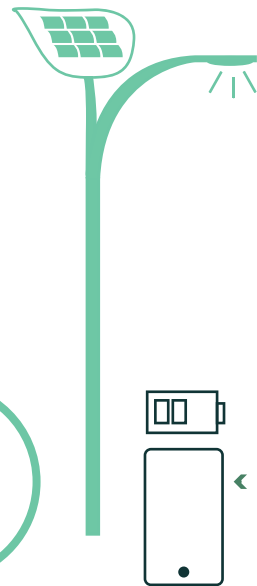
THE QR6 WIND TURBINE HAS BEEN DESIGNED AND DEVELOPED IN THE UK. WITH IT'S RECOGNISED, ICONIC DESIGN AND STRONG AERODYNAMIC PERFORMANCE IT IS THE IDEAL SMALL WIND TURBINE. A 10-KW VAWT RECORDED A POWER GENERATION OF **105.1 KWH** AT AN AVERAGE WIND SPEED OF 7.3M/H



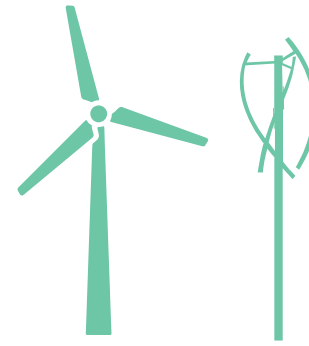
CITY GRID



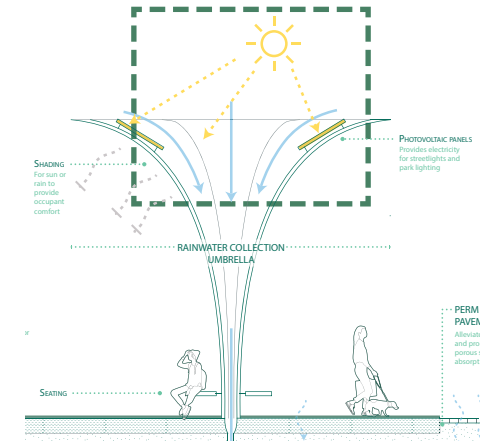
SOLAR PANELS



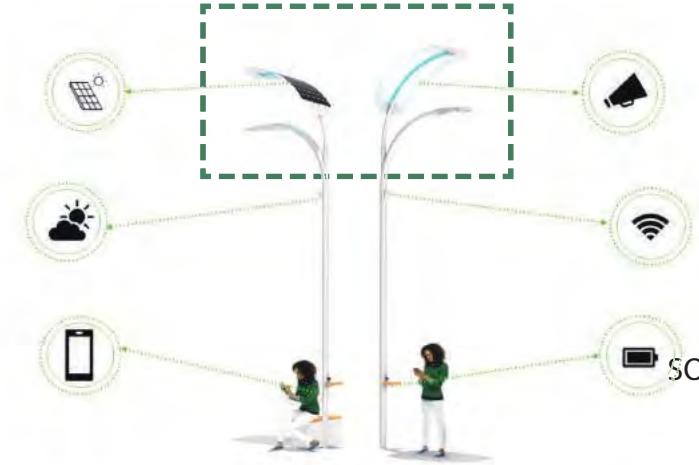
ELECTRICITY



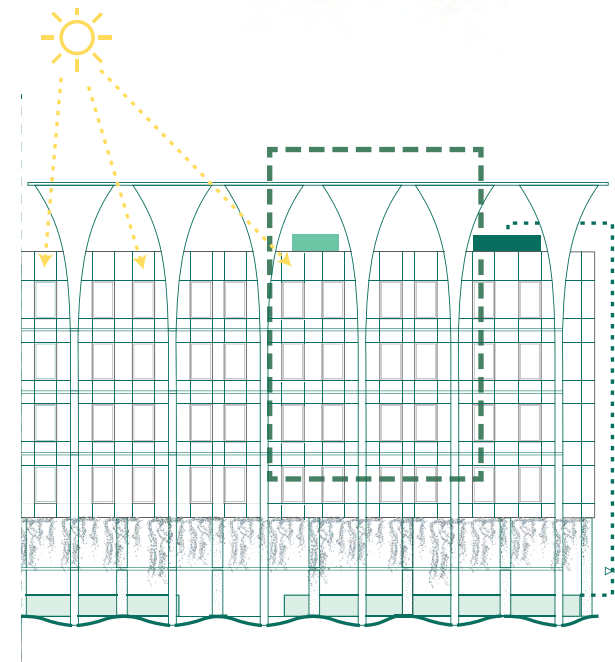
WINDTURBINE



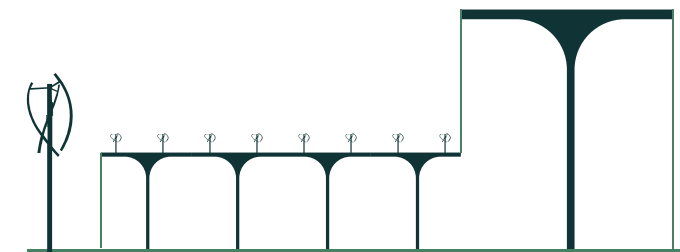
URBAN "UMBRELLA"



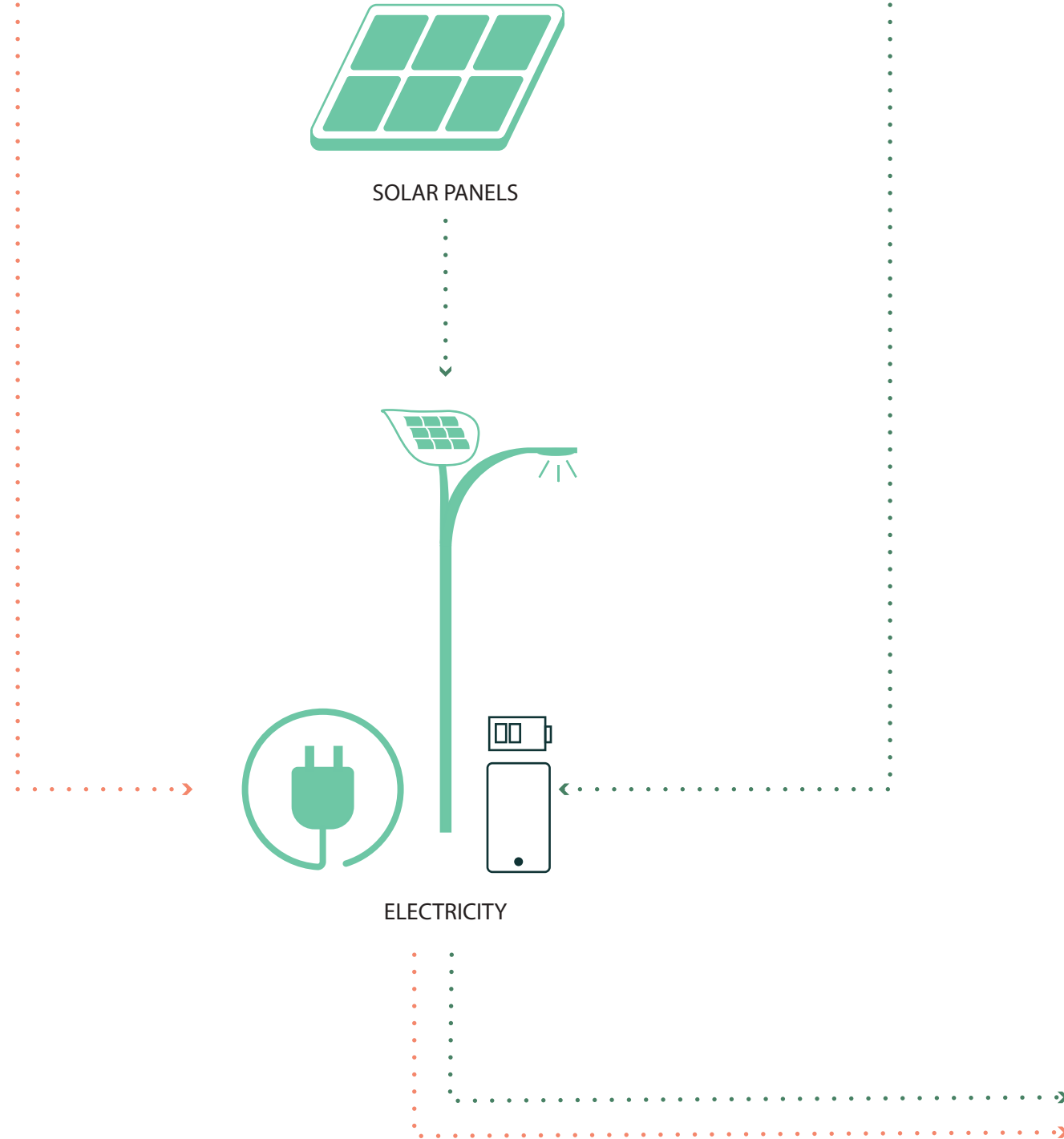
SOLAR STREET LIGHT



PV PANELS ON BUILDING FACADE



BOTANICAL GARDEN



ENERGY STRATEGY

1. PHOTOVOLTAIC PANELS ON THE ROOF OF "UMBRELLA" PAVILLION

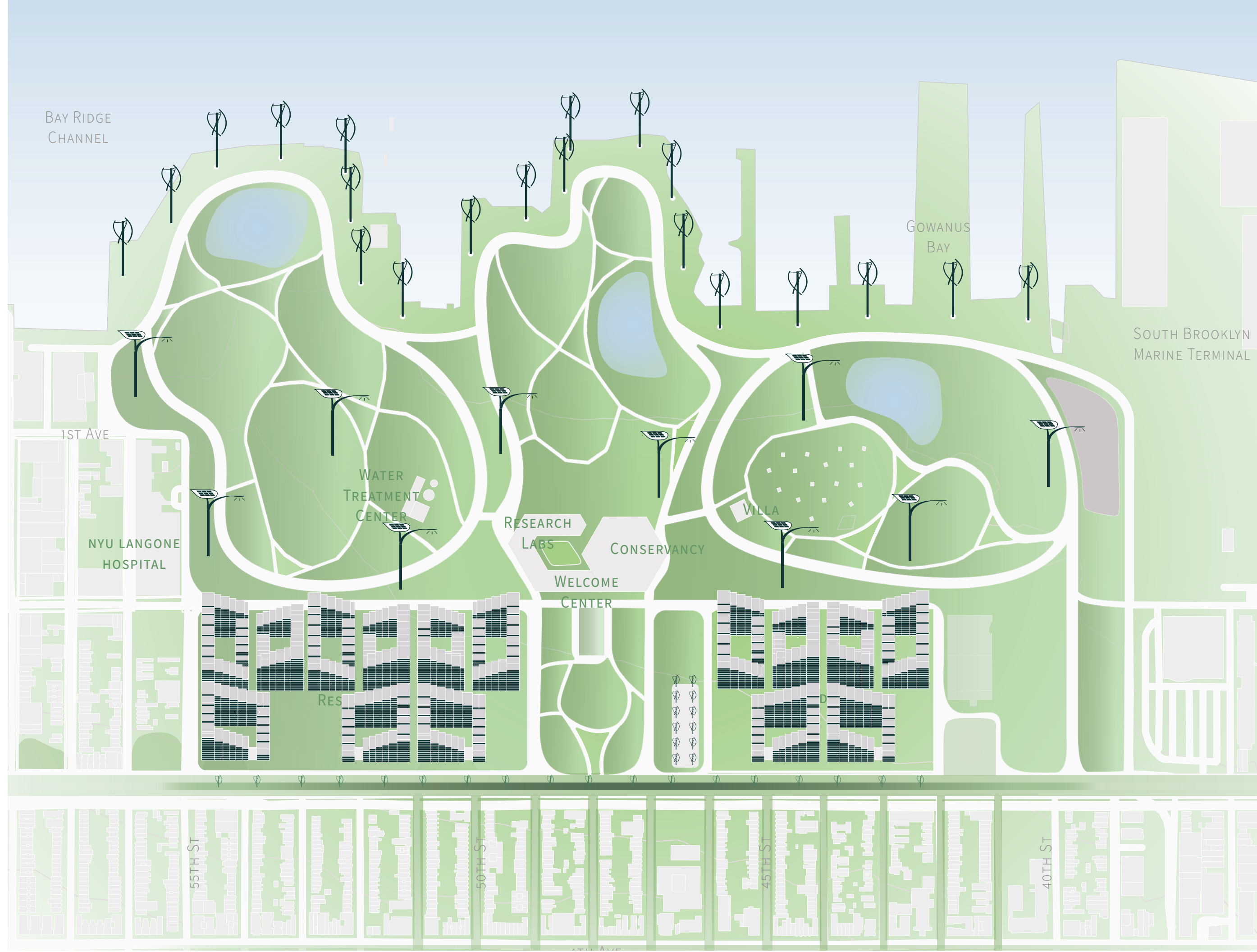
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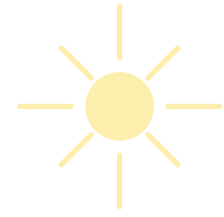
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ENERGY STRATEGY



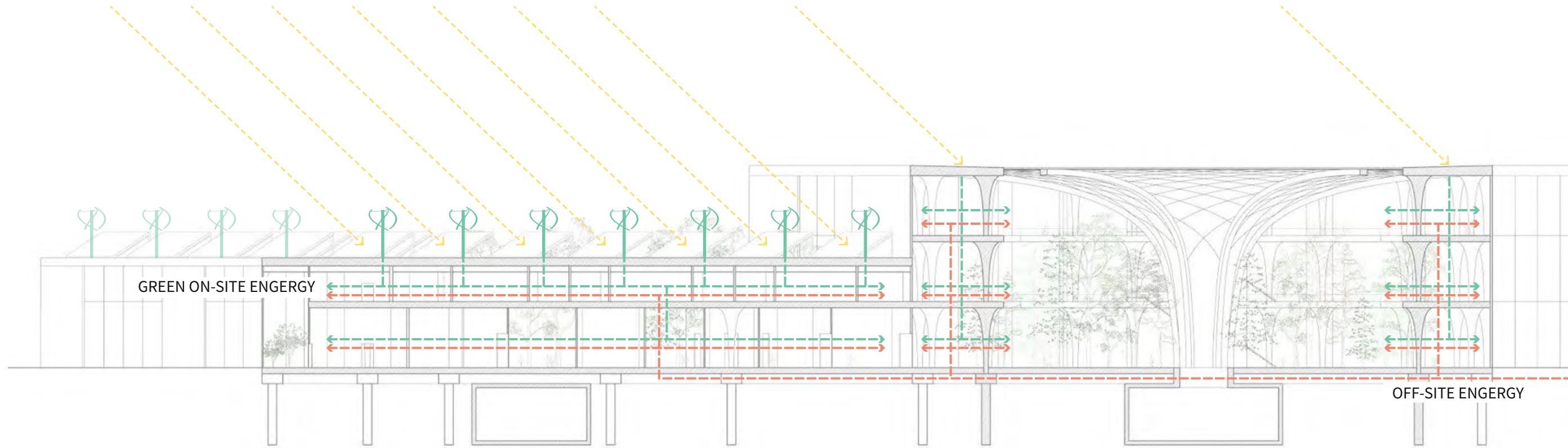
1. PHOTOVOLTAIC PANELS ON THE ROOF OF "UMBRELLA" PAVILLION

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ANNUAL SOLAR POTENTIAL PRODUCTION

BUILDING	SOURCE EUI	SITE EUI	ROOF (SF)	ROOF (SQM)	SIZE OF PV	NUMBER OF FLOOR	ANNUAL ENERGY (kWh)	SOLOR POTENTIAL PRODUCTION (kWh/ year)	COVERAGE (%)
Welcome center	110.4	52.4	10,000	929	111.48	2	303920	145,762	47.96
Waste Water Treatment Plant	7.51	2.86	30,000	2787	334.44	4	99528	429,306	431.34
Coservancy	112	50.8	10,000	929	111.48	3	441960	145,762	32.98
Resident	118.1	59.6	32,500	3019.25	362.31	8	4493840	465,082	10.35
Villa	146.7	63	5,000	464.5	55.74	10	913500	145,762	15.96



MOBILITY

MOBILITY STRATEGY

AVERAGE DAILY TRAFFIC (2018)
1 TO 300,000

WALKABILITY INDEX (2011)
-10.04 TO 15.97

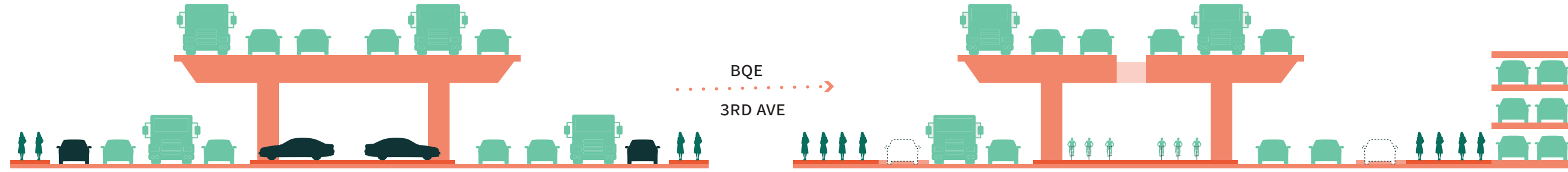
HIGH
138,181

34,883

MODERATE
0.48
TO
1.93

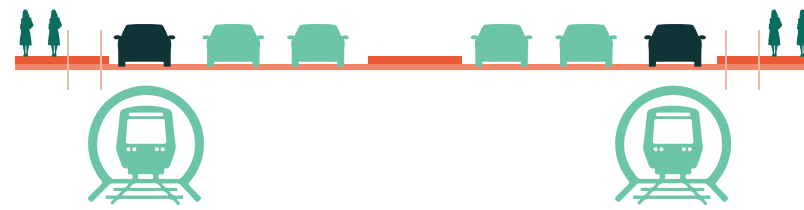
EXISTING CONDITION

MOBILITY INTERVENTION

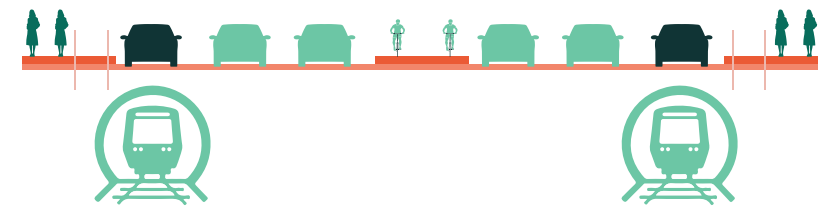


22,234

-0.62
TO
0.47



4TH AVE



8,301

-1.79
TO
-0.61



2ND AVE

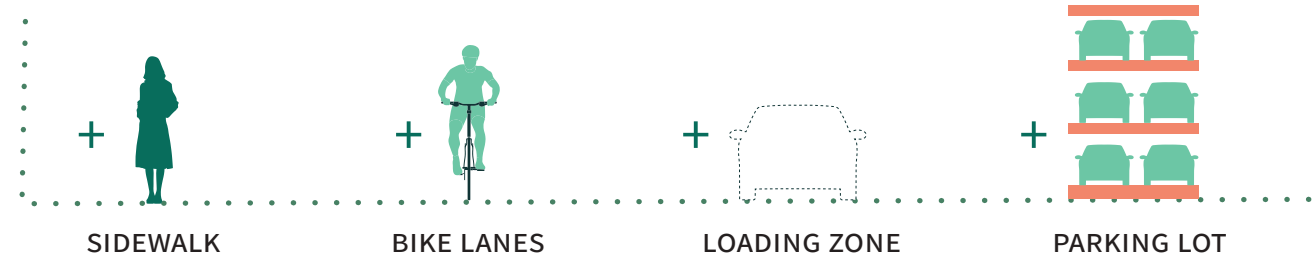


LOW
4,148

LOW
-10.04
TO
-1.78







1ST AVE



TRAFFIC LANE
 PARKING LANE

MOBILITY

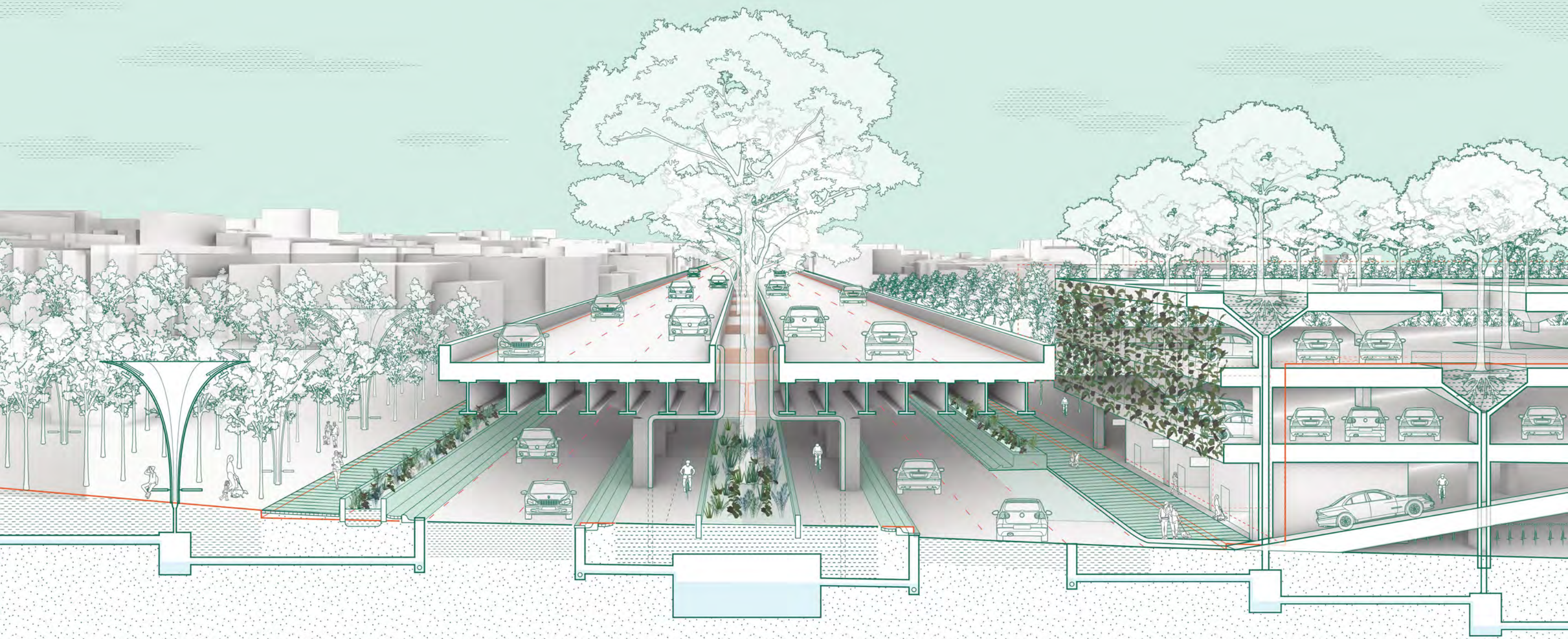
- PARKING 
- BQE FLOW 
- CAR FLOW 
- PEDESTRIAN (ONLY) FLOW 



STUDIO 
OCTOPUS

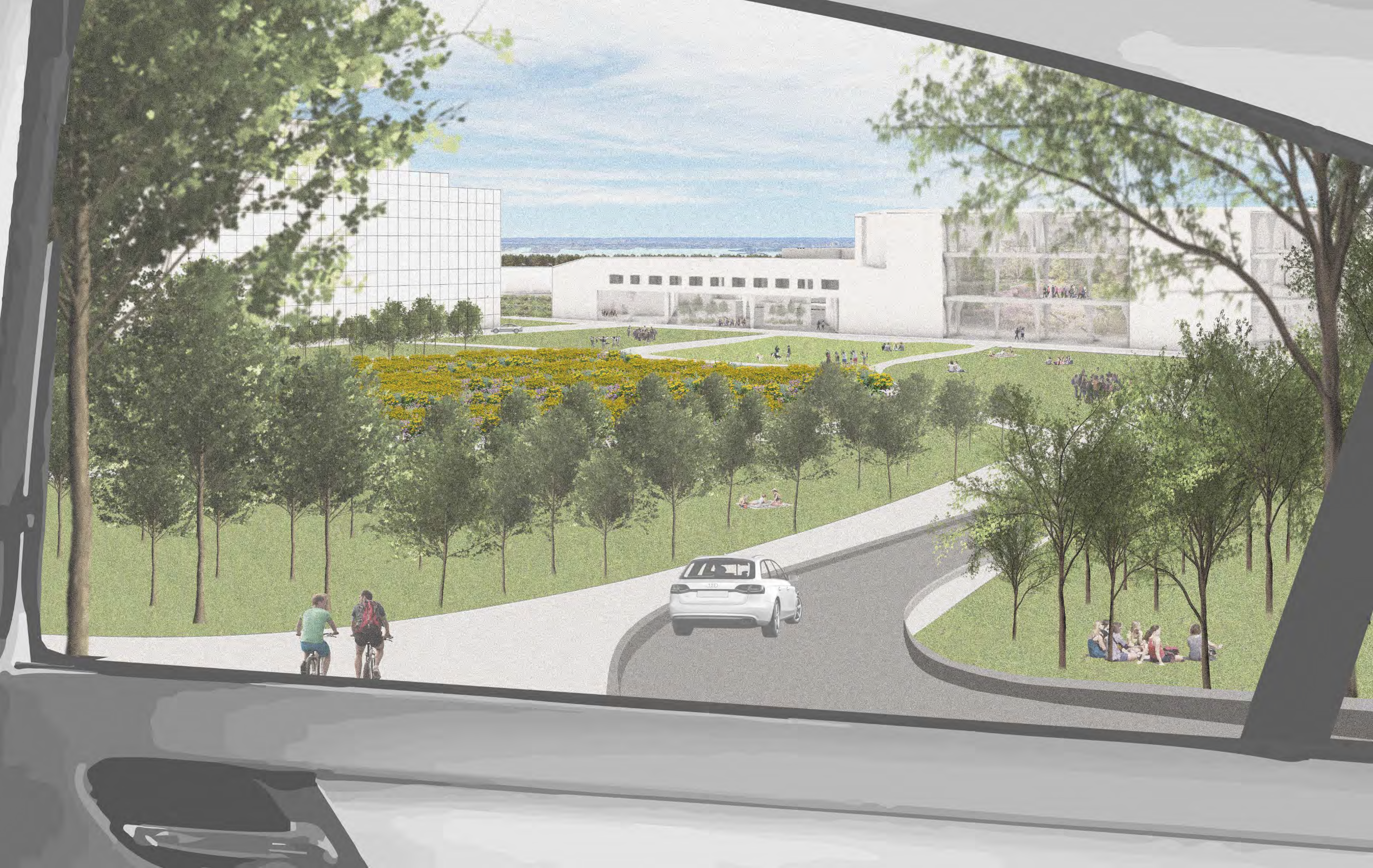
Alice Fang, Yaxin Jiang, Tung Nguyen, Angela Sun





NEW DEVELOPMENT

EXISTING CONDITION





STUDIO 
OCTOPUS

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