

# NUECES RIVER RECREATION AND ECOLOGICAL RESTORATION PROJECT

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**Sponsored in Partnership by:**

H.E. Butt Foundation

Keep It Real-ly Beautiful

Real County Visionaries



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# 1

## PART ONE BACKGROUND

### 1.1 Contextual Analysis

# CONTEXTUAL ANALYSIS



**LOCATION:** Camp Wood, Real County, TX, U.S.

**SIZE:** 4.9 acres

## POPULATION & DENSITY

Camp Wood is a town located in Real County, Texas, with a 2020 population of 748. Camp Wood is currently growing at a rate of 0.81% annually. And Camp Wood has a population density of 1,485 people per square mile.

## DISTANCE & PROXIMITY

The distance between the town and our site is about a 15-minute walk, not the distance people are willing to walk before opting to drive.

The main point of interest is the Los Rios Campground, within 10 minutes' walking distance. The campground is currently only open to campers, which presents an opportunity for a public free space close by that offers more recreational options. Besides, within 10 minutes' walking, there are mainly undeveloped areas.

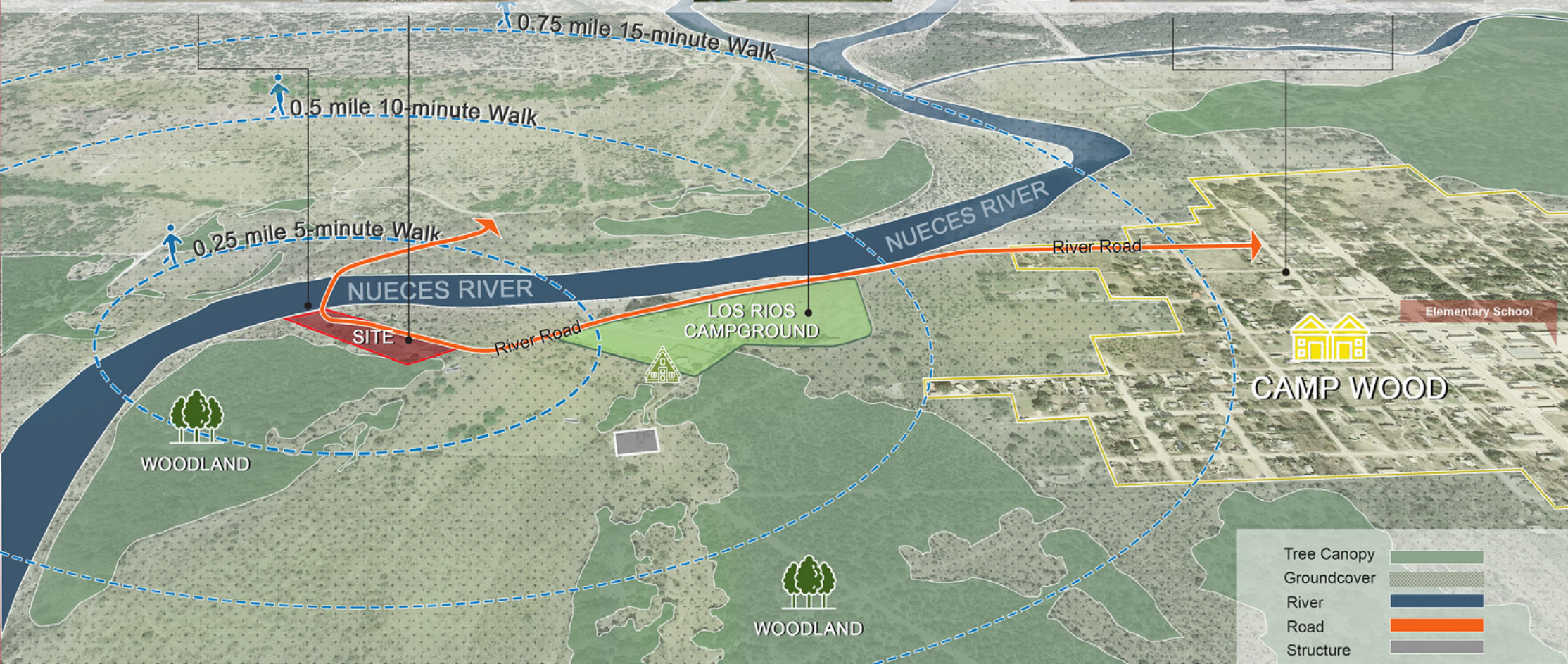
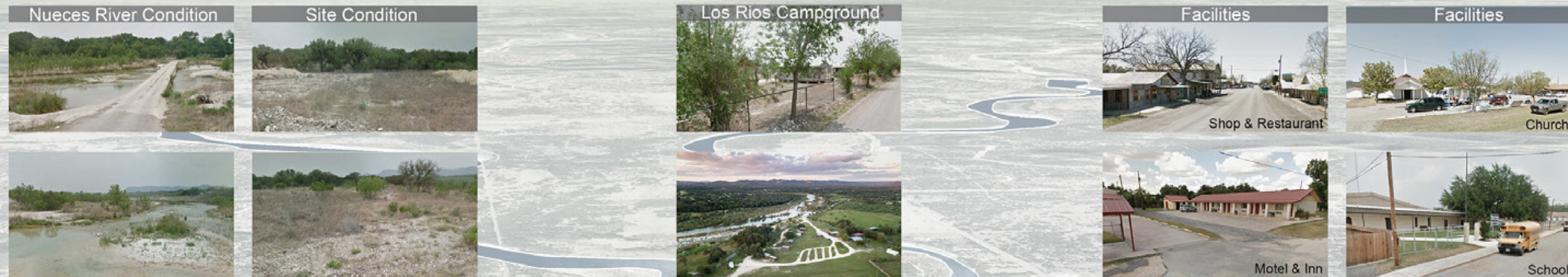
Our site is next to the Nueces River, and we can take advantage of the riverfront location. However, natural erosion and human disturbance have had negative impacts on the riparian ecosystem.

## LAND USE & AMENITIES

The town is relatively well-developed with residential, commercial, and educational land use. However, this is a need to provide more parks and open space. The riverfront park project will serve residents in the town well, by supporting social interaction, recreation, and education.

## ACCESS

River Road crosses the river and connects the communities in the west with Camp Wood. Also, it is the only road that provides vehicular access to the site. Better signage and parking facility are needed for better access.



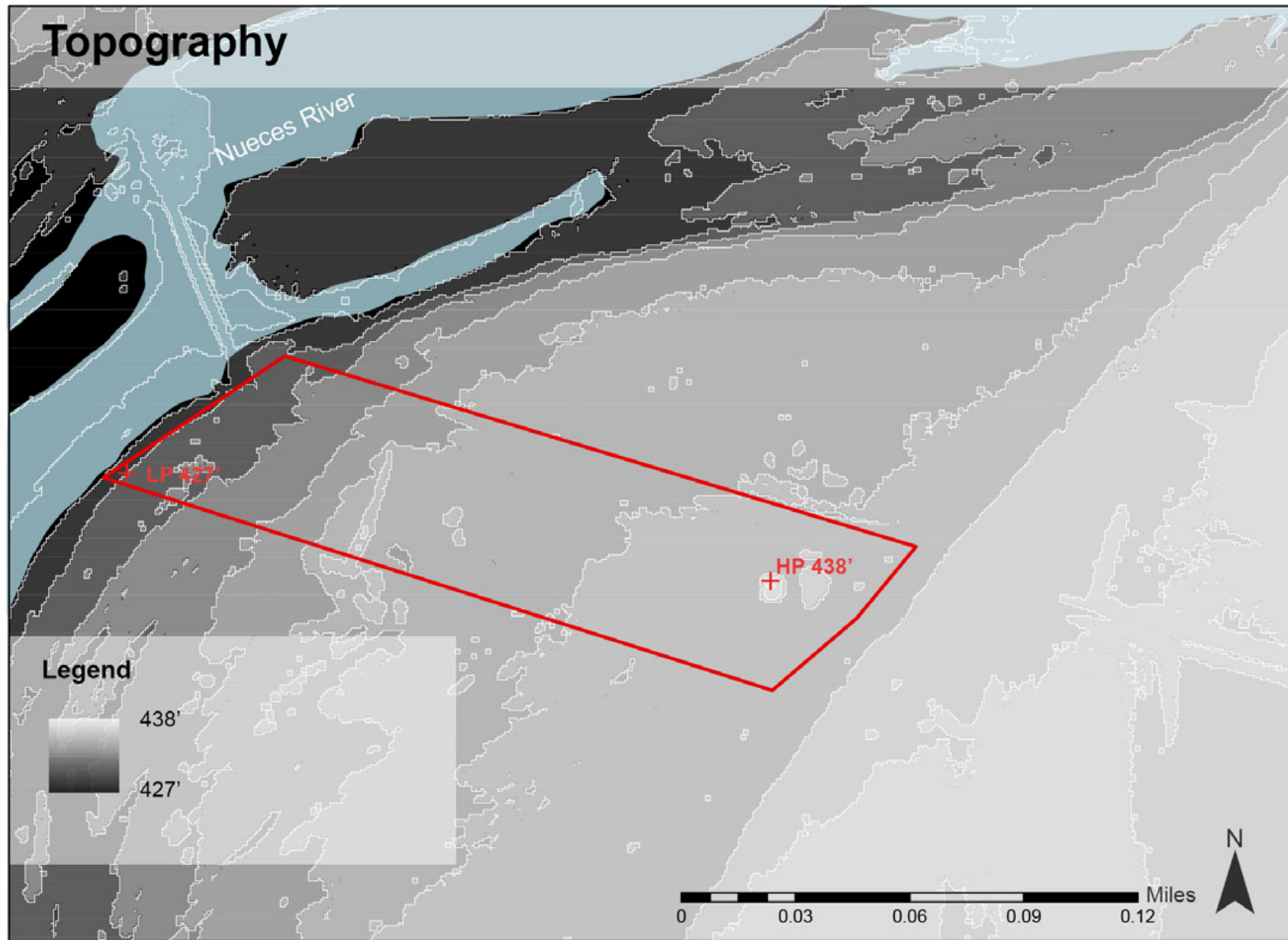
# 2

## PART TWO

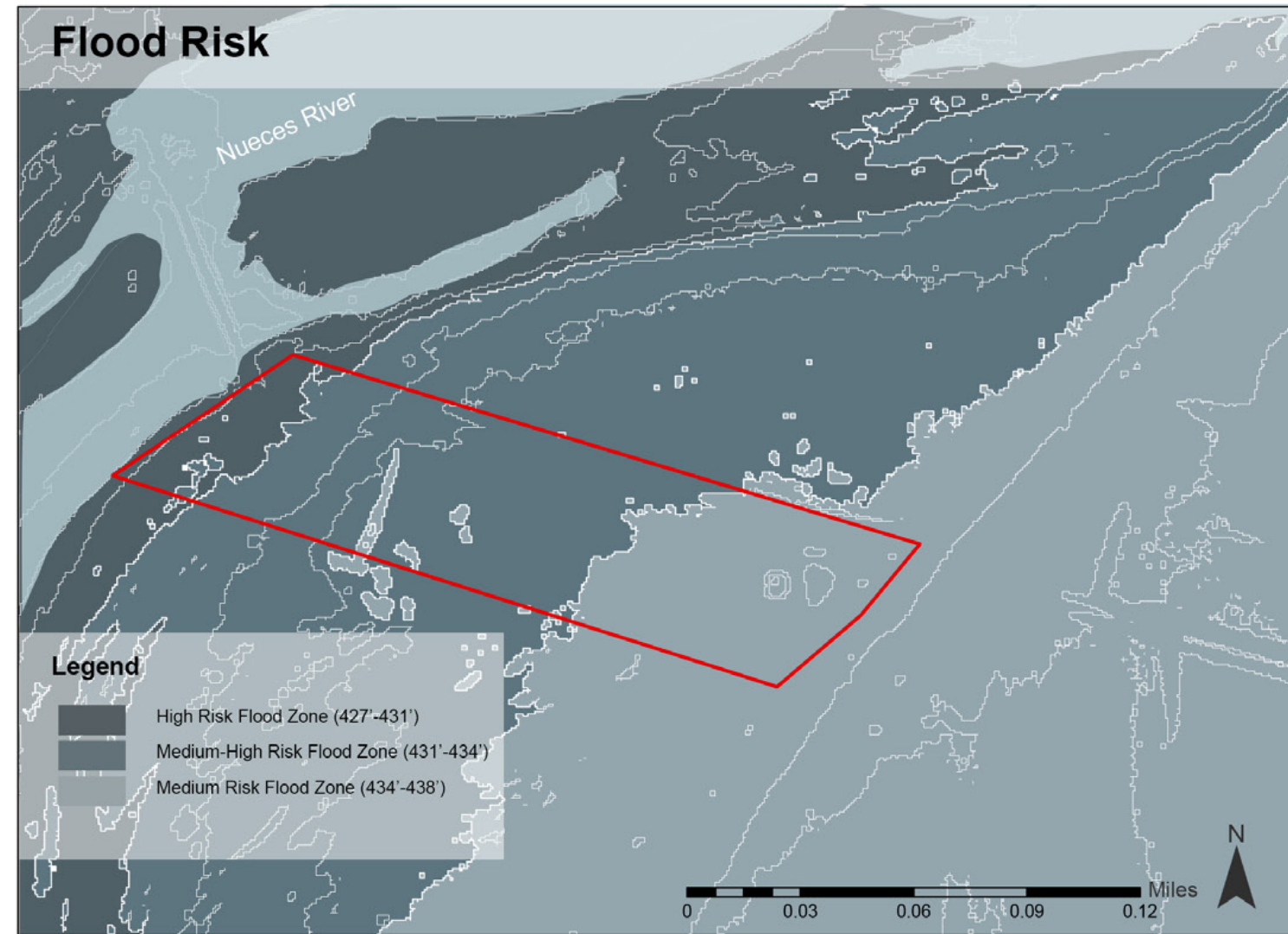
### SITE ANALYSIS

- 2.1 Topography & Flood Risk
- 2.2 Slope & Drainage
- 2.3 Land Cover & Accessibility
- 2.4 SWOT Analysis

# SITE ANALYSIS

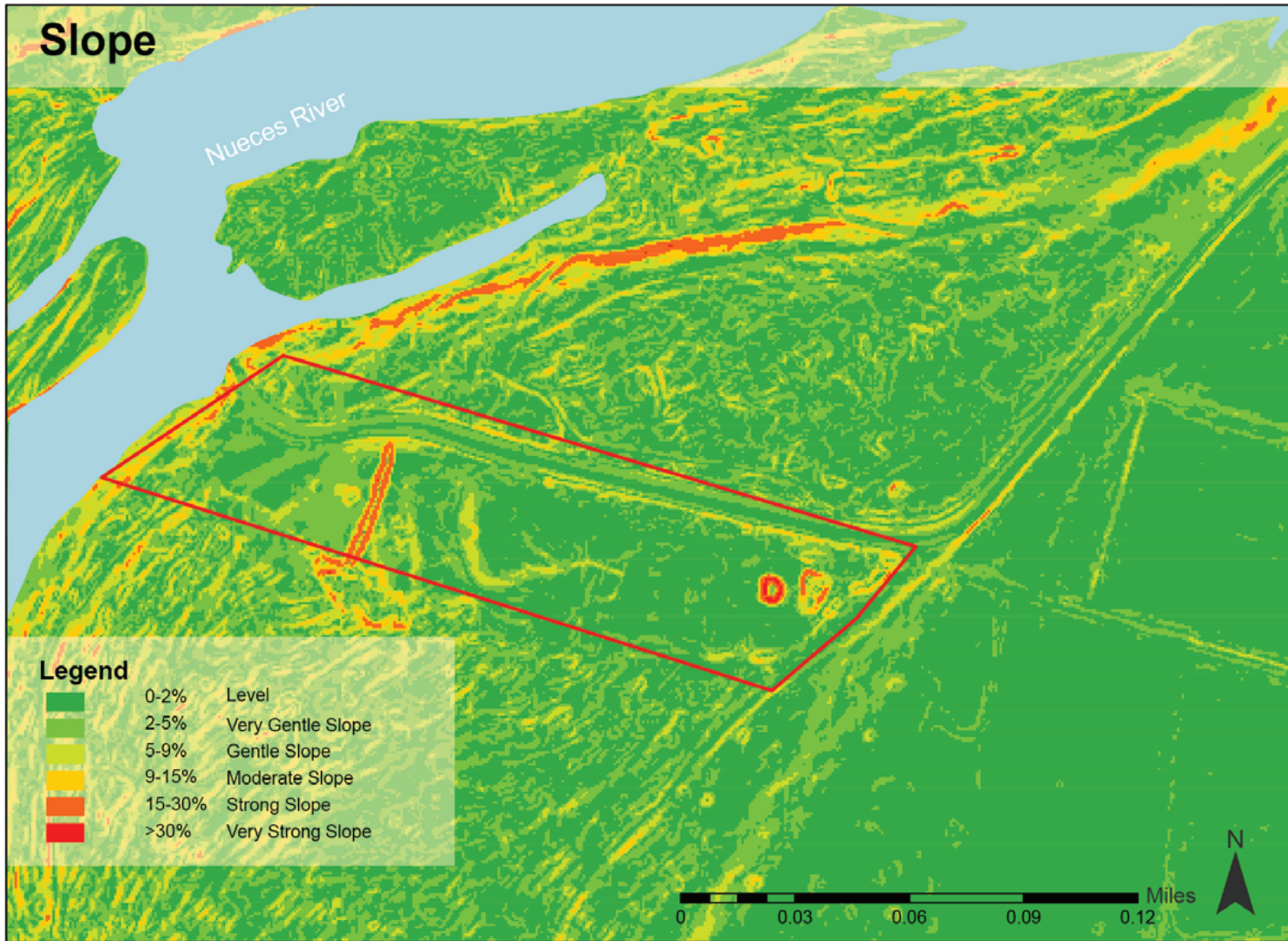


The elevation change of the site is 12 feet. The high point is 438', and the low point is 427', adjacent to the river.

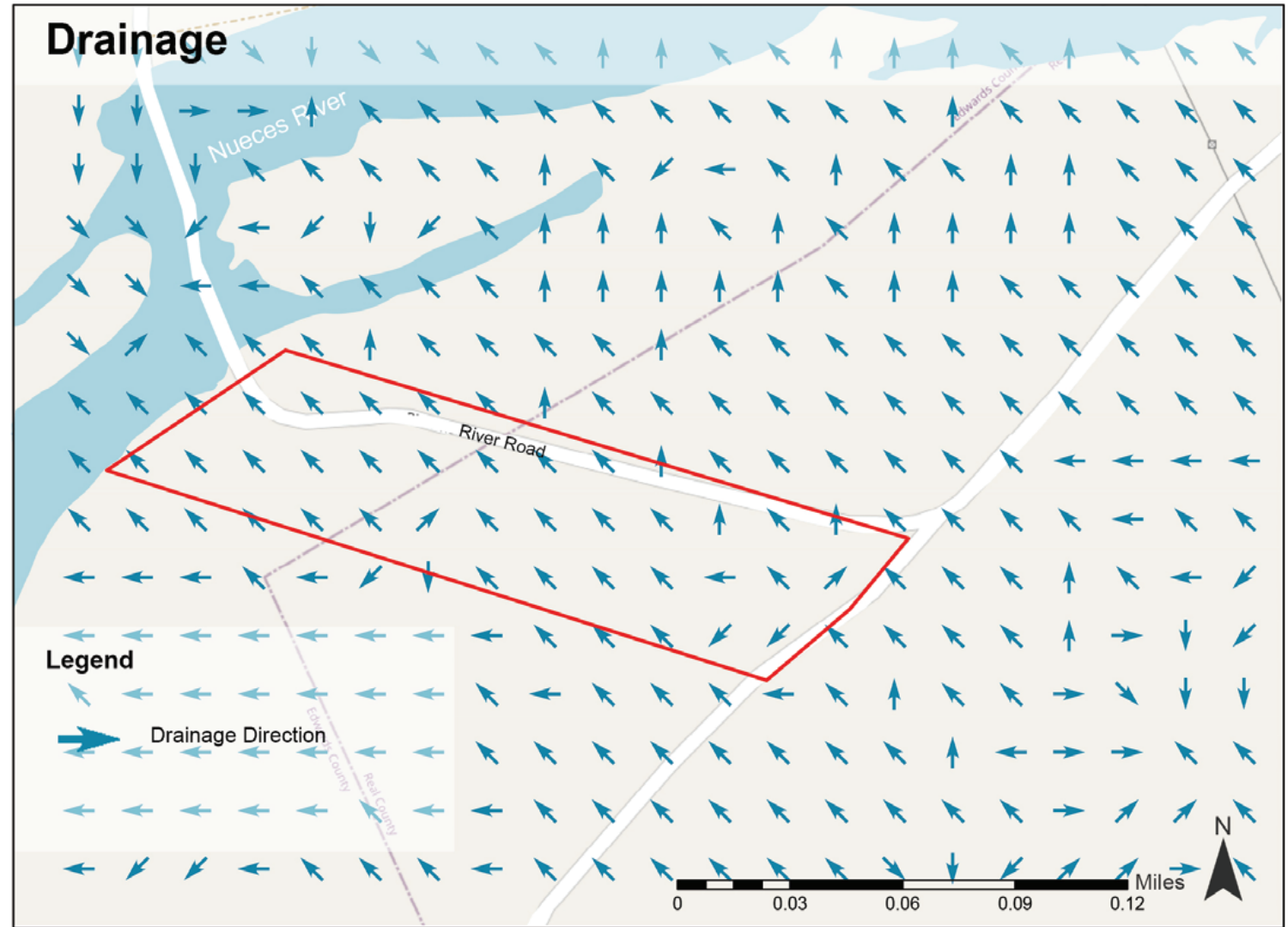


Due to the proximity to the river, the entire site is subject to flooding. The relative flood risk is lower on the east side of the site than on the west side. Construction on the site needs to consider the flood risk.

# SITE ANALYSIS

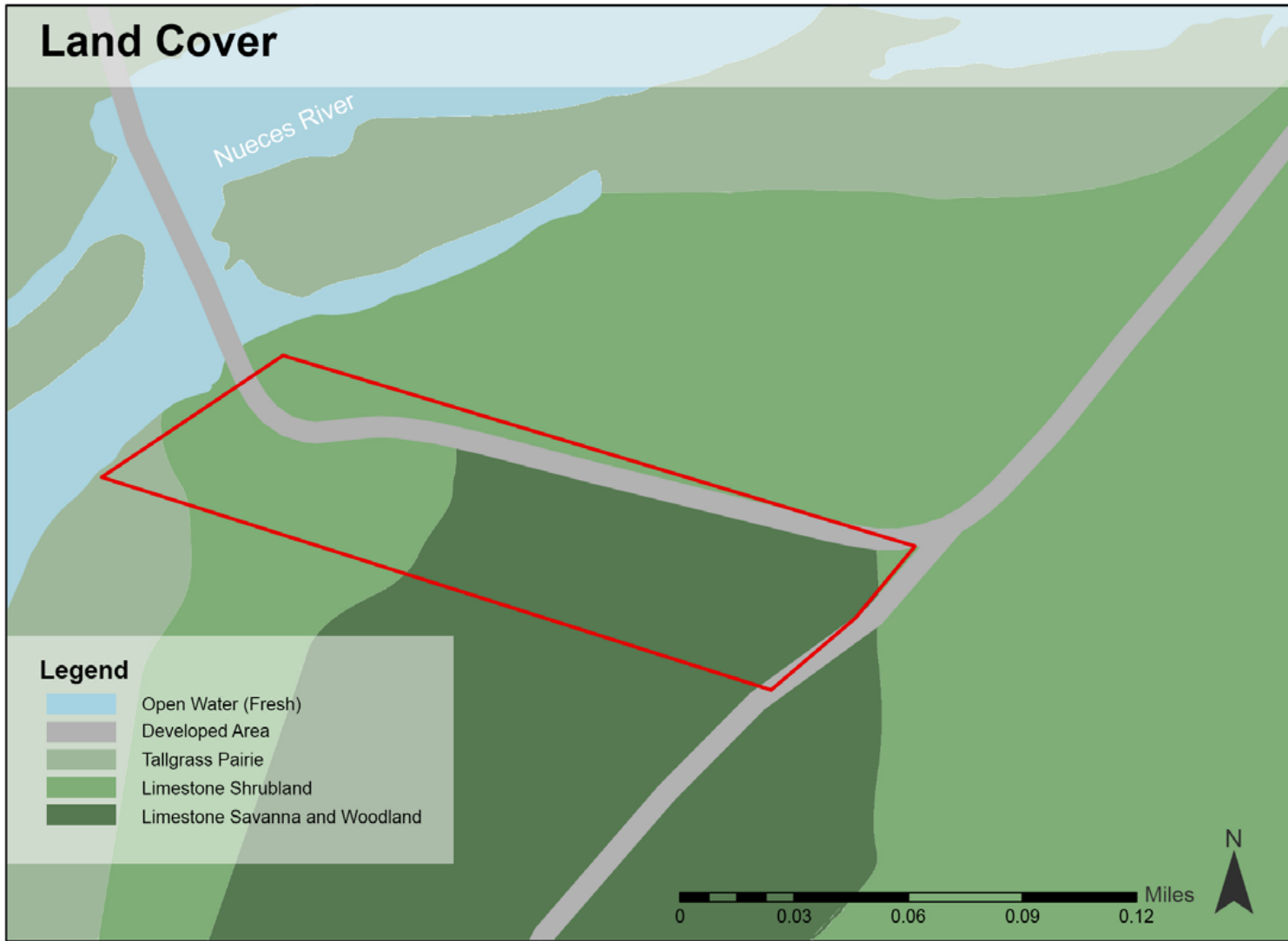


Most areas of the site are less than 15%, and the slope is very gentle. Within such a slope range, it is suitable for construction on the site. As for the area with a steeper slope, it is related to current waste dumping practices.

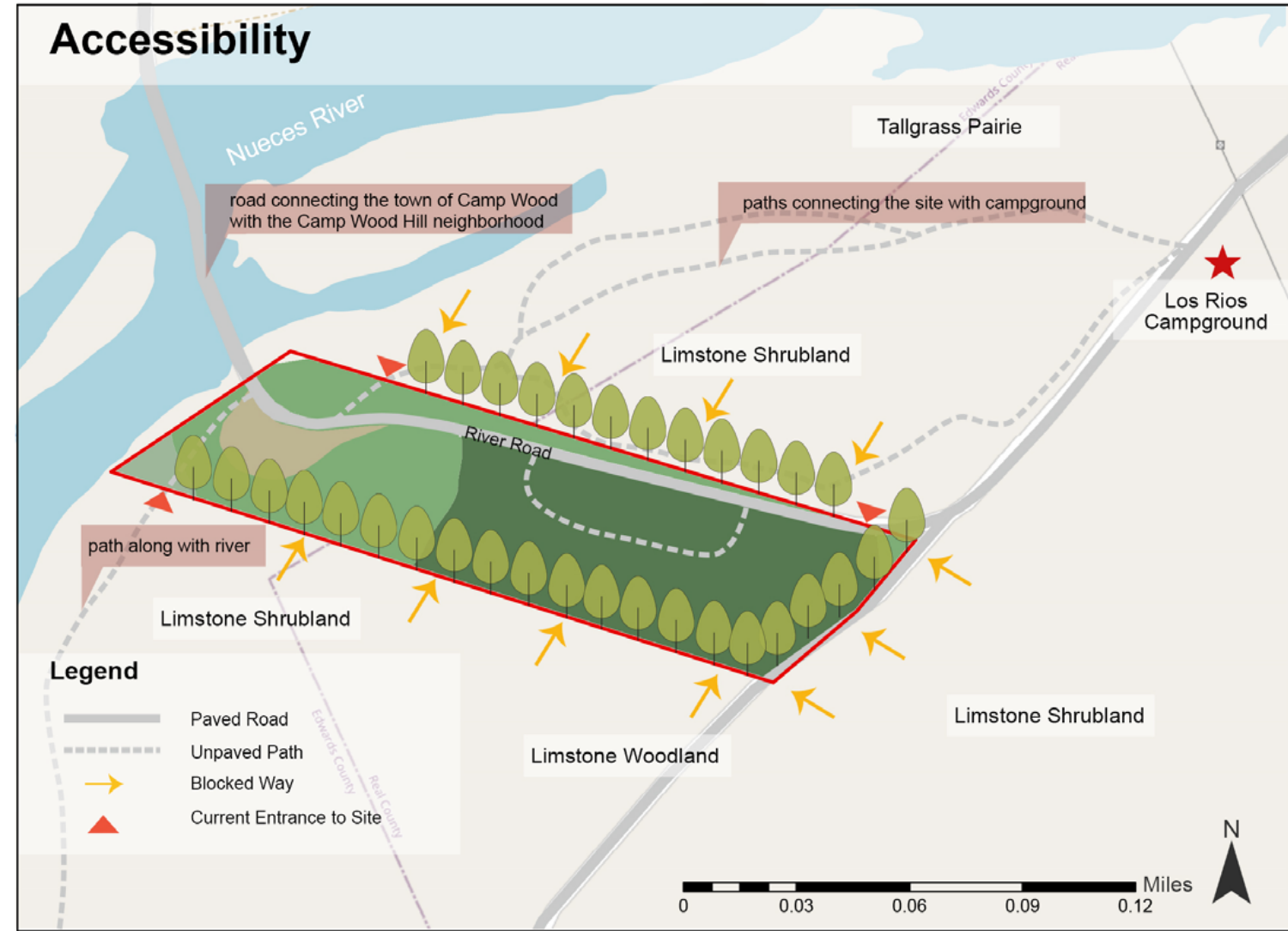


The elevation change of the site is 12 feet. The highland is on the east side; the lowland is west and adjacent to the river. The current runoff direction is toward the river.

# SITE ANALYSIS



Based on the dataset of 2011 from USGS, historically, the east part of the site is woodland, and the west part of the site is shrubland. The River Road is the only area of the site that has been developed.



Several unpaved roads serve pedestrians. However, there is no existing trail that connects the riverfront areas, and pedestrian access is limited.



# SWOT ANALYSIS

- Proximity to the Nueces River and Los Rios Campground
- Convenient location between the town of Camp Wood and Camp Wood Hill neighborhood
- Gentle Slope



S

STRENGTHS

- No sufficient parking area
- No supporting facilities
- Waste dumps and environmental pollution
- Riparian habitat destruction



W

WEAKNESSES


- Community engagement
- Reusing, recycling, and repurposing waste



O

OPPORTUNITIES

- Flooding issues



T

THREATS

# 3

## PART THREE

### MASTER PLAN GENERATION

3.1 Design Objective

3.2 Design Toolkit

3.3 Waste Management Strategy

3.4 Spatial Organization &  
Zoning & Programming

3.5 Master Plan

3.6 Alternative Master Plan

# DESIGN OBJECTIVE

This project aims to restore the Nueces River's riparian habitats, provide recreational access to the river away from the bridge, and develop the land to divert parking off River Road. These improvements will secure a safer, greener, and cleaner environment for the community.

## RESTORATION

Restore the riparian habitats of the Nueces River and embrace sustainable development along the river.

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01

## RECREATION

Enhance the recreation experience by providing passive and active spaces and convenient access to the river away from the bridge.

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02

## EDUCATION

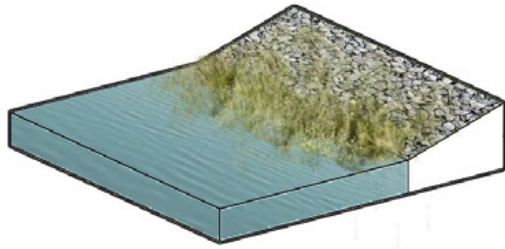
Offer educational and learning opportunities for children, especially related to riparian ecosystems and waste management.

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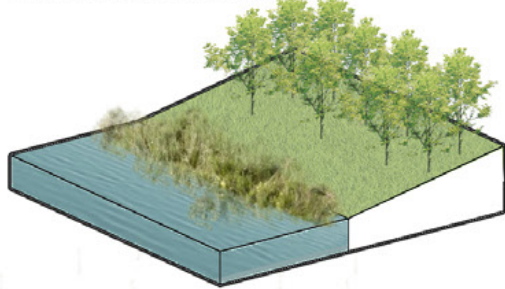
03

# DESIGN TOOLKIT

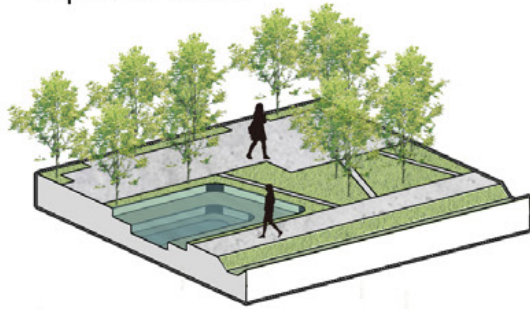
## [ RESTORATION ]



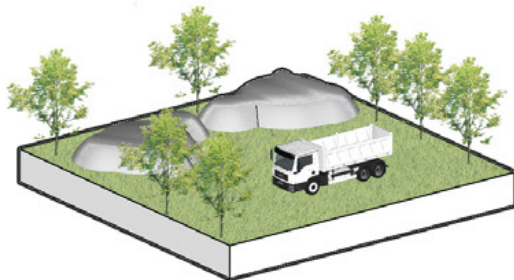
Riverbank Stabilization



Riparian Buffer

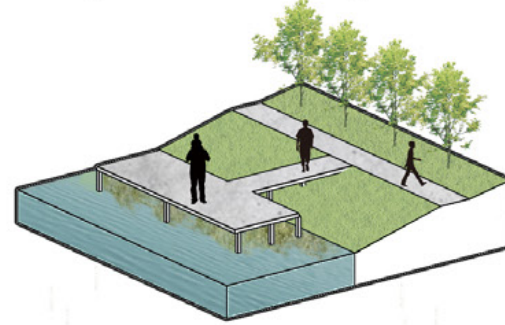


Bioretention / Rain Garden



Waste Management

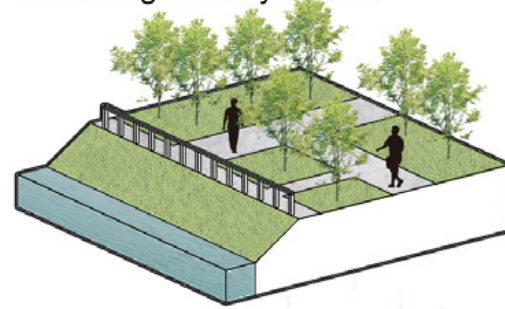
## [ RECREATION ]



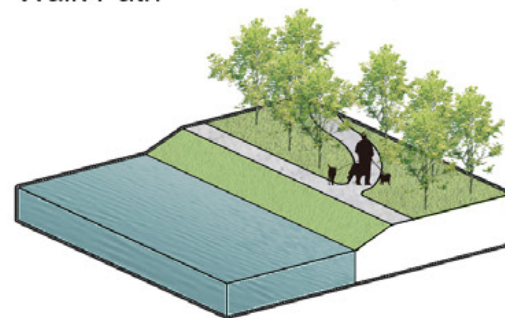
Dock & Boardwalk



Gathering/ Activity Space

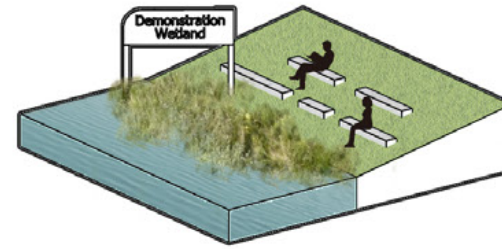


Walk Path

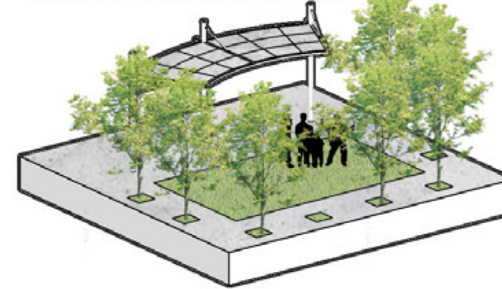


Nature Trail

## [ EDUCATION ]



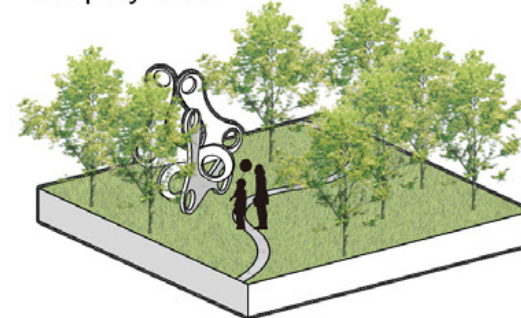
Demonstration Wetland



Outdoor Classroom

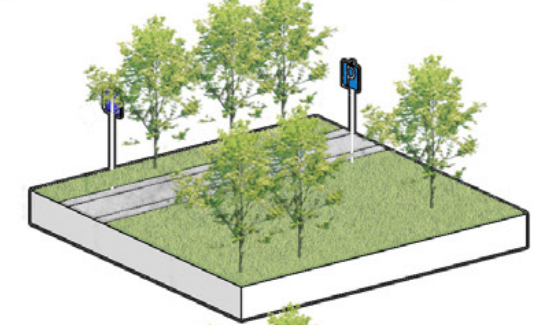


Display Wall

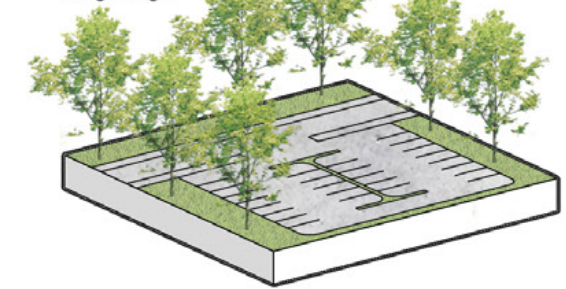


Art Space

## [ SUPPORTING FACILITY ]



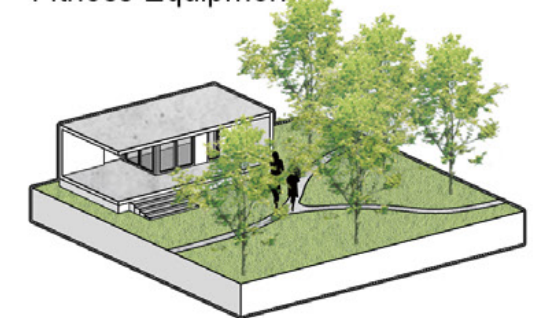
Signage



Green Parking Lot



Fitness Equipment



Portable Restroom

# WASTE MANAGEMENT STRATEGY

## Restrict

No Dumping Here



Restrict and discourage waste dumping on the site by using educational signs and boards.

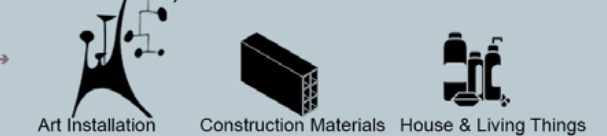
## Recycle & Reuse

Reusing waste in its current form; Processing waste to valuable products

The garbage is sorted into various streams (sections for glass, plastics, metals, paper, and organic waste).



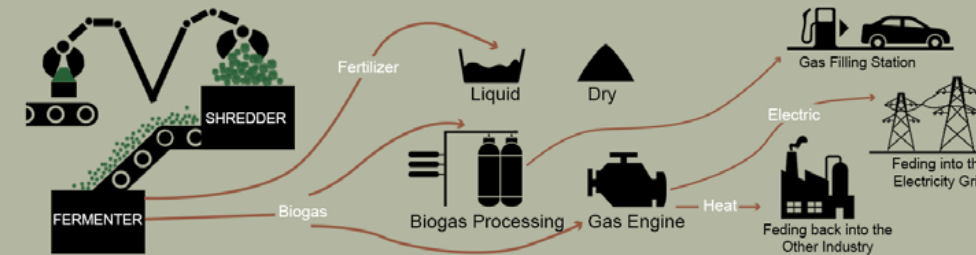
The crushed glass, plastics, and metals were sent to manufacturers as raw materials to produce products (like art installation).



## Recovery

Recovering energy from waste

The organic waste is shredded and put into a fermenter, where the bacteria break down the trash into methane gas, liquid, and soil fertilizer.

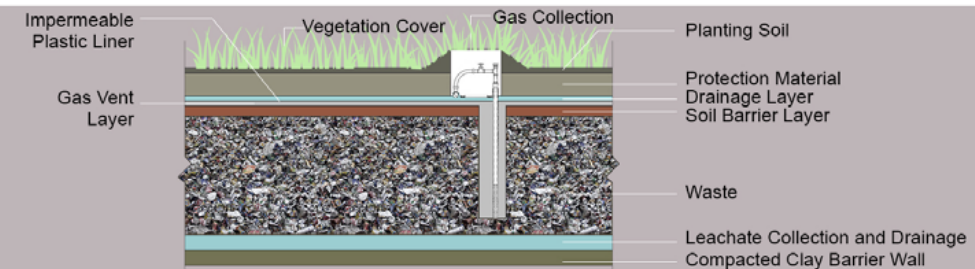


The biogas is burnt using the gas engine to produce electricity or purified to create fuel gas for vehicles. The slurry is processed and treated to create solid and liquid fertilizer.

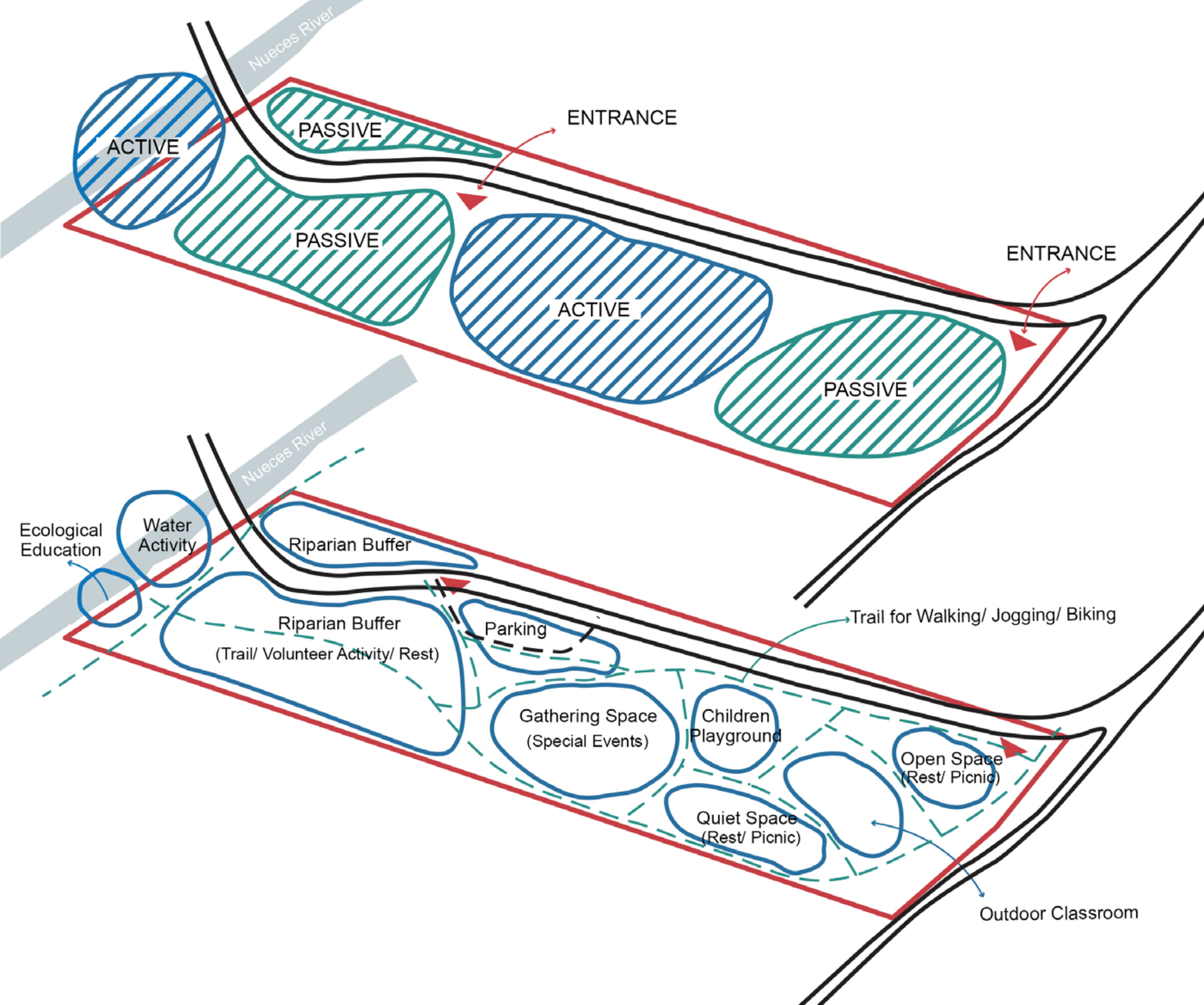
## Disposal and Revegetation

Caping the landfill with soil and vegetation

Soil capping process will take place as the first remedial action. And Capping design and construction are comprised of engineering and restoration layers.



# SPATIAL ORGANIZATION & ZONING & PROGRAMMING



## Spatial Organization

In terms of the site's spatial organization, there are **two different activity spaces** from the riverside area to the inland, the **active recreation space**, and **passive recreation space**, which alternately appear. This variable spatial organization can **improve users' recreation experience** and make recreational activities more varied and plentiful.

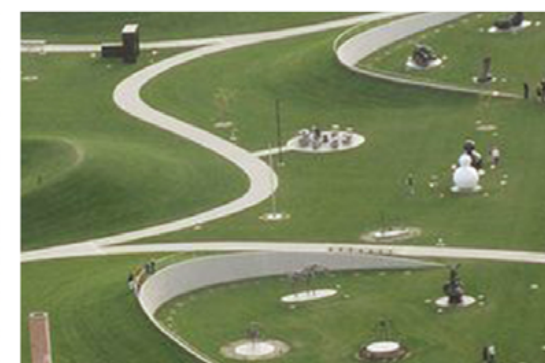
## Zoning & Programming

There will be space designed for **water activity** along the riverside, like fishing, swimming, and boating. Also, there will be space designed for supporting **ecological education**. Next to the riverside, we plan the **riparian buffer** area to protect the river from adjacent land uses. In the central open field, we proposed the **parking lot**, **gathering space**, and **children's playground** for various activities and special events. Adjacent to the central active area, we offered an outdoor classroom supporting **waste management education**. Also, there will be **open space** and **quiet space** used for rest and conservation. Trail system helps to connect each zone and allows people to access different areas.

## Ecological Restoration Education



## Waste Management Education



# MASTER PLAN



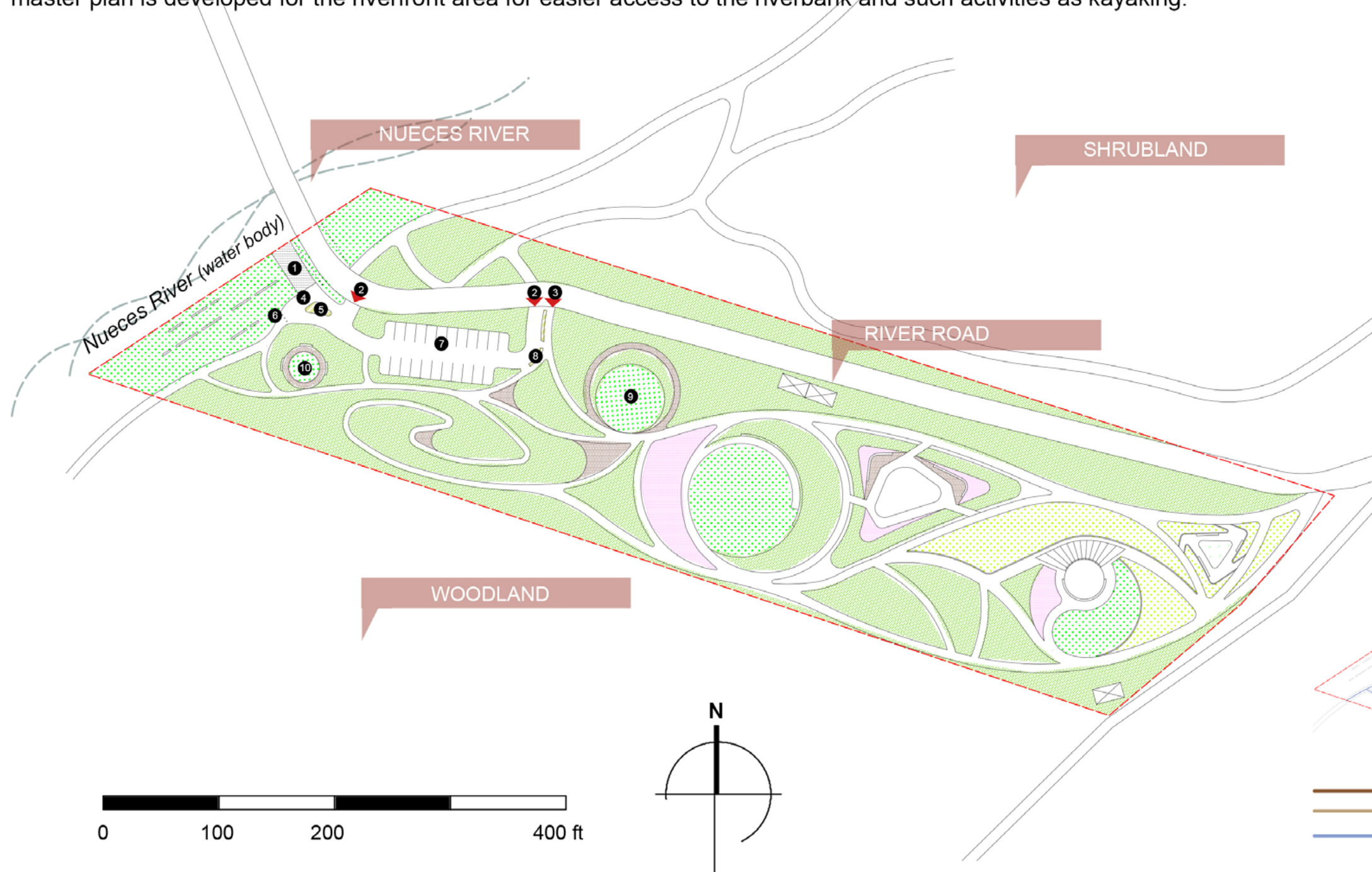
## Nueces River Park

- ① Educational Wetland
- ② Stepping Stone/ Bench
- ③ Security Bollards
- ④ Riparian Buffer/ Mature Forest
- ⑤ Tent-only Campsite & Picnic Area
- ⑥ Art Installation
- ⑦ Parking Lot
- ⑧ Trail
- ⑨ Wooden Deck
- ⑩ Wild Flower Bed
- ⑪ Gathering Space
- ⑫ Stone Bench
- ⑬ Children Playground
- ⑭ Rest Area
- ⑮ Portable Restroom
- ⑯ Vegetated Hillside
- ⑰ Display Wall / Retaining Wall
- ⑱ Pergola
- ⑲ Outdoor Classroom
- ⑳ Rest Area

# ALTERNATIVE MASTER PLAN

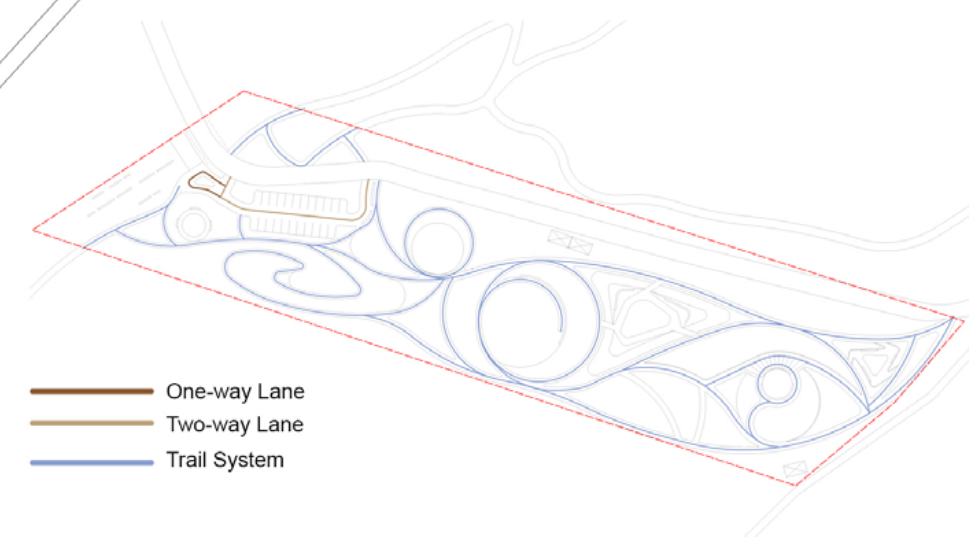
As the primary master plan aims to restrict vehicular access to the riverfront and minimizing the ecological impacts, an alternative master plan is developed for the riverfront area for easier access to the riverbank and such activities as kayaking.

## Nueces River Park



- ① Kayak Launch
- ② Vehicle Entrance/ Exit
- ③ Pedestrian Entrance
- ④ Traffic Island
- ⑤ Loading Zone
- ⑥ Security Bollard
- ⑦ Parking Lot
- ⑧ Median Strip
- ⑨ Tent-Only Campsite
- ⑩ Rest Area

### Circulation System





# 4

## PART FOUR

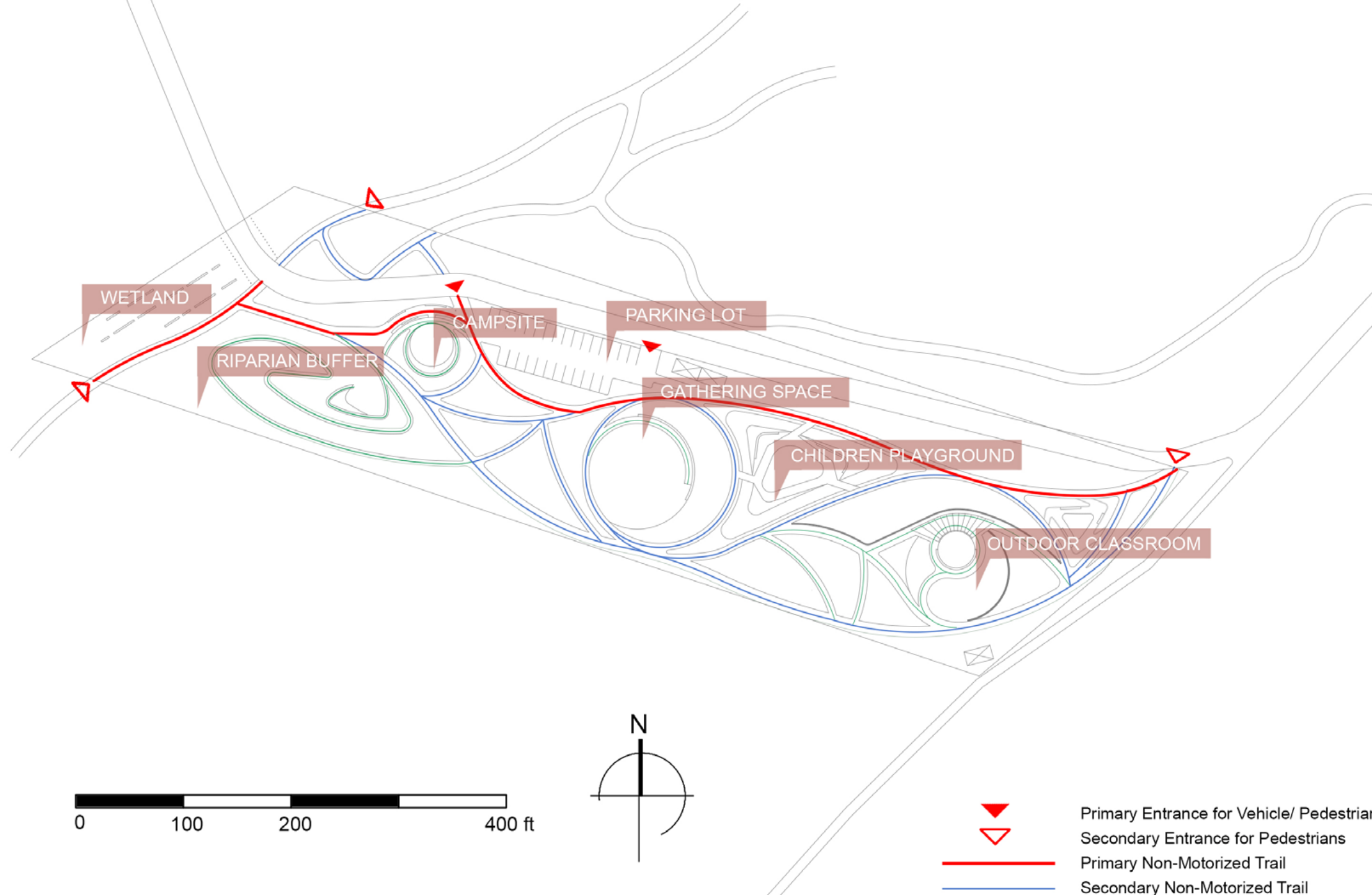
### MASTER PLAN ANALYSIS

4.1 Trail System Analysis

4.2 Zoning & Size

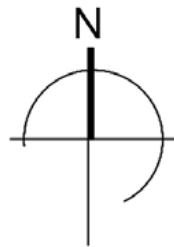
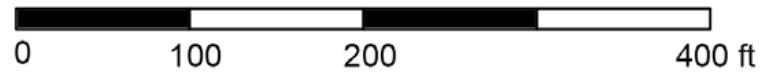
4.3 Water Budget






# TRAIL SYSTEM ANALYSIS



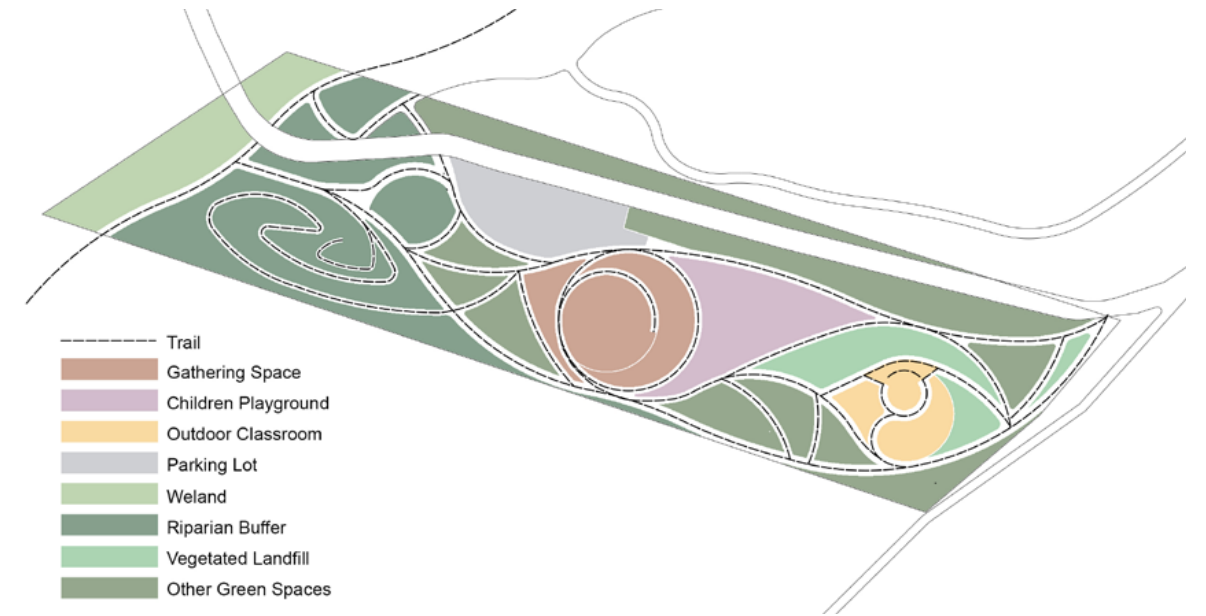
## Non-Motorized Multi-Used Trail:

- Primary Trail--- 10-ft Width
- Secondary Trail--- 8-ft Width
- Tertiary Trail--- 6-ft Width



-  Primary Entrance for Vehicle/ Pedestrians
-  Secondary Entrance for Pedestrians
-  Primary Non-Motorized Trail
-  Secondary Non-Motorized Trail
-  Tertiary Non-Motorized Trail

# ZONING & SIZE



ACTIVITY SPACE						GREEN SPACE				
Trail (Ft)			Gathering Space (Acre)	Children Playground (Acre)	Outdoor Classroom (Acre)	Parking Lot (Acre)	Wetland (Acre)	Riparian Buffer (Acre)	Vegetated Landfill (Acre)	Other Green Space (Acre)
6-ft Width	8-ft Width	10-ft Width								
2030	2550	1147	0.412	0.290	0.165	0.247	0.541	0.802	0.236	1.45
15.4%			8.4%	5.9%	3.4%	5.1%	11.0%	16.4%	4.8%	29.6%
38.3%						61.7%				
1.87 Acres						3.03 Acres				

# WATER BUDGET

The balance between the volume of water required for landscape irrigation and the local rainfall shows that adopting storm-water harvesting measures could help us deal with the irrigation requirements for January, February, May, June, September, October, November, and December. However, in March, April, July, and August, we need to pump water from the Nueces River to supplement irrigation.

<b>CATEGORY</b> \ <b>MONTH</b>	January	February	March	April	May	June	July	August	September	October	November	December
<b>The Volume of Landscapes Water Requirement</b> (Gal.)	134416	174021	265232	328240	388247	418251	438653	419451	338441	266432	171021	141617
<b>The Volume of Rainfall Directly on Irrigated Landscapes</b> (Gal.)	84795	112545	118712	185006	242820	282134	161109	236653	221236	266717	136442	106379
<b>The Volume of Storm-water Runoff</b> (Gal.)	56181	74568	78653	122576	160882	186930	107744	156796	146842	176715	90401	70482
<b>Balance</b> (Gal.)	6560	13092	-67867	-20658	15455	50813	-170800	-26002	29637	177000	55822	35244



Total Monthly Landscapes Demand (gal.)



Estimated Monthly Supply to Landscapes (gal.)



Balance = Estimated Monthly Supply to Irrigated Landscapes (gal.) – Total Monthly Irrigated Landscapes Demand (gal.)

*[POSITIVE VALUE: Rainfall directly on irrigated landscapes and water collected from storm water runoff can demand the total monthly irrigation of landscapes.]*

*[NEGATIVE VALUE: How much volume of water the irrigated landscapes require for healthy growth monthly]*

# 5

## PART FIVE

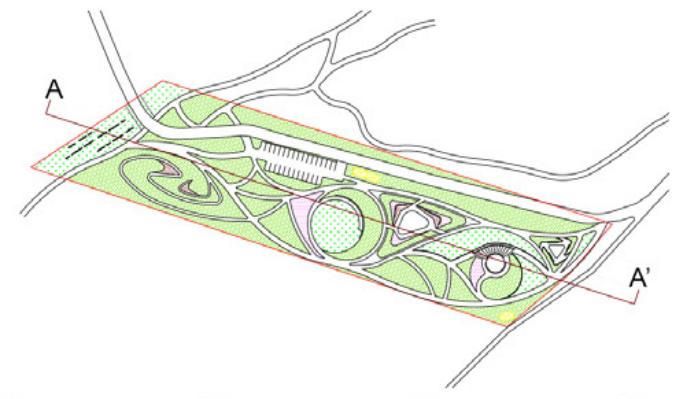
### SECTION ANALYSIS

5.1 Nueces River Park

5.2 Riparian Buffer

5.3 Landfill Cap & Revegetation

# SECTION ANALYSIS



Stepping Stones  
Demonstration Wetland



Natural Trail



Wooden Deck



Picnic Table  
Campsite



Art Installation



Wild Flowers



Stone Bench  
Multi-used Lawn



Playground Equipment



Vegetated Hillside



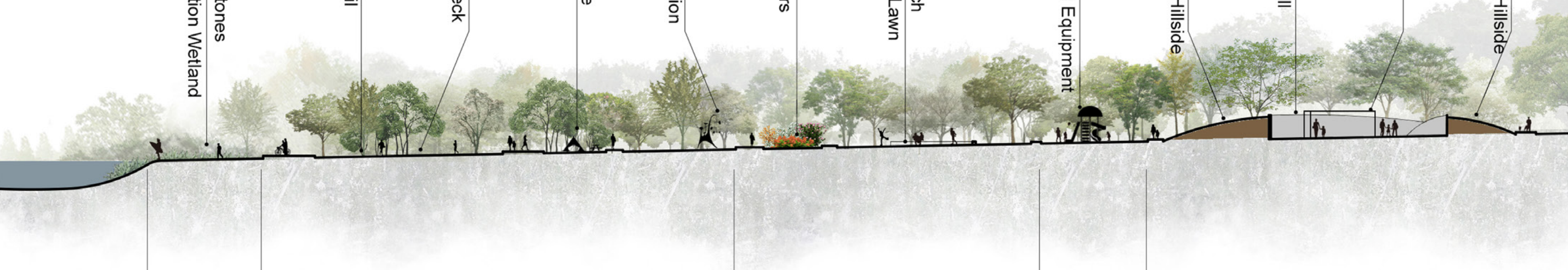
Display Wall



Pergola



Vegetated Hillside



Nueces River

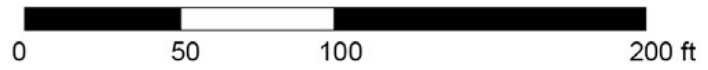
Riverbank/  
Wetland

Riparian Buffer

Gathering Space

Children  
Playground

Outdoor Classroom



Section A - A'

# RIPARIAN RESTORATION



Nueces River

Riverbank/ Wetland

Riparian Buffer

## Early-Stage Colonizers



## Late-Stage Colonizers



## Herbaceous Stabilizers



## Woody Stabilizers

(<http://www.nueces-ra.org/YRR/pdfs/yrr2.pdf>)



## Riparian Restoration

### • Riverbank Stabilization

#### Vegetated Riprap

It involves tamping live cuttings of rootable plant material into the soil between the joints or open spaces in rocks placed on a slope. Therefore, riverbank could be reinforced by the root system, minimizing erosion risks.

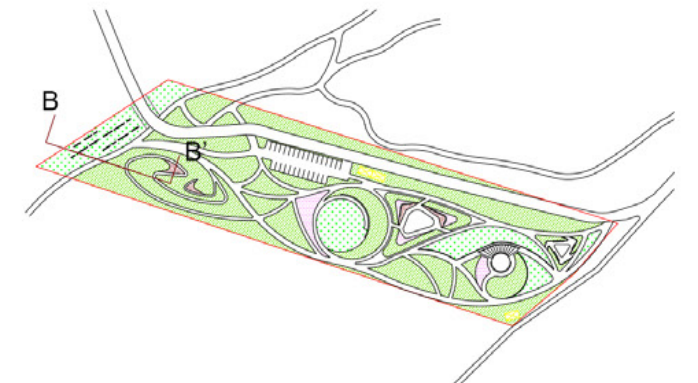
### • Buffer System

#### The Riverside Buffer Zone

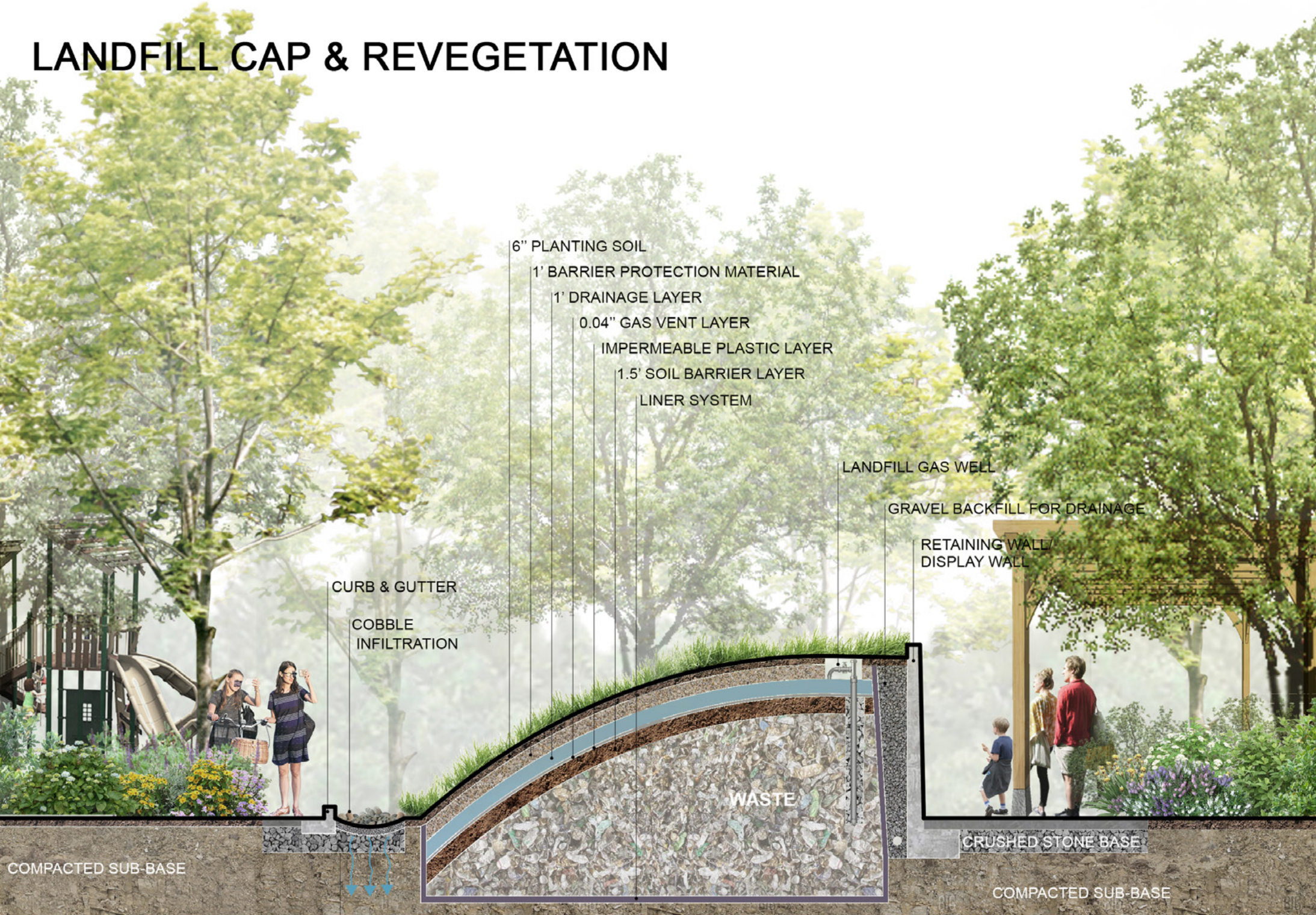
It is ideally wetland, protecting the physical and ecological integrity of the stream ecosystem.

#### The Middle Buffer Zone

The mature forest serves for stormwater management, access, and recreational uses, extending from the streamside zone, protecting wetlands, and providing distance between the stream and upland development.



# LANDFILL CAP & REVEGETATION



## Waste Management (Landfill Cap)

The landfill cap contains the following layers:

### Linner System

Naturally occurring clay-like soil at the very bottom of the waste layer helps prevent leachate and waste vertical migration.

### Soil Barrier Layer

This layer covers the garbage and ensures the hills are stable.

### Gas Venting Layer

The gas venting layer is a thick geotextile made to promote gas collection and absorption in soil.

### Impermeable Plastic Liner

This layer is a different type of geotextile made from a thin, durable plastic material. Neither water nor gas can move through this layer.

### Drainage Layer

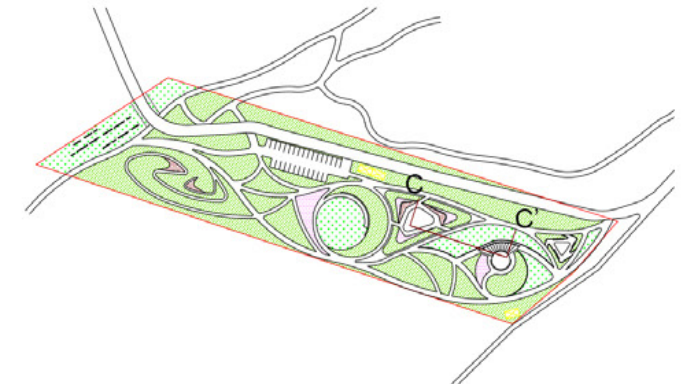
The drainage layer prevents water from traveling downward through the top layers of the landfill cap.

### Barrier Protection Material

This soil protects the geotextiles underneath.

### Planting Soil

It provides growth opportunities for native plants, whose roots help stabilize the mounds and absorb water.



Children Playground

Outdoor Classroom for Waste Management Education



# 6

## PART SIX

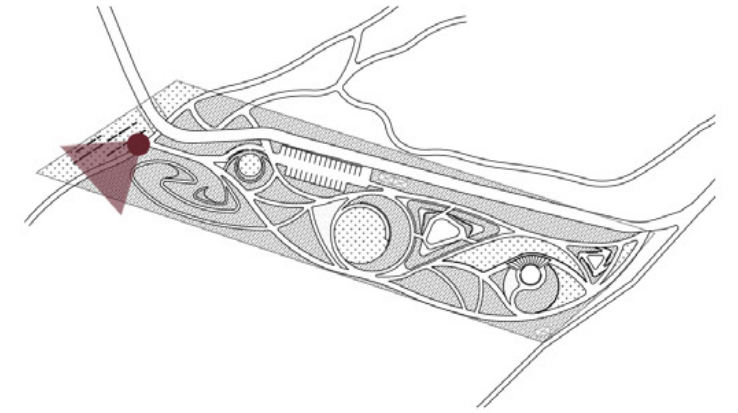
### PERSPECTIVE

6.1 Riverfront

6.2 Parking Lot & Campsite

6.3 Outdoor Classroom

# RIVERFRONT



## Trail & Stepping Stone

- Provide safe and low-impact access to the Nueces River.

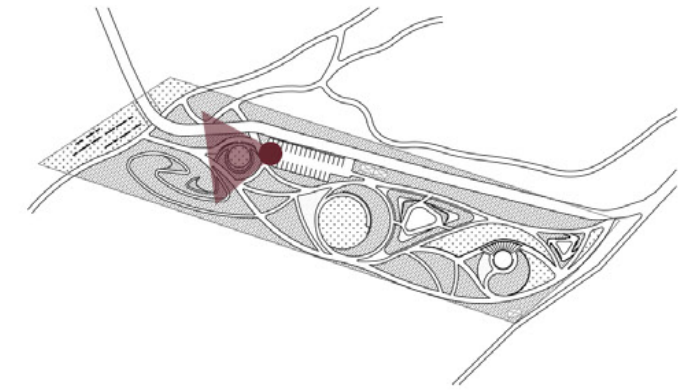
## Wetland & Riparian Buffer

- Restore the riparian habitat of the Nueces River.
- Improve wildlife habitats along the river.

## Education Signage

- Support ecological education along the Nueces River.

# PARKING LOT & CAMPSITE



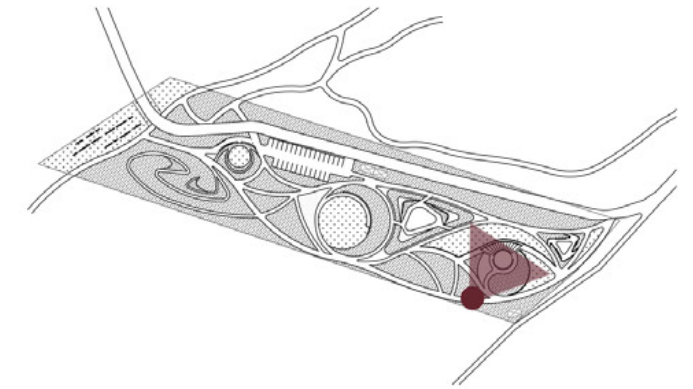
## Trail & Campsite

- Provide recreational access to the Nueces River

## Green Parking Lot

- Develop sustainable land to divert parking off River Road.
- Facilitate the stormwater management

# OUTDOOR CLASSROOM



## Vegetated Hillside

- Transform landfill to the sustainable green space.

## Display Wall & Outdoor Classroom

- Provide multi-used spaces for community activities.
- Support K-12 science learning and outdoor activities

# 7

## PART SEVEN

### DESIGN PHASING

#### 7.1 Phase I:

Restoring The Riverfront

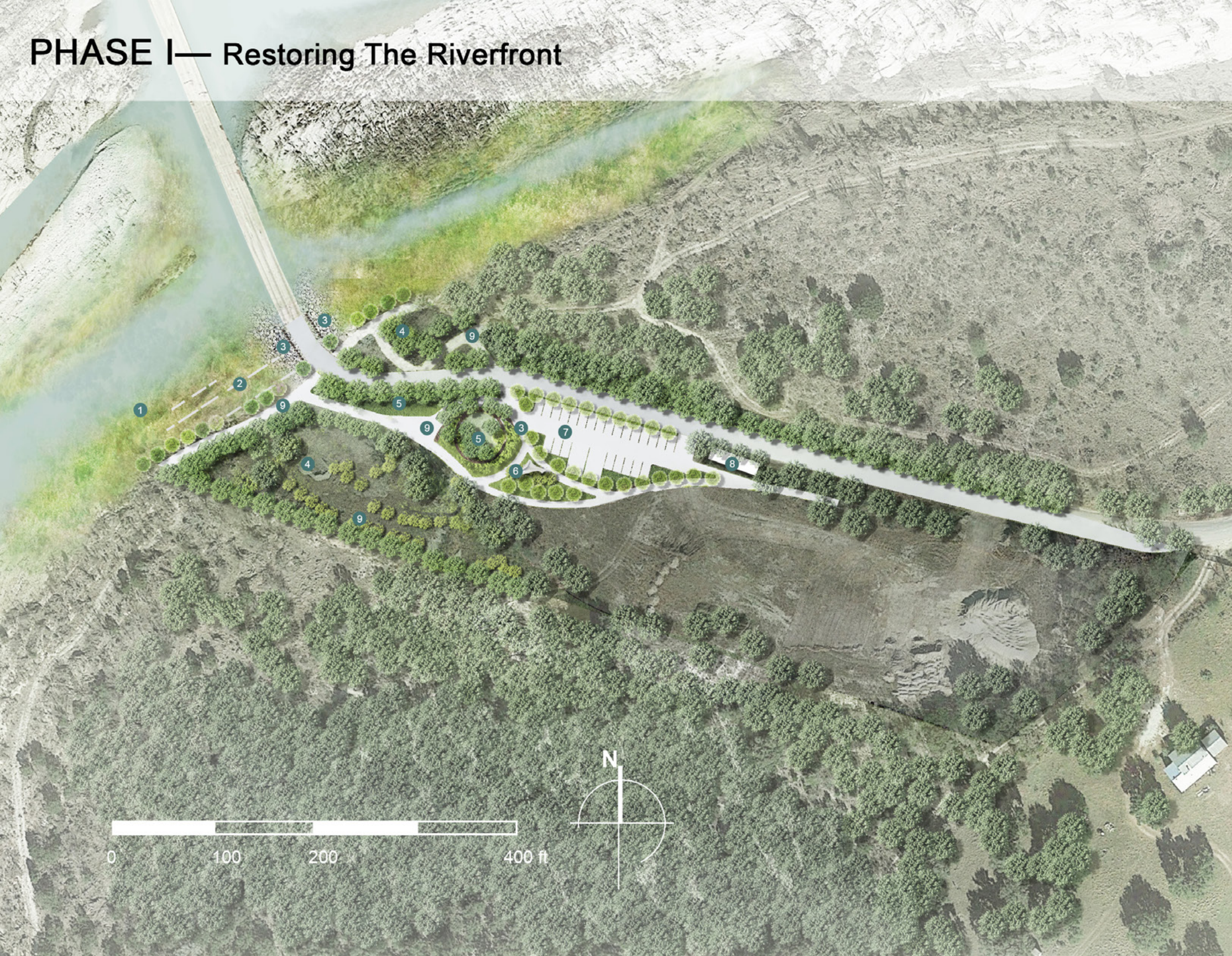
#### 7.2 Phase II:

Creating A Recreational Hub

#### 7.3 Phase III:

Stimulating Learning Of The Next Generation

# PHASE I — Restoring The Riverfront



## Phase I (Year 1-3)

Parking Lot & Riparian Zone & Trail System

- ① Educational Wetland
- ② Stepping Stone/ Bench
- ③ Security Bollards
- ④ Riparian Buffer/ Mature Forest
- ⑤ Tent-only Campsite & Picnic Area
- ⑥ Art Installation
- ⑦ Parking Lot
- ⑧ Portable Restroom
- ⑨ Trail

0 100 200 400 ft



# PHASE II— Creating A Recreational Hub



## Phase II (Year 4-6)

### Gathering Space & Children Playground

- ① Educational Wetland
- ② Stepping Stone/ Bench
- ③ Security Bollards
- ④ Riparian Buffer/ Mature Forest
- ⑤ Tent-only Campsite & Picnic Area
- ⑥ Art Installation
- ⑦ Parking Lot
- ⑧ Portable Restroom
- ⑨ Trail
- ⑩ Wooden Deck
- ⑪ Wild Flower Bed
- ⑫ Gathering Space
- ⑬ Stone Bench
- ⑭ Children Playground
- ⑮ Rest Area
- ⑯ Trail

0 100 200 400 ft



# PHASE III— Stimulating Learning of the Next Generation

## Phase III (Year 7-10)

### Landfill Disposal and Revegetation

- ① Educational Wetland
- ② Stepping Stone/ Bench
- ③ Security Bollards
- ④ Riparian Buffer/ Mature Forest
- ⑤ Tent-only Campsite & Picnic Area
- ⑥ Art Installation
- ⑦ Parking Lot
- ⑧ Portable Restroom
- ⑨ Trail
- ⑩ Wooden Deck
- ⑪ Wild Flower Bed
- ⑫ Gathering Space
- ⑬ Stone Bench
- ⑭ Children Playground
- ⑮ Rest Area
- ⑯ Trail
- ⑰ Vegetated Hillside
- ⑱ Display Wall / Retaining Wall
- ⑲ Pergola
- ⑳ Outdoor Classroom
- ㉑ Rest Area
- ㉒ Portable Restroom
- ㉓ Trail

0 100 200 400 ft





# 8

## PART EIGHT

### REFERENCE

#### 8.1 Reference

# REFERENCE

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