RIVER EN ROUTE

A STORMWATER MANAGEMENT SYSTEM IN NEIGHBORHOOD REVITALIZATION

MUKSHATU KHANAM

INTEGRATION OF GREENWAYS WITH DAYLIT CREEKS

This proposition investigates the opportunity of daylighting the original network of creeks that ran through Detroit to draw a new layout of resilient green-blue infrastructure. The project vision is to integrate the ecological system of runoff water filtration before it goes back to river with new urban space for the residents of the neighborhood.

URBAN ISSUES IN DETROIT

One third of the residential plots in Detroit are vacant There is almost no new investment in the sector after 1970.

The city has combined sewer system. So when it is an event of extreme rainfall, sewer get mixed directly with the Detroit river. The number of such events is increasing since last decade.

DETROIT RIVER

INDUSTRIAL BELT

LAND BANK PROPERTY

CSO PIPELINE

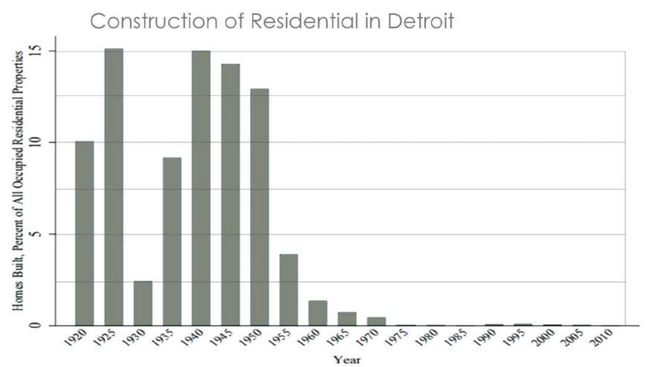
EXISTING GREEN

HISTORIC CREEKS

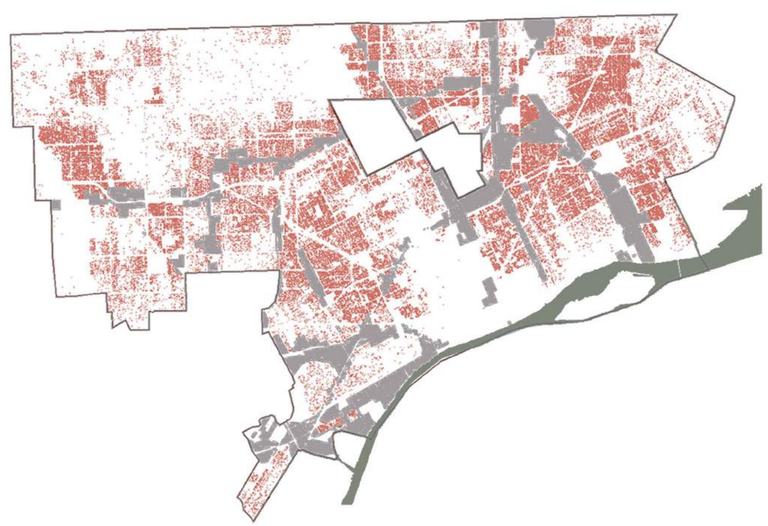
NEIGHBORHOOD DENSIFICATION

FLOOD LEVEL PROJECTION

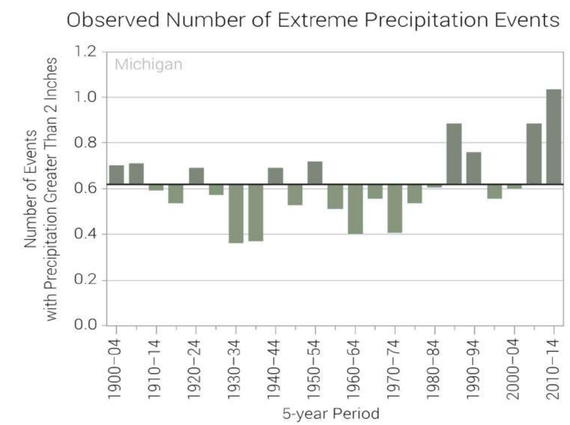
URBAN BLIGHT



(Source: Southeast Michigan Council of Governments)



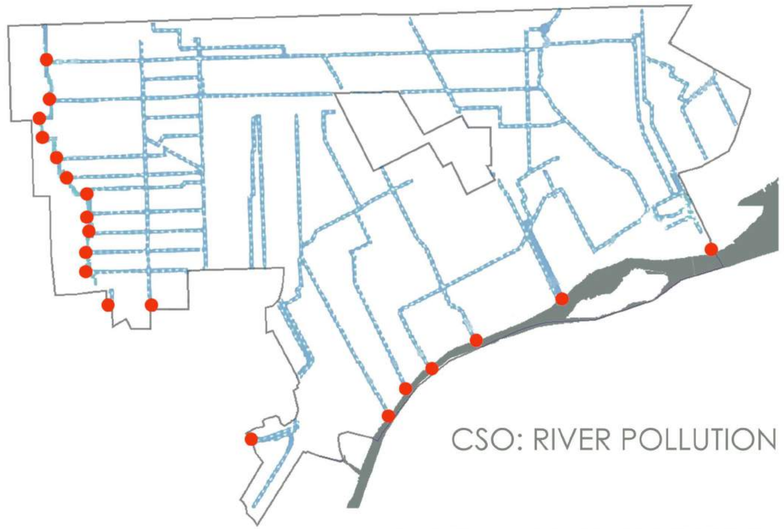
CSO-RIVER POLLUTION



TOTAL OUTFALL IN 2018: 235 MGIN DETROIT RIVER

DEVELOPMENT STRATEGY: DAYLIGHTING RIVER

The city of Detroit had a network of creeks. The combined sewer pipelines were built on top of some existing creeks. Those still have traces are identified and proposed to recover here.



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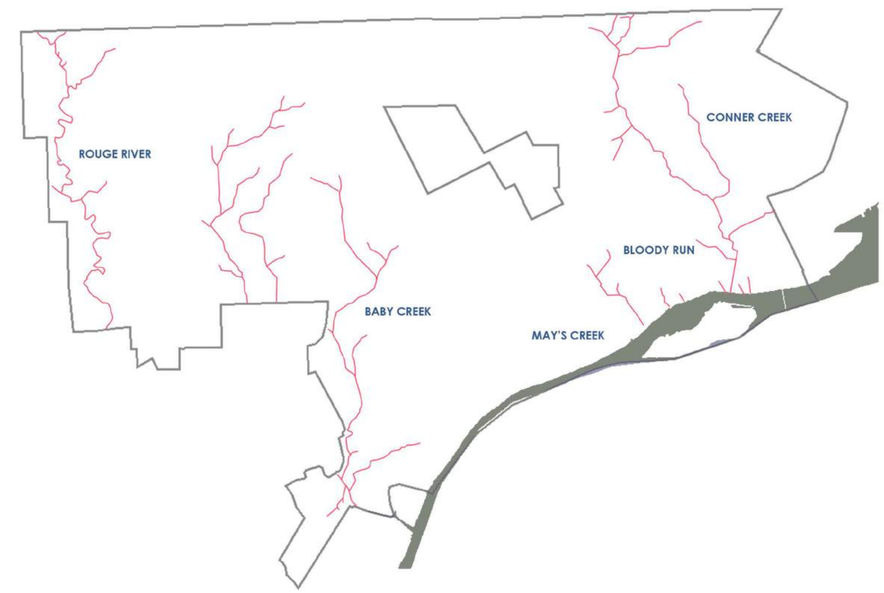
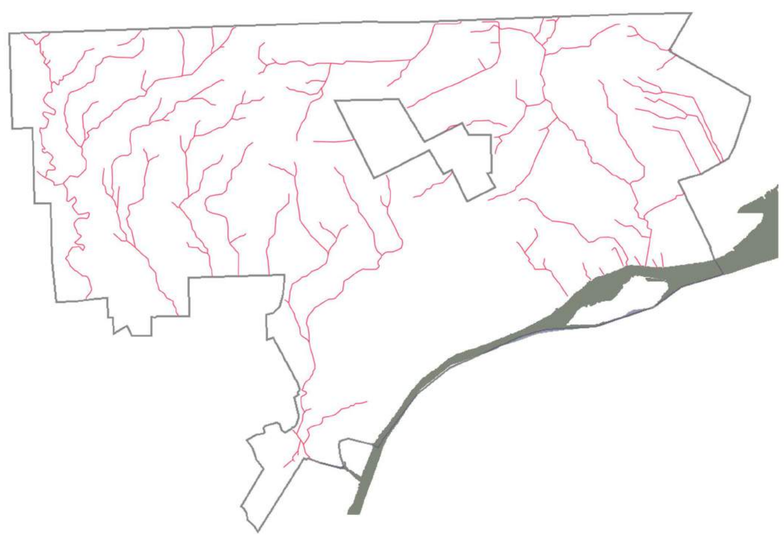
TOTAL OUTFALL IN 2018: 235 MGIN DETROIT RIVER



RIVERS TO RECOVER



HISTORIC CREEKS NETWORK

DETROIT RIVER

INDUSTRIAL BELT

LAND BANK PROPERTY

CSO PIPELINE

EXISTING GREEN

HISTORIC CREEKS

NEIGHBORHOOD DENSIFICATION

FLOOD LEVEL PROJECTION

DEVELOPMENT STRATEGY: COLLECTING STORMWATER

The industrial fabric of city of Detroit was developed along the creek network. Also the vacancy densification is significant next to the industrial belt. Daylit river with greenways can play as buffer with the industrial area, at the same time can be a revitalization tool for neighborhood.

DETROIT RIVER

INDUSTRIAL BELT

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CSO PIPELINE

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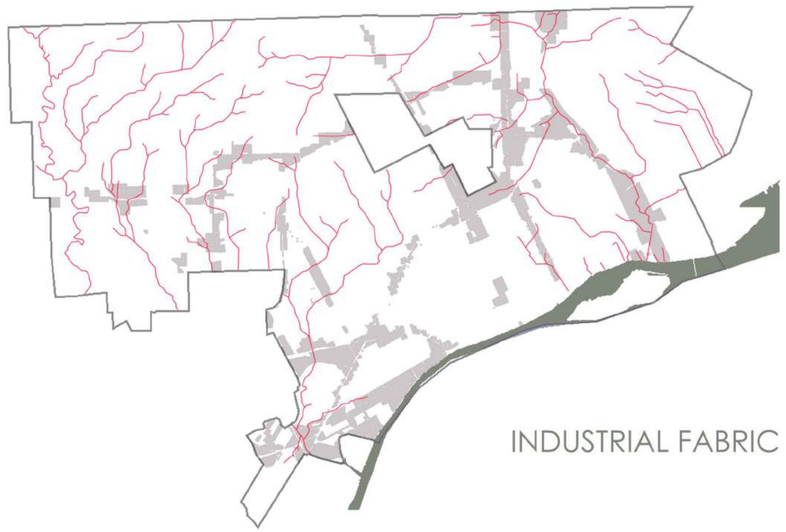
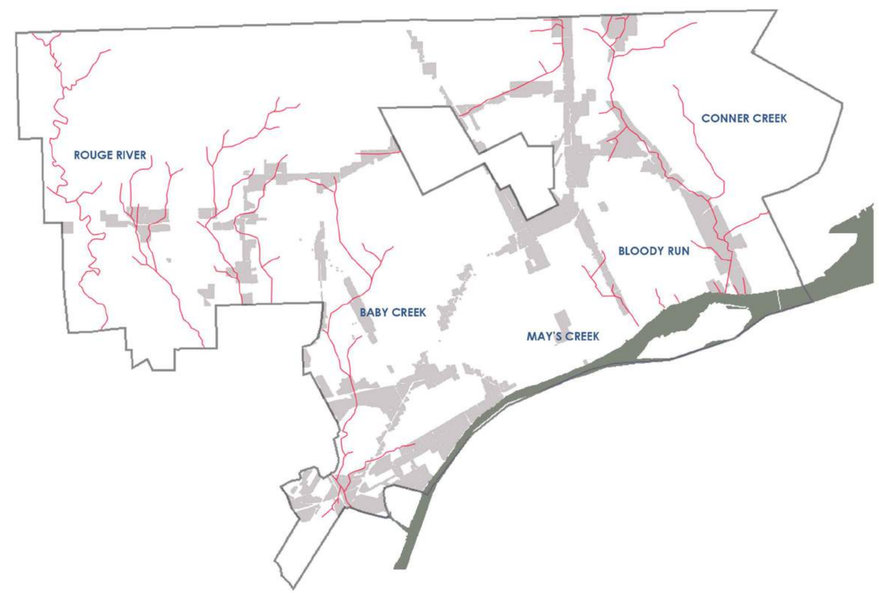
HISTORIC CREEKS

NEIGHBORHOOD DENSIFICATION

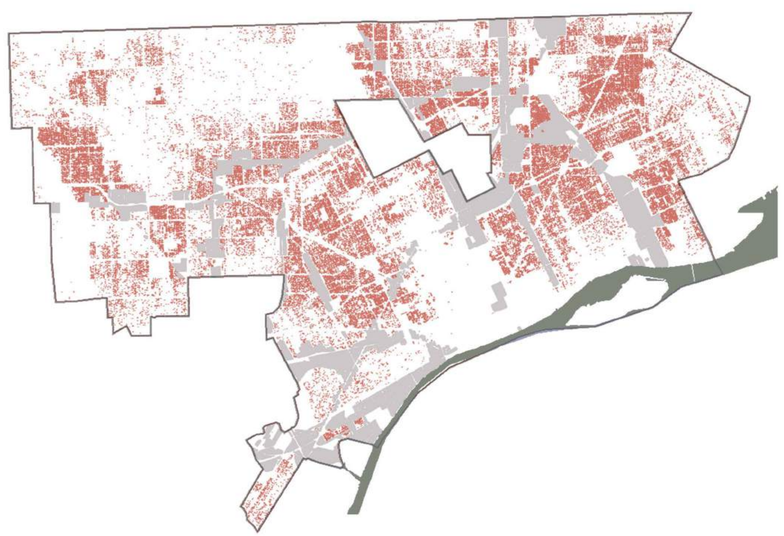
FLOOD LEVEL PROJECTION



INDUSTRIAL FABRIC



DAYLIT RIVER AS BUFFER



RESIDENTIAL VACANT

DEVELOPMENT STRATEGY: INTEGRATING GREENWAYS

The daylit river channels can connect the existing green areas and create a green network all over the city. The blue-green infrastructure will attract neighborhood along it for densification.

DETROIT RIVER

INDUSTRIAL BELT

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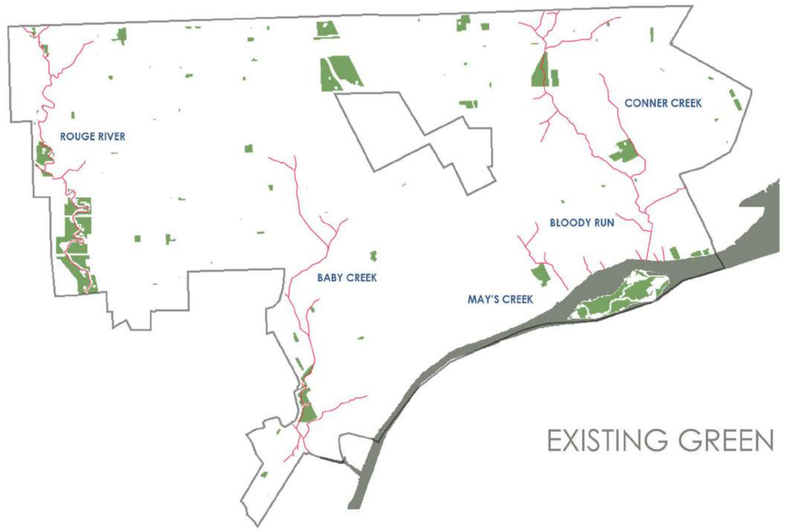
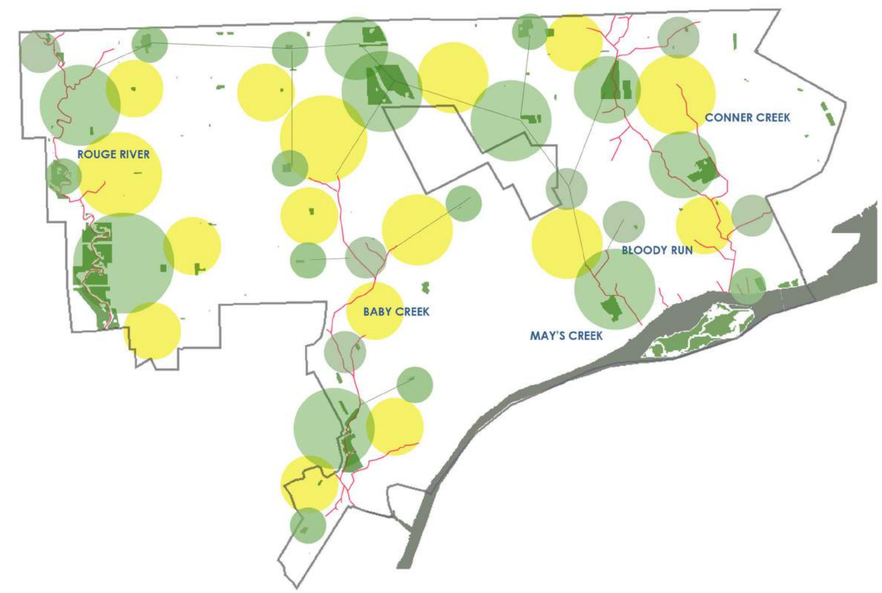
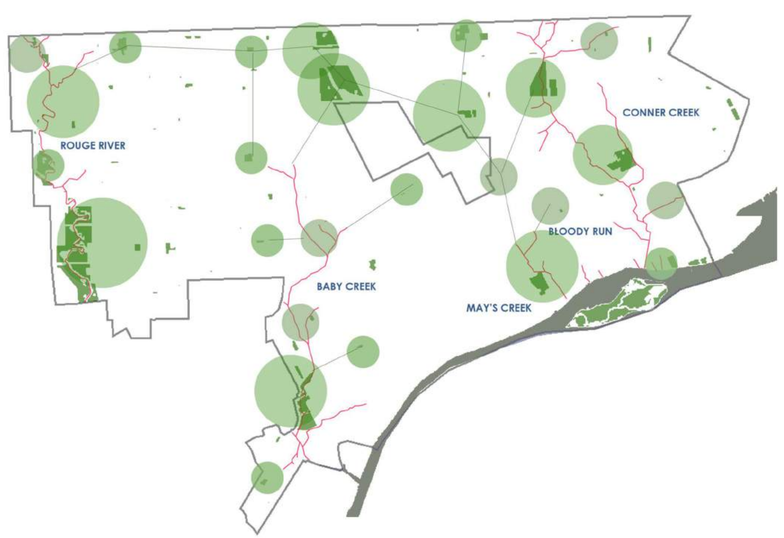
FLOOD LEVEL PROJECTION



EXISTING GREEN



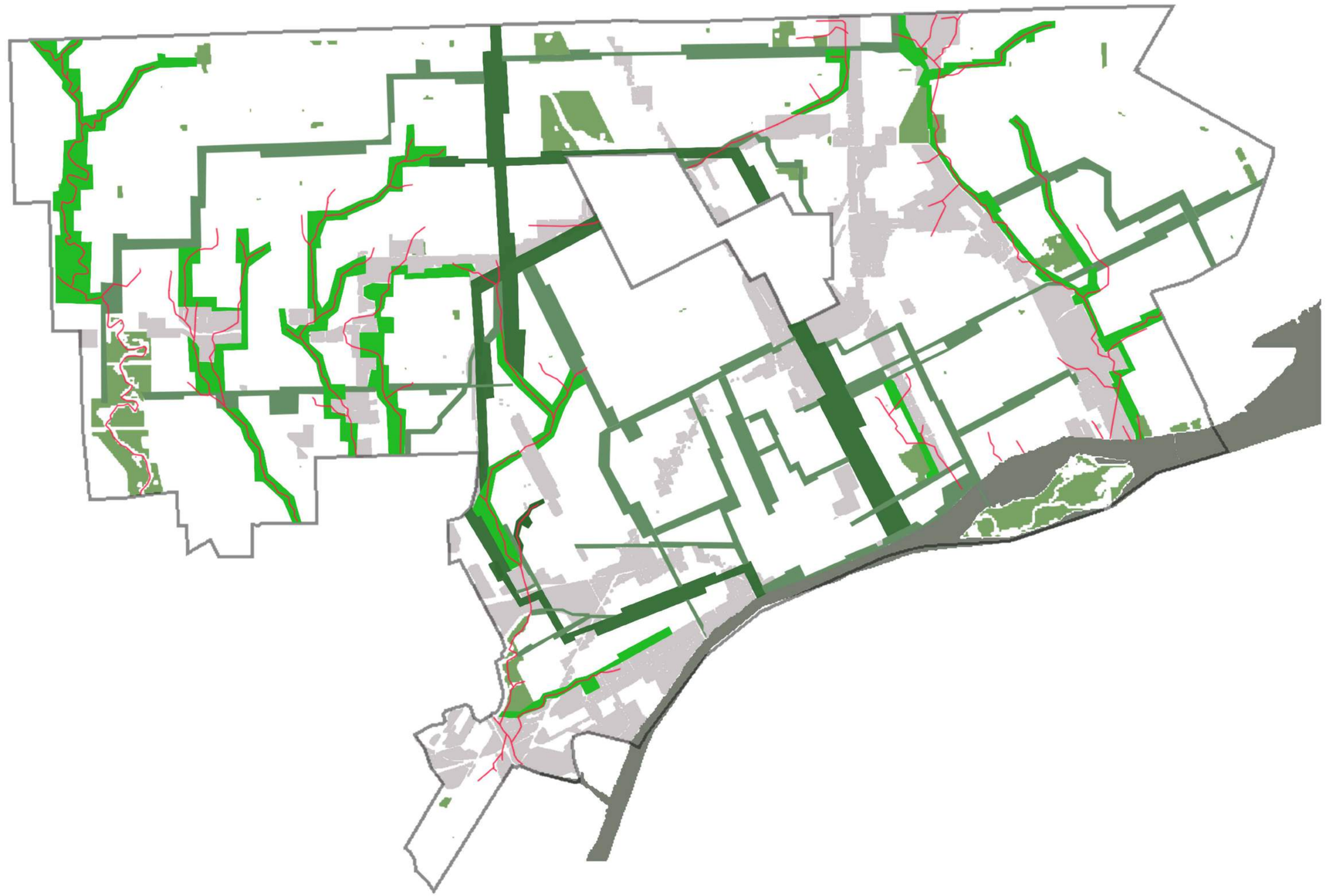
NEW NEIGHBORHOOD DENSIFICATION



NEW GREEN NETWORK

INTEGRATION WITH OTHER GREENWAYS

The proposed greenway will work in a harmony with other greenway proposals such as Joe Luis. Iron belle, Bond streetscapes projects in Detroit.



DETROIT RIVER

EXISTING GREEN

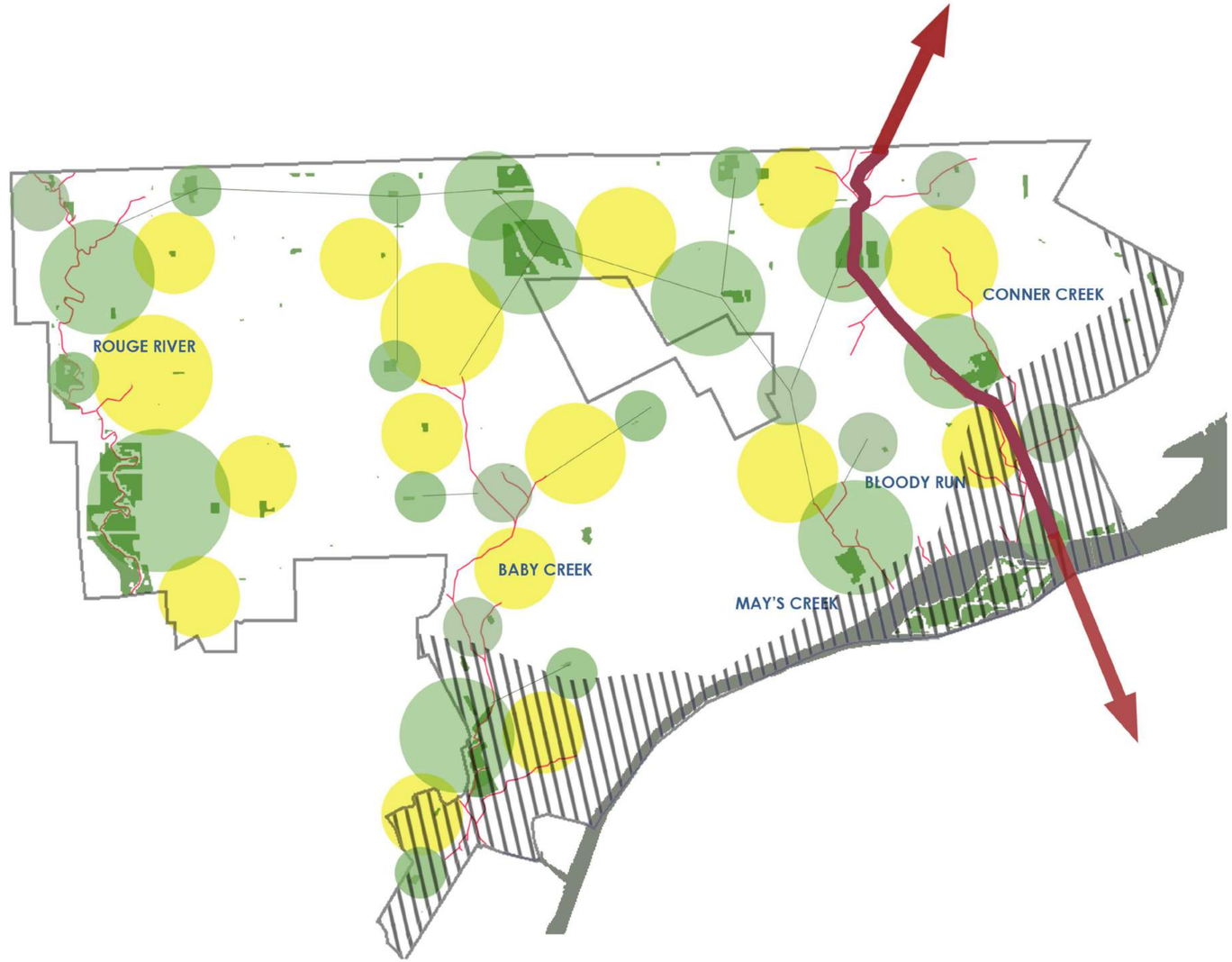
JOE LUIS GREENWAY

IRON BELLE TRAIL

PROPOSED GREENWAY WITH CREEK

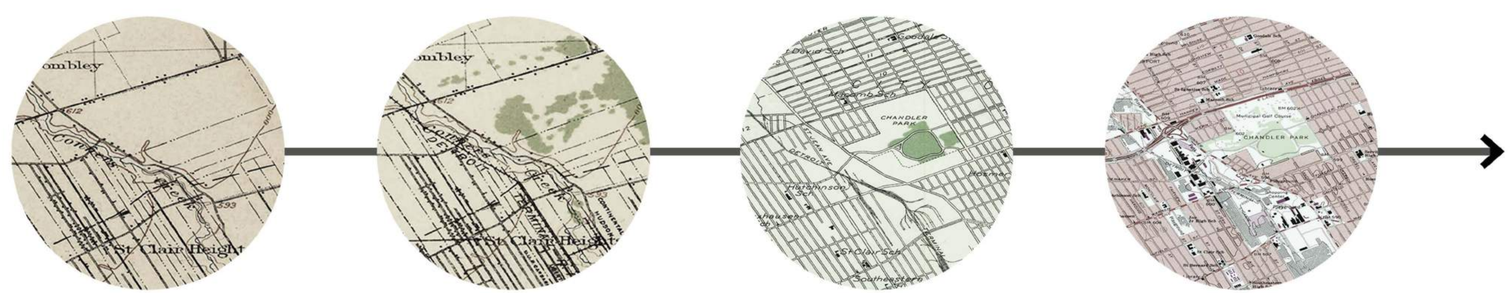
STUDY AREA:
CONNER CREEK

Conner creek is chosen for further study. As per Detroit river water level and flood projection, Jefferson-Chalmers and associatedareas are in more risk. Stormwater managementissues are investigated here.



DETROIT RIVER
INDUSTRIAL BELT
LAND BANK PROPERTY
CSO PIPELINE
EXISTING GREEN
HISTORIC CREEKS
NEIGHBORHOOD DENSIFICATION
FLOOD LEVEL PROJECTION

WATER TRANSPORTATION | TERMINAL RAIL | CONNER ST | 6 LANE ROADWAY



1905 | 1918 | 1936 | 1968

TRANFORMATION OVER TIME

MAPPING:
CONNER CREEK

MT OLIVET CEMETERY

COLEMAN A. YOUNG AIRPORT

GETHSEMANE CEMETERY

CONNER PLAYFIELD

WAYNE COUNTY COMMUNITY COLLEGE

CHANDLER PARK

CHRYSLER PLANT

MAHERAS GENTRY PARK

BELLE ISLE PARK

DETROIT RIVER

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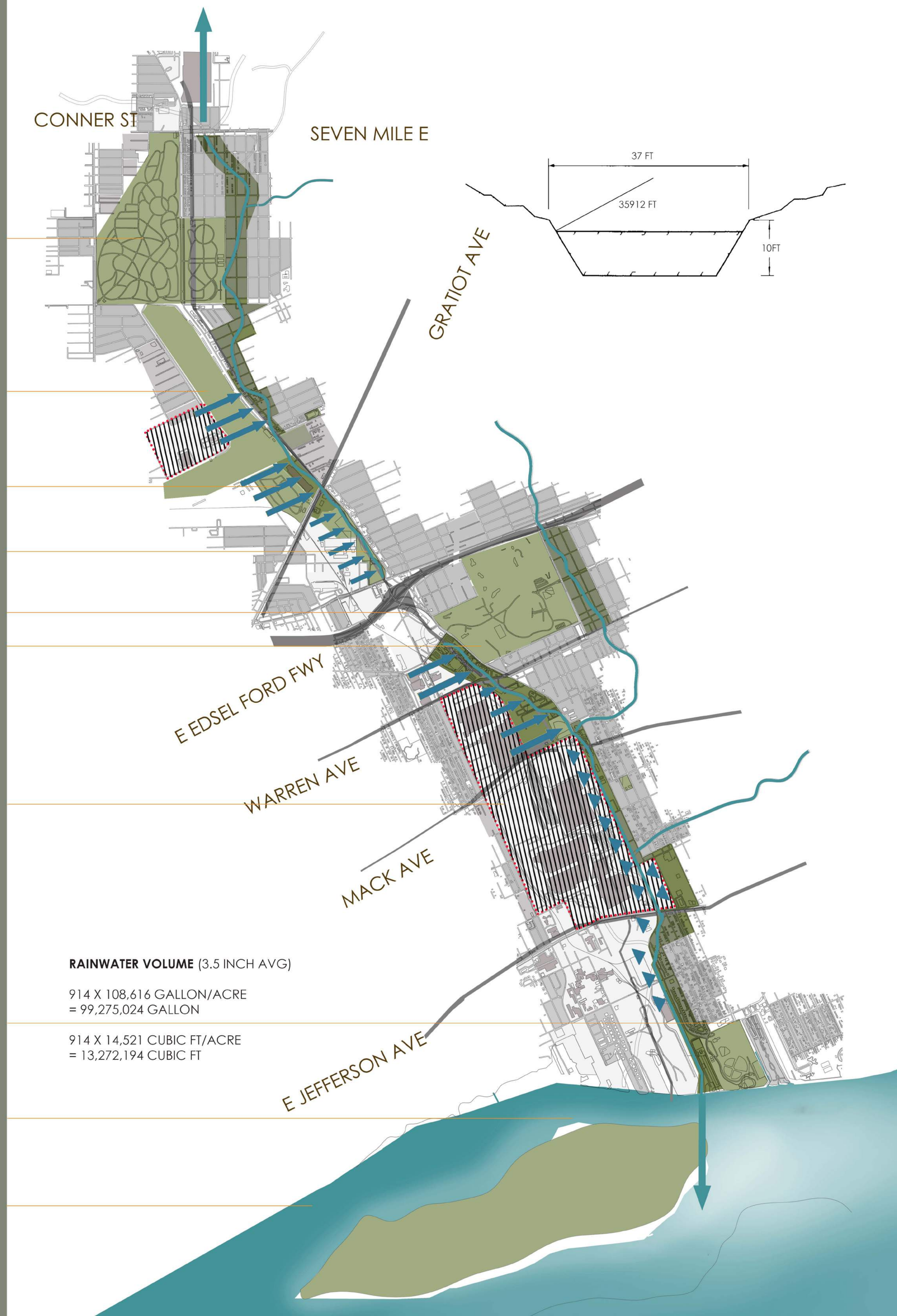


RAINWATER VOLUME (3.5 INCH AVG)

914 X 108,616 GALLON/ACRE
= 99,275,024 GALLON

914 X 14,521 CUBIC FT/ACRE
= 13,272,194 CUBIC FT

RECONFIGURATION:
MASTERPLAN

MT OLIVET CEMETERY

COLEMAN A. YOUNG AIRPORT

GETHSEMANE CEMETERY

CONNER PLAYFIELD

WAYNE COUNTY COMMUNITY COLLEGE

CHANDLER PARK

CHRYSLER PLANT

MAHERAS GENTRY PARK

BELLE ISLE PARK

DETROIT RIVER

RECONFIGURATION:
LANDSCAPE LAYERS

RIVER

TREES & VEGETATION

PRODUCTIVE LANDSCAPE

WALKWAY & BIKE LANE

PLAZA

PRIMARY ROADS

IMPERVIOUS SURFACE

COMMERCIAL ZONE

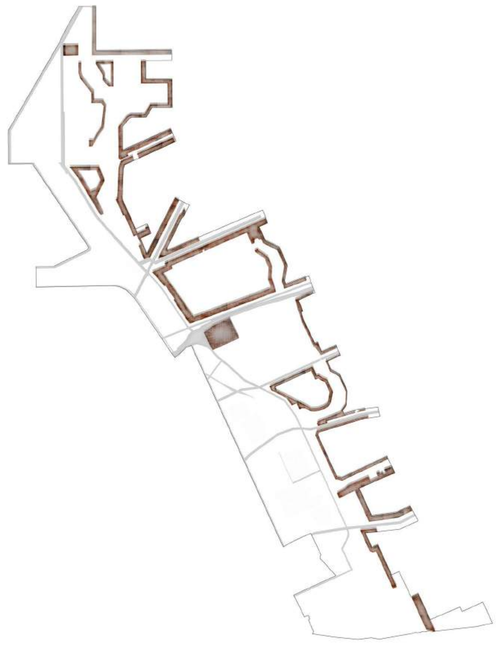
NEW DEVELOPMENT AREA

RIVER & CREEK

VEGETATION

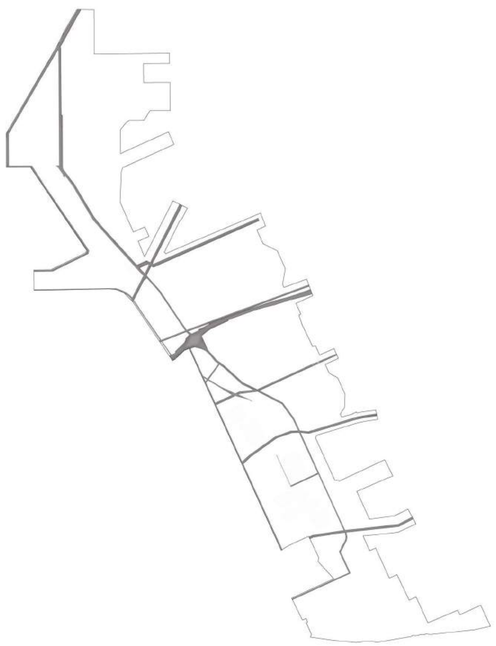
GREEN FOREST

CONSTRUCTED WETLAND

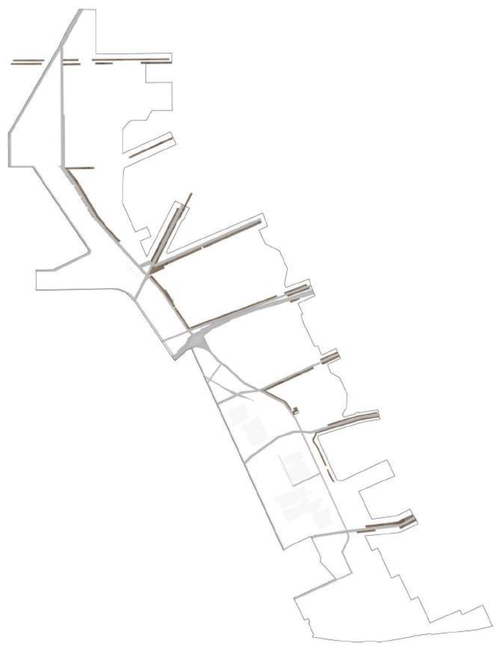


DENSIFICATION

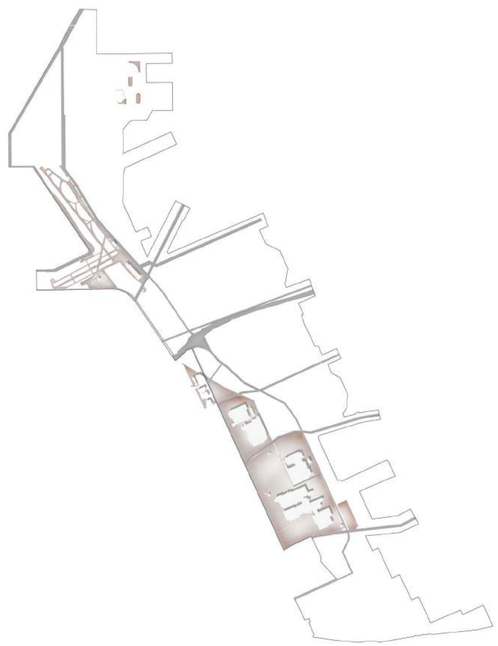
WALKWAYS & PLAZA



ROAD NETWORK

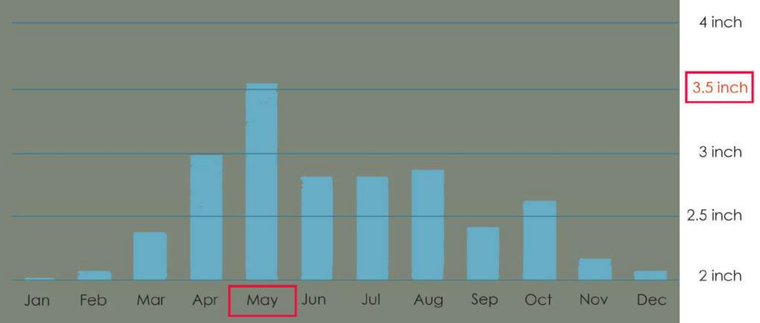


COMMERCIAL PLOTS

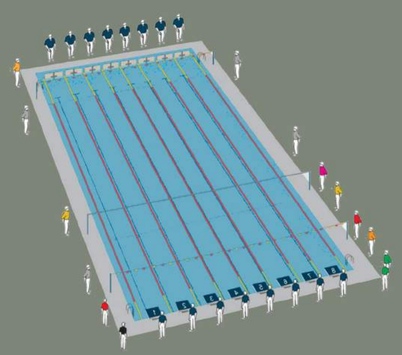


IMPERVIOUS AREA

INVESTMENT RESOURCES



120 OLYMPIC POOLS



INDUSTRIAL IMPERVIOUS AREA

CHRYSLER PLANT AREA

INDUSTRIAL STORMWATER

NEW DEVELOPMENT AREA

NRSA GRANT AREA

STORMWATER NETWORK

CHRYSLER

Drainage fee= $602/ month X 573 acres
= $344,946/ month
= $4,139,352/ year

Green cr./year = 80% of $4,139,352
= $3,311,481
=$3.3 M/YEAR

Highest precipitation= 3.50"/month in May
= 81,462 gallons/acre
= 10,891 cubic feet/acre

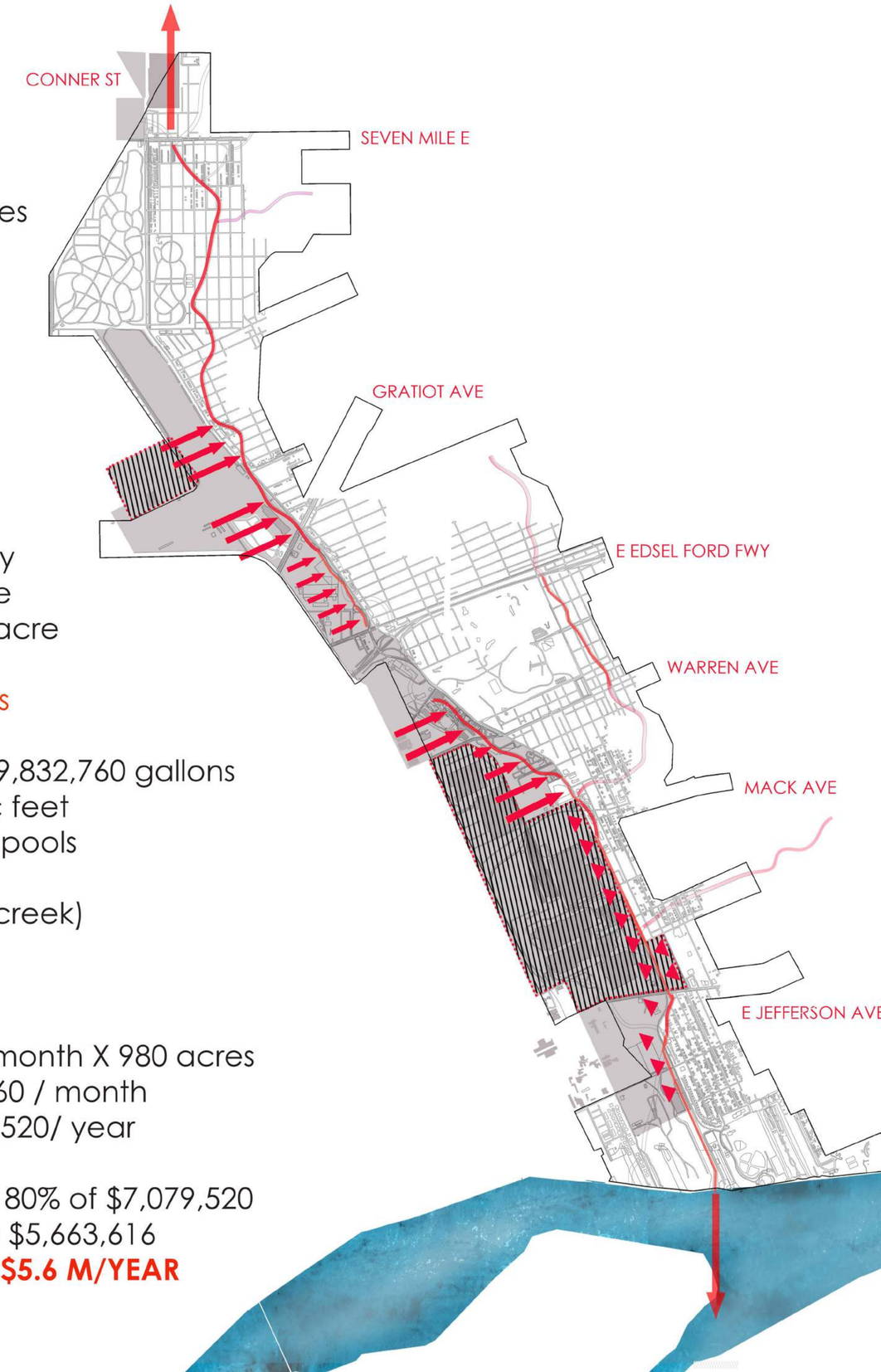
Adjacent impervious surfaces = 980 acres

Total run off per month = 980 x 81,462 =79,832,760 gallons
=10,672,087 cubic feet
=120 Olympic size pools

10,672,087 cubic feet/ 35,000' (length of creek)
/ 10' (approx. depth) = 30.5' width

Stormwater Drainage fee= $602/ month X 980 acres
= $589,960 / month
= $7,079,520/ year

Green Infrastructure credit/year = 80% of $7,079,520
= $5,663,616
=**$5.6 M/YEAR**



INVESTMENT RESOURCES

NATIONAL FOUNDATIONS
FEMA
ENV. PROTECTION AGENCY
HUD

IMPLEMENTATION COST (APPROX)

Creek	35,000 L.F.	$350,000,000
Filtration	6,000 l.F.	$18,000,000
Retention ponds	20	$6,000,000
Streetscape features		$60,000,000
Landscape features		$40,000,000
Raw water connection		$9,000,000

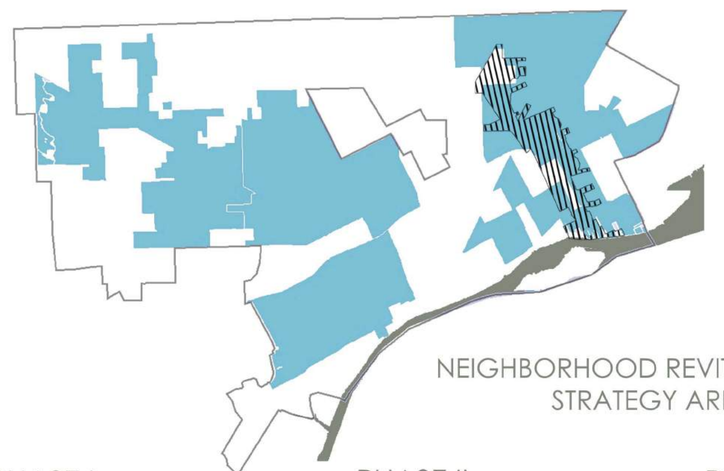
Total= $483,000,000
= **$483 M**

INDUSTRIAL IMPERVIOUS AREA
CHRYSLER PLANT AREA
INDUSTRIAL STORMWATER
NEW DEVELOPMENT AREA
NRSA GRANT AREA
STORMWATER NETWORK

New development area = 1800 acres

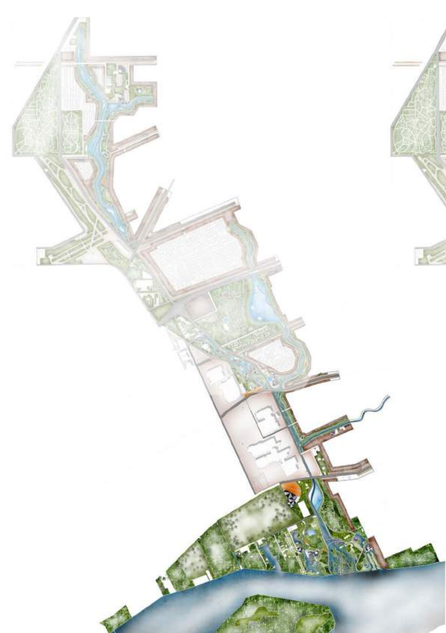
Drainage fee = $602/ month X 1800 acres
= $1,083,600 / month
= $13,003,200/ year

Green credit/year = 80% of $13,003,200
= $10,402,560
=**$10.4 M**

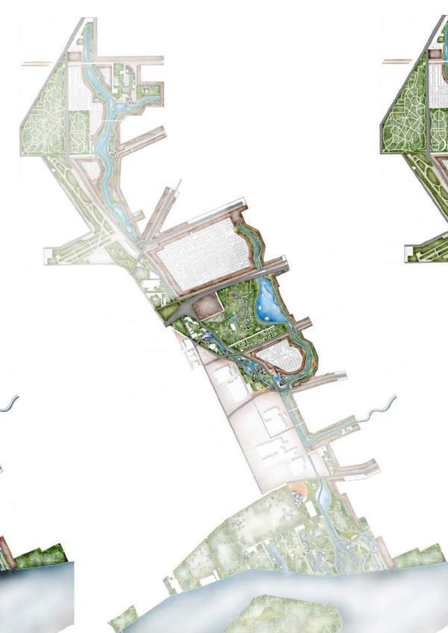


NEIGHBORHOOD REVITALIZATION
STRATEGY AREA

PHASE I

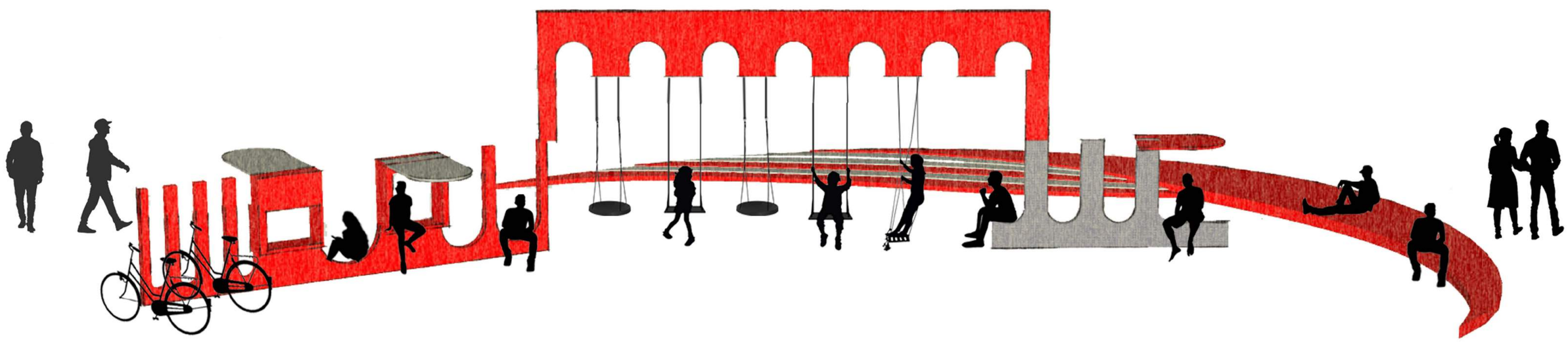


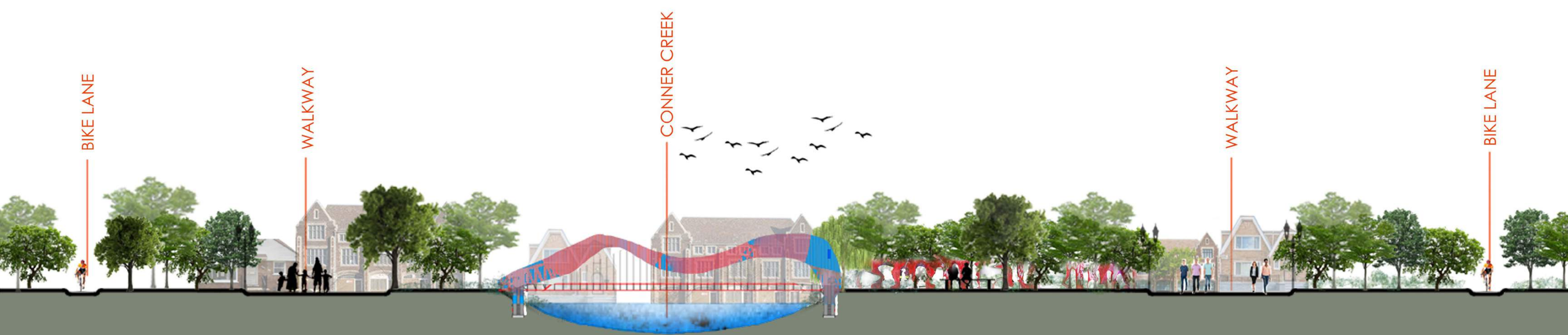
PHASE II



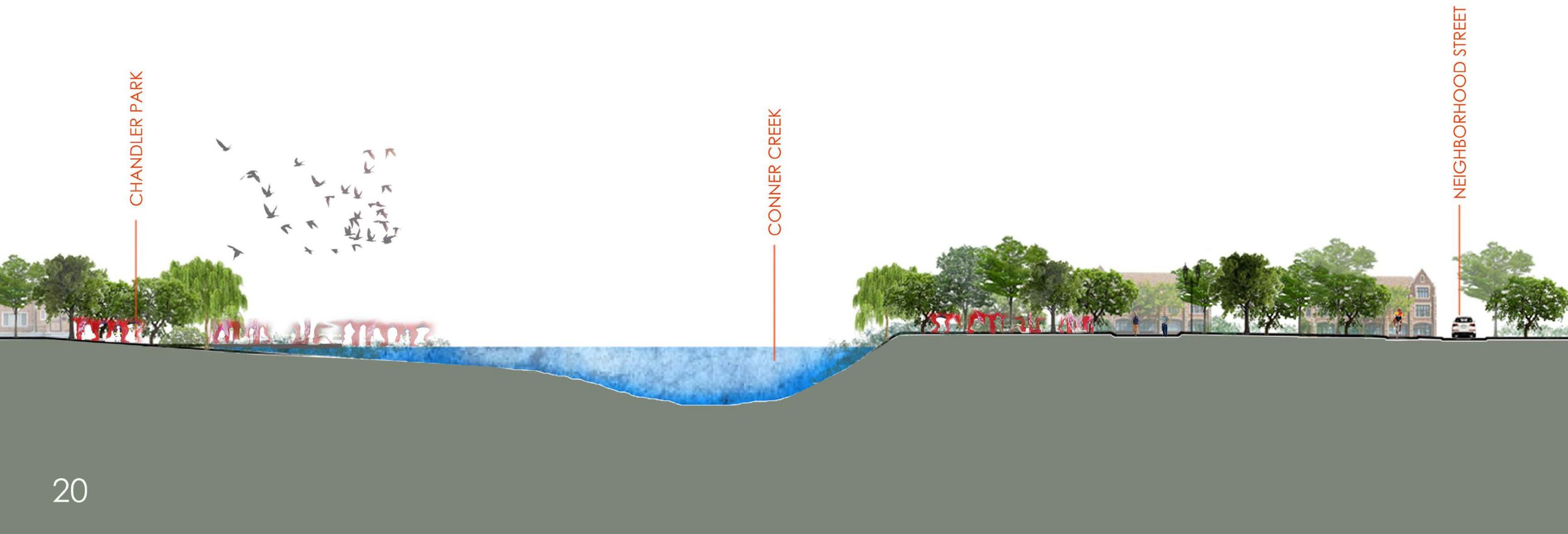
PHASE III

GREENWAYS WITH NEIGHBORHOOD

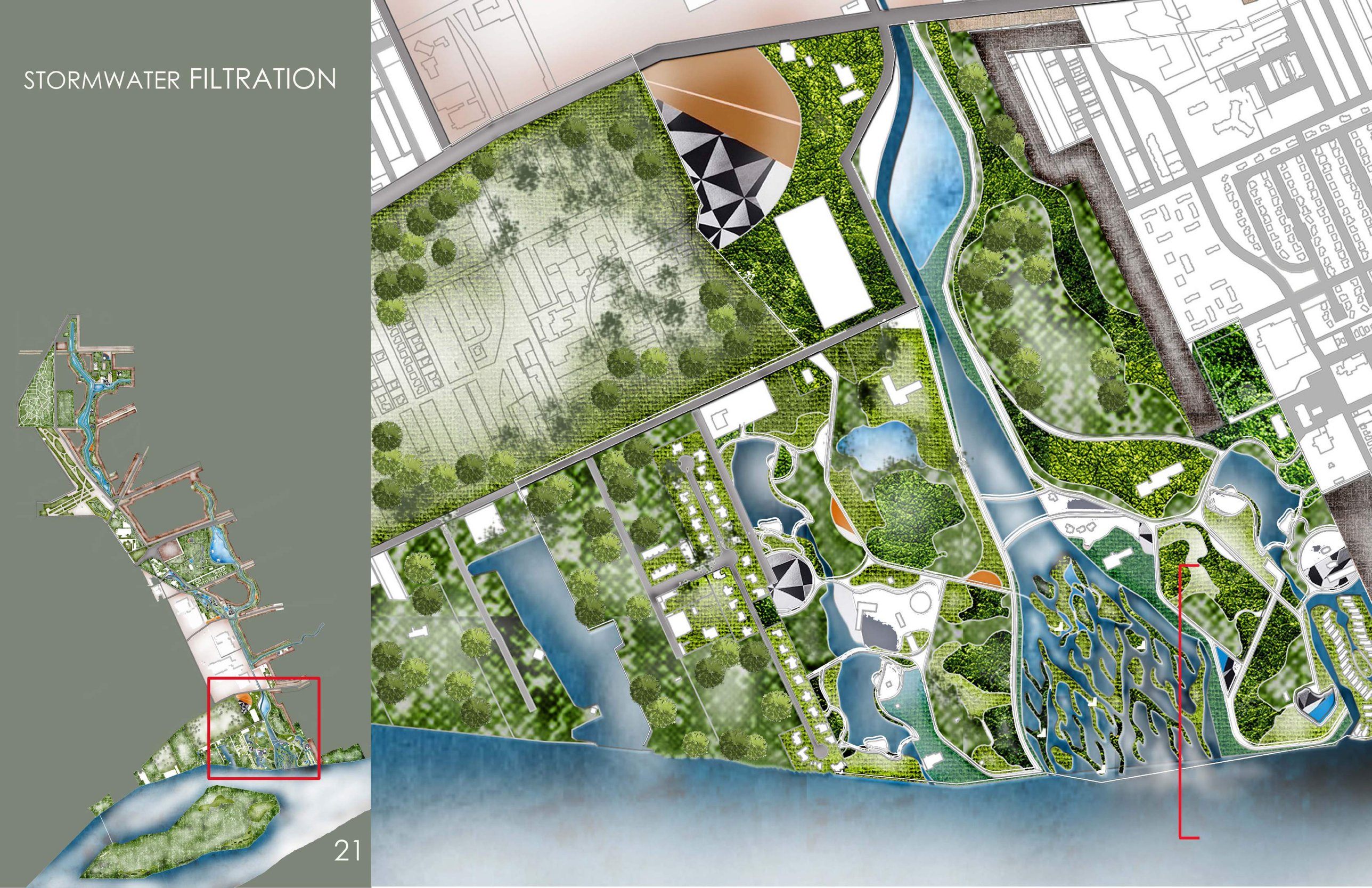



BIKE LANE
WALKWAY
CONNER CREEK
WALKWAY
BIKE LANE

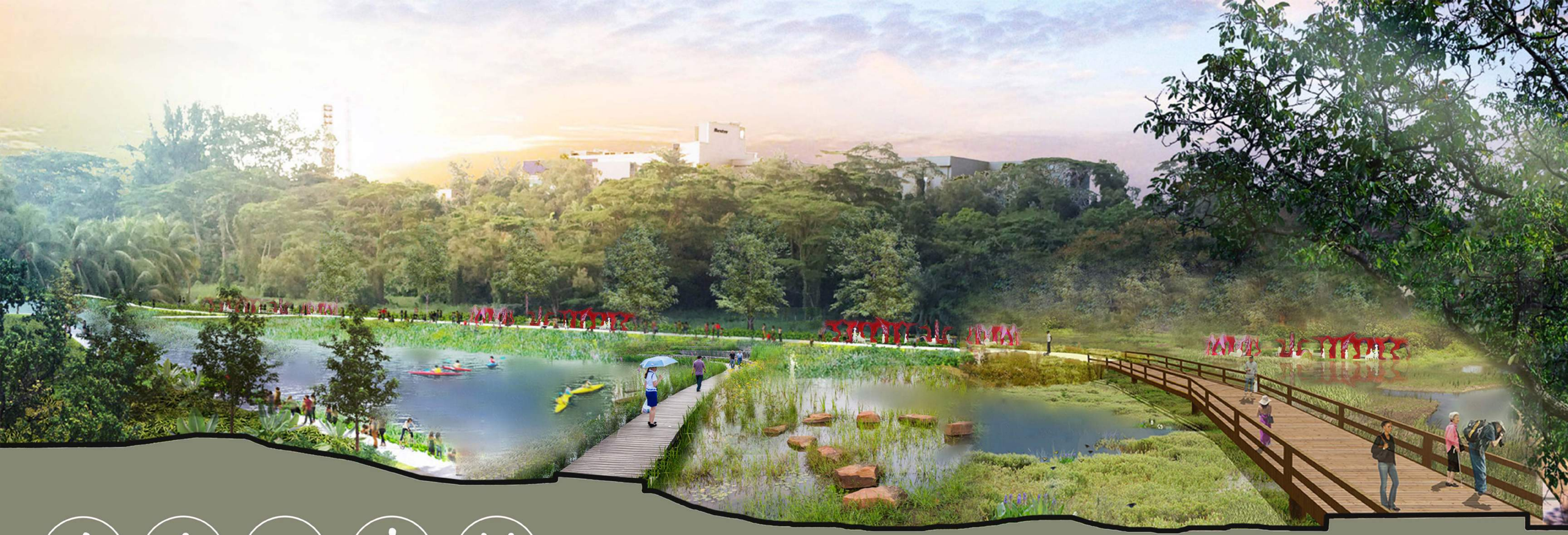
WETLAND AND URBAN INTEGRATION


CHANDLER PARK
CONNER CREEK
NEIGHBORHOOD STREET

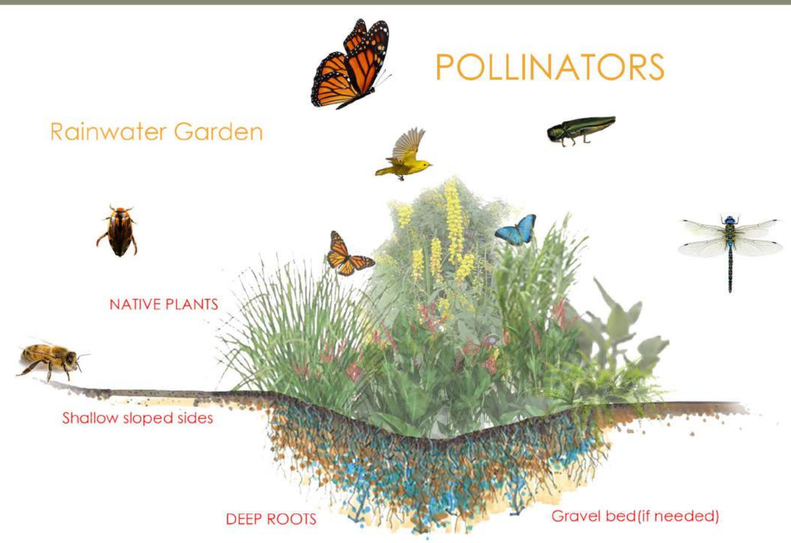
STORMWATER FILTRATION



WETLAND VEGETATION
COMMON REEDS
REED SWAMP
SHURBS AND GROUNDCOVER
WATER TOLERANT SPECES
COMMON REEDS
SUBMERGED PLANTS
WETLAND VEGETATION
FLOODPLAIN GRASS
FREE FLOATING SPECIES
COMMON REEDS
INLET POND
WETLAND REEDS
BUFFER STRIP
SEDIMENT BASIN
BIOSWALE
RETENTION
OUTLET POND
DETROIT RIVER



STORMWATER PARK



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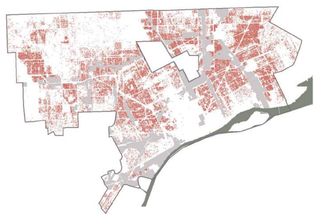
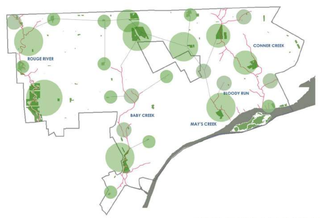
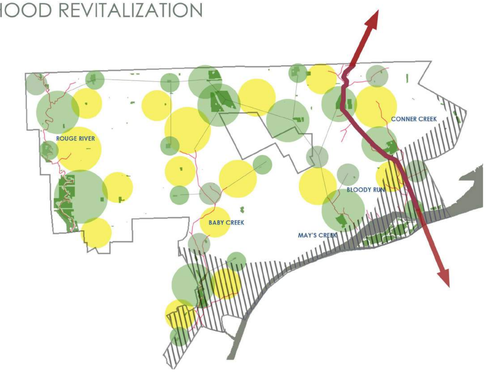
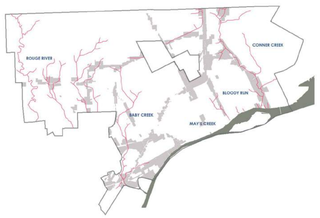


RESIDENTIAL VACANT

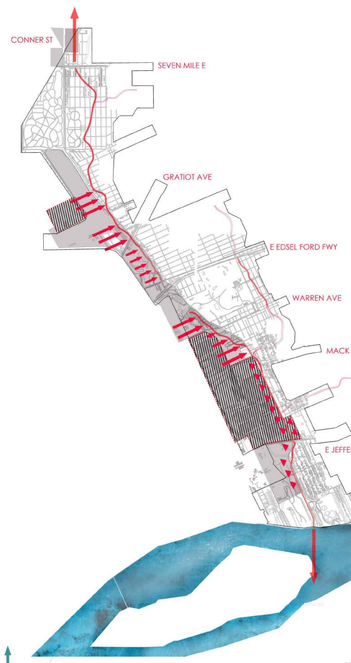


NEW GREEN NETWORK





DAYLIT RIVER AS BUFFER



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= $1,083,600 / month
= $13,003,200/ year

Green credit/year = 80% of $13,003,200
= $10,402,560
=**$10.4 M**

Highest precipitation= 3.50"/month in May
= 81,462 gallons/acre
= 10,891 cubic feet/acre

Adjacent impervious surfaces = 980 acres

Total run off per month = 980 x 81,462 =79,832,760 gallons
=10,672,087 cubic feet
=120 Olympic size pools

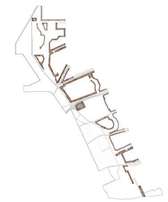
10,672,087 cubic feet/ 35,000' (length of creek)
/ 10' (approx. depth) = 30.5' width

RIVER & CREEK

VEGETATION

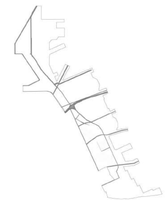
GREEN FOREST

CONSTRUCTED WETLAND



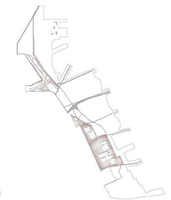
DENSIFICATION

WALKWAYS & PLAZA

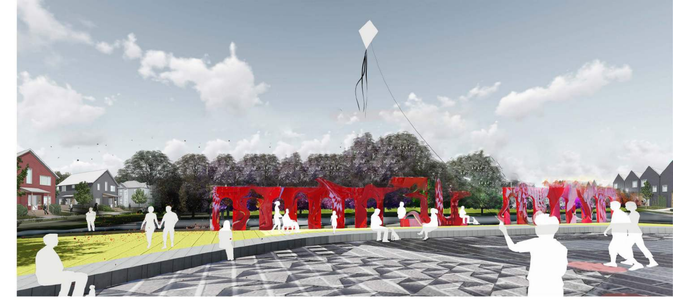


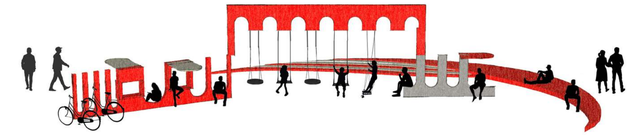
ROAD NETWORK

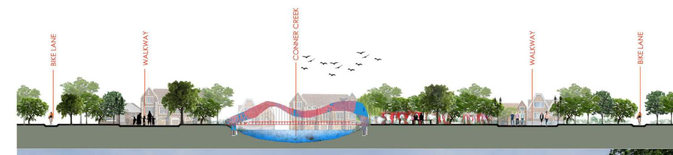
COMMERCIAL PLOTS

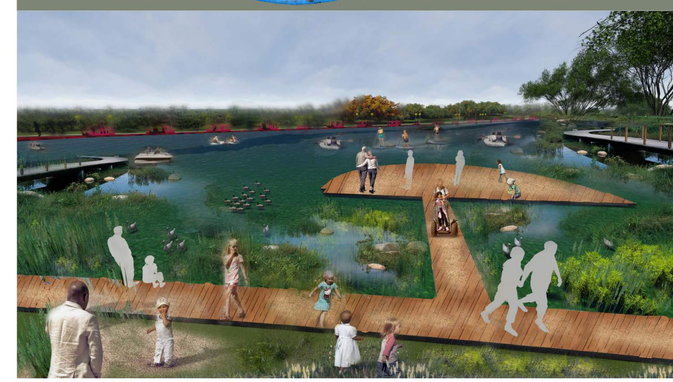


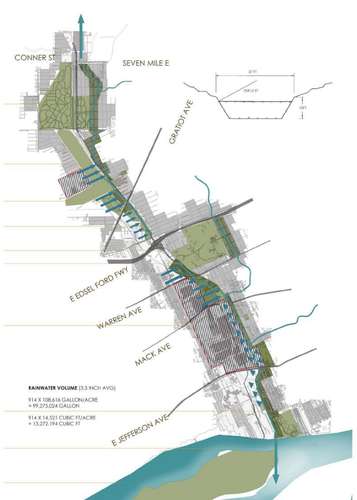
IMPERVIOUS AREA

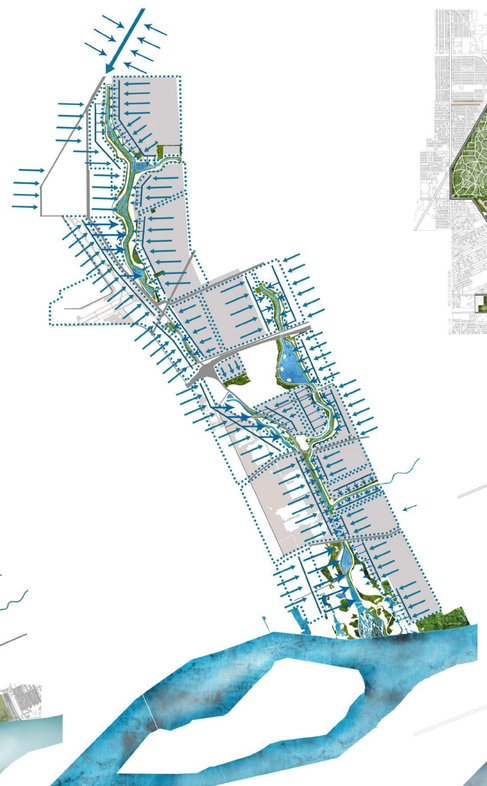


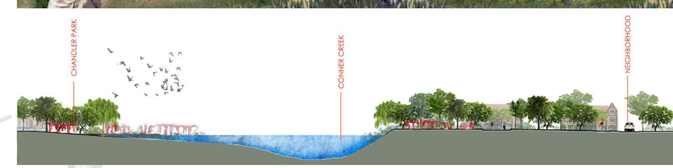












STORMWATER PARK