

# Stimulate Rehabilitation

Due to the geological location of our site, the area receives a heavy amount of rain almost year round, which leads to severe problems for the local inhabitants. Flooding causes health problems, leads to family displacement, and even causes death amongst the local peoples.

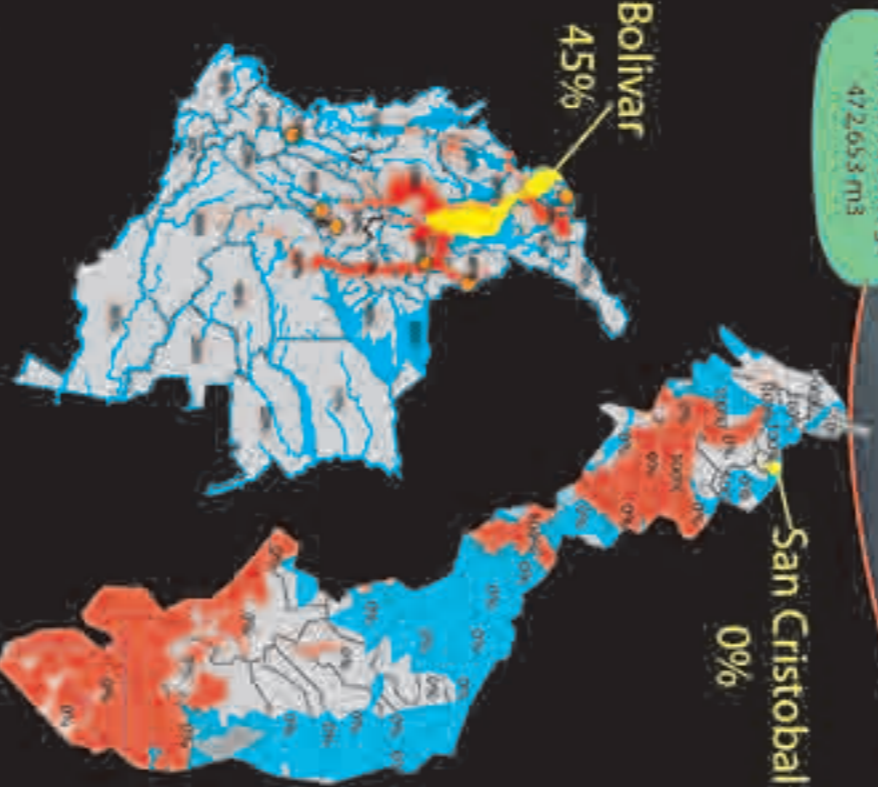
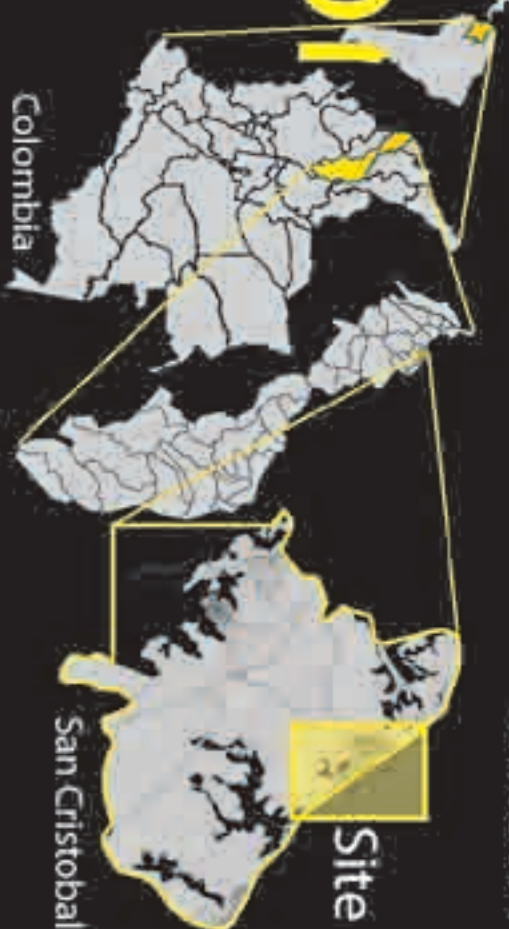
San Cristobal is extremely vulnerable to flooding due to its location near the Canal Del Dique, it's low-lying topography, and northern location near the La Nina effect zone. The city of San Cristobal, itself, floods with regularity, especially during La Nina flooding. Due to the lack of sanitation infrastructure, many septic tanks become discharged into the flooded water, causing the inhabitants of San Cristobal to suffer severe health problems and be left without clean drinkable water. In order to address this issue, we propose building a system of levees along the coast of the Canal Del Dique while at the same time implementing systems of constructed wetlands. These will serve to protect the locals from flooding, provide informal sewage infrastructure, and clean water for human consumption and irrigation. So as to not alienate the community from its livelihood, we have strategically placed breaks in the levees to allow access to the canal. The levees serve as protection from the canal floods, provide clean water, and serve as make-shift parks for tourists and residents. We will install additional constructed wetlands throughout specific areas throughout the city, as a means of informal sewage infrastructure, which will provide water for irrigation purpose to further stimulate agriculture in the area.



# Stimulate Rehabilitation

Location, Protection, Sanitation

It is our mission to provide informal infrastructure to produce clean drinkable water, locations for sewage treatment, while producing animal fodder for livestock feed, and creating micro ecosystems for habitats. All the while providing a system of levees to protect against further flooding and family displacement.



La Nina Flooding  
Flood Zone  
Waste Treatment Plants

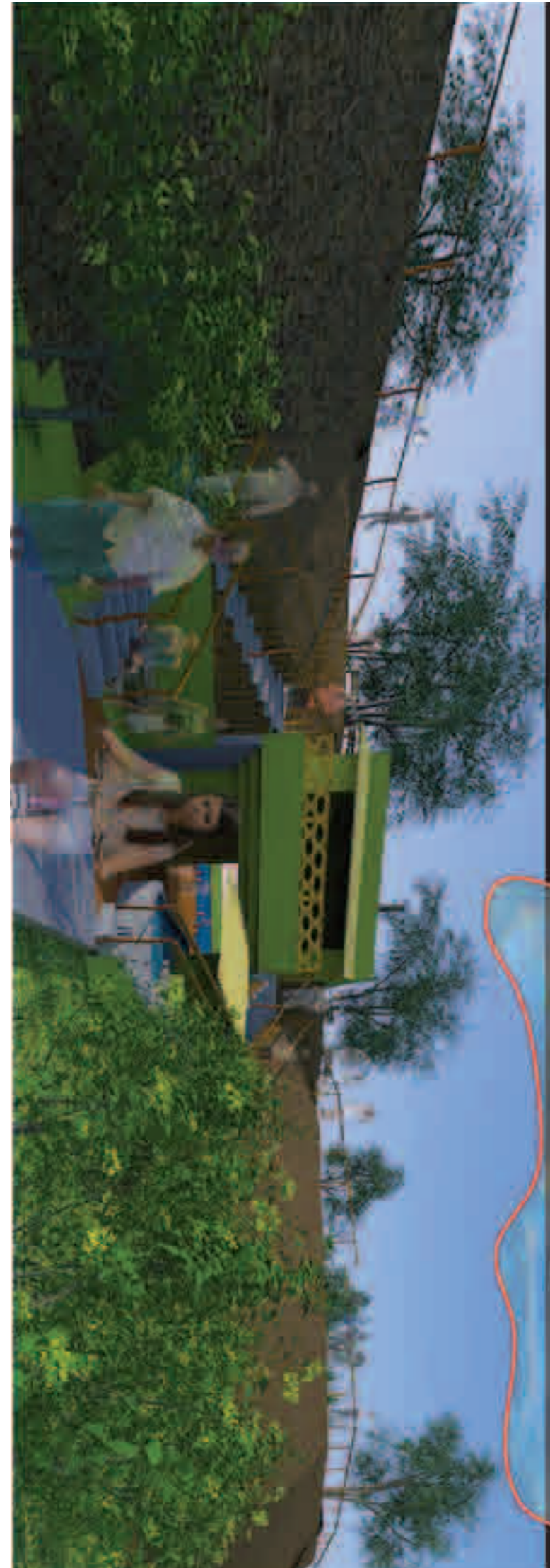


## People Affected by La Nina 2011

	-People Affected	987,000		-Killed	338		-Wounded	312		-Missing	66
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### EFFECTS OF UNTREATED WASTE WATER

- Death
- Cancers
- Allergies
- Hypersensitivity





# Phase I: Re-Location

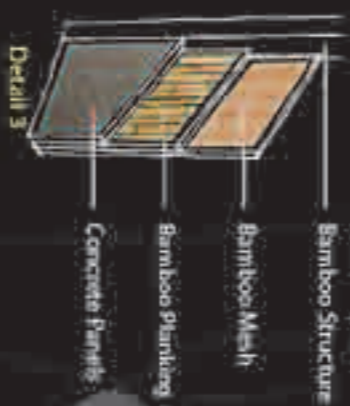
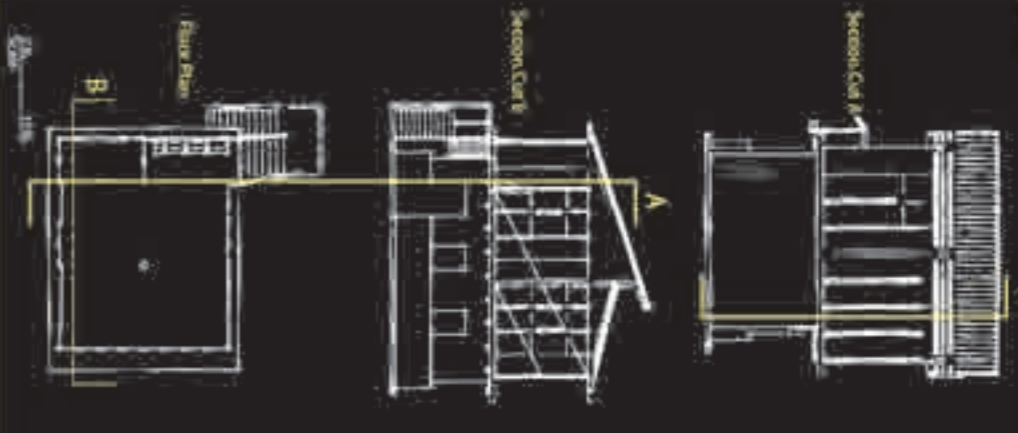
## Stage III:

Re-locate to newly developed area

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**Stage I:** Identify Area of re-location

**Stage II:** Design and build Expansion Housing

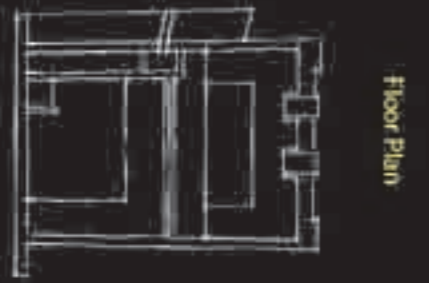


# Phase II: Protection

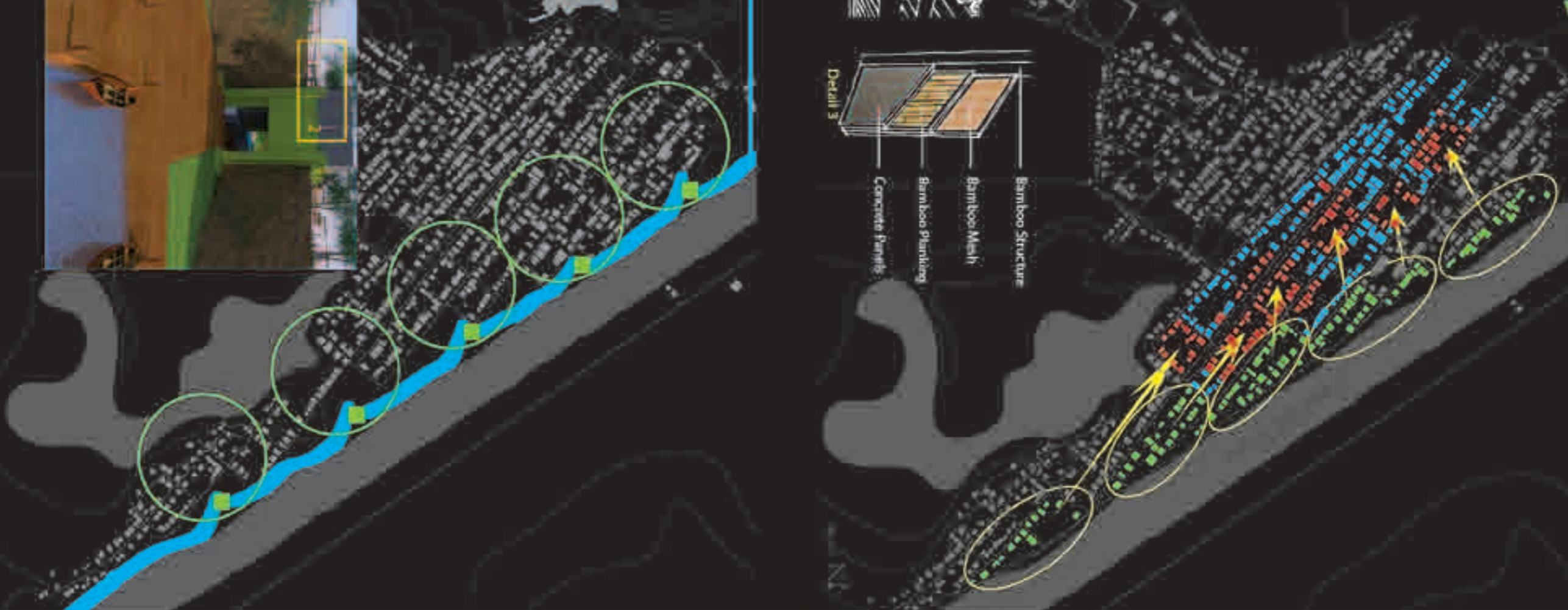
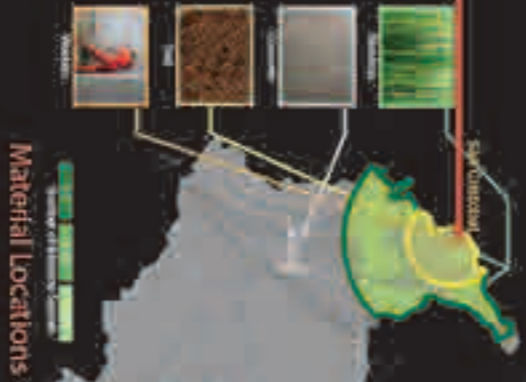
**Stage I:** Identify location and Design proposed Levees

**Stage II:** Gather Resources and Construct Levees

**Stage III:** Design and build Water Collection Houses.



Section Cut A





# Phase III: Sanitation Implementation

## Stage I: Locate and Gather materials



*Phragmites australis*  
(Rodeau Cane)



*Pennisetum purpureum*  
(Napier Grass)



*Typha domingensis*  
(Cattail)



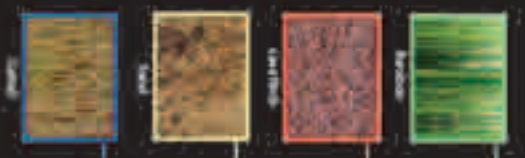
*Phalaris australis*  
(Reed Canary Grass)

### Advantages

- Can be built and repaired with locally available materials
- Construction can provide short-term employment to local laborers
- Low operation and maintenance
- No chemical & electrical energy required
- Utilisation of natural processes

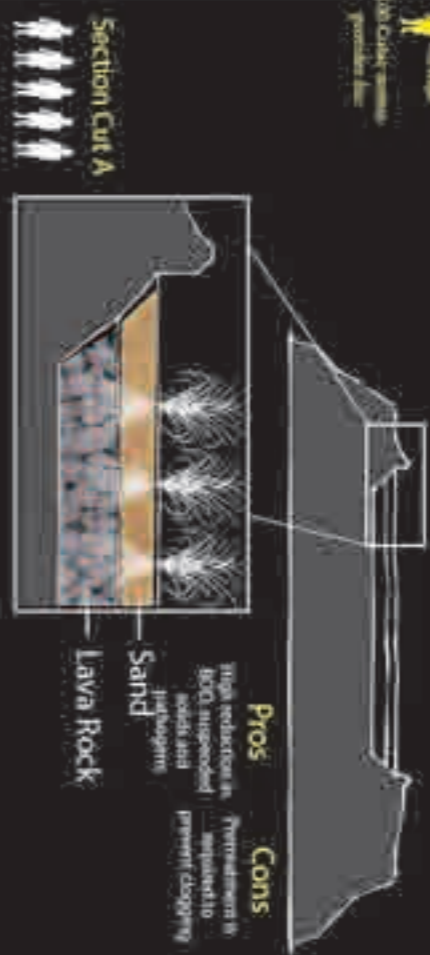
### Constructed Wetlands filter out:

- Organic Matter
- Suspended Solids
- Nitrogen
- Phosphorus
- pathogens



Material Locations

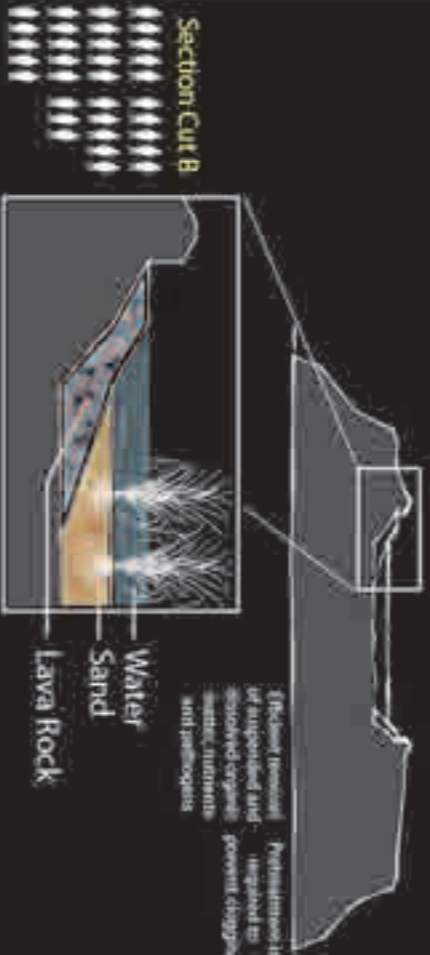
## Stage II: Design and Build Water Sanitation Wetlands



Section Cut A

### Pros Cons

- Pros:** High reduction in BOD, suspended solids and pathogens
- Cons:** Permeability is required to prevent clogging

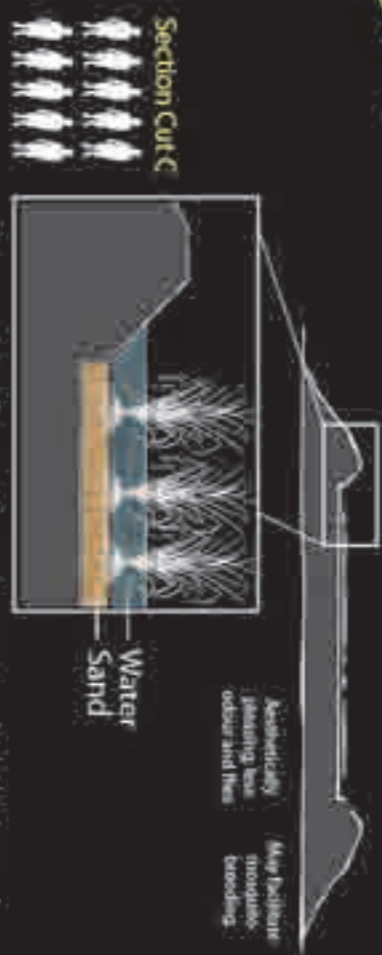


Section Cut B

- Pros:** Efficient removal of suspended and dissolved organic matter, nutrients and pathogens
- Cons:** Permeability is required to prevent clogging

### Horizontal Flow Constructed Wetlands

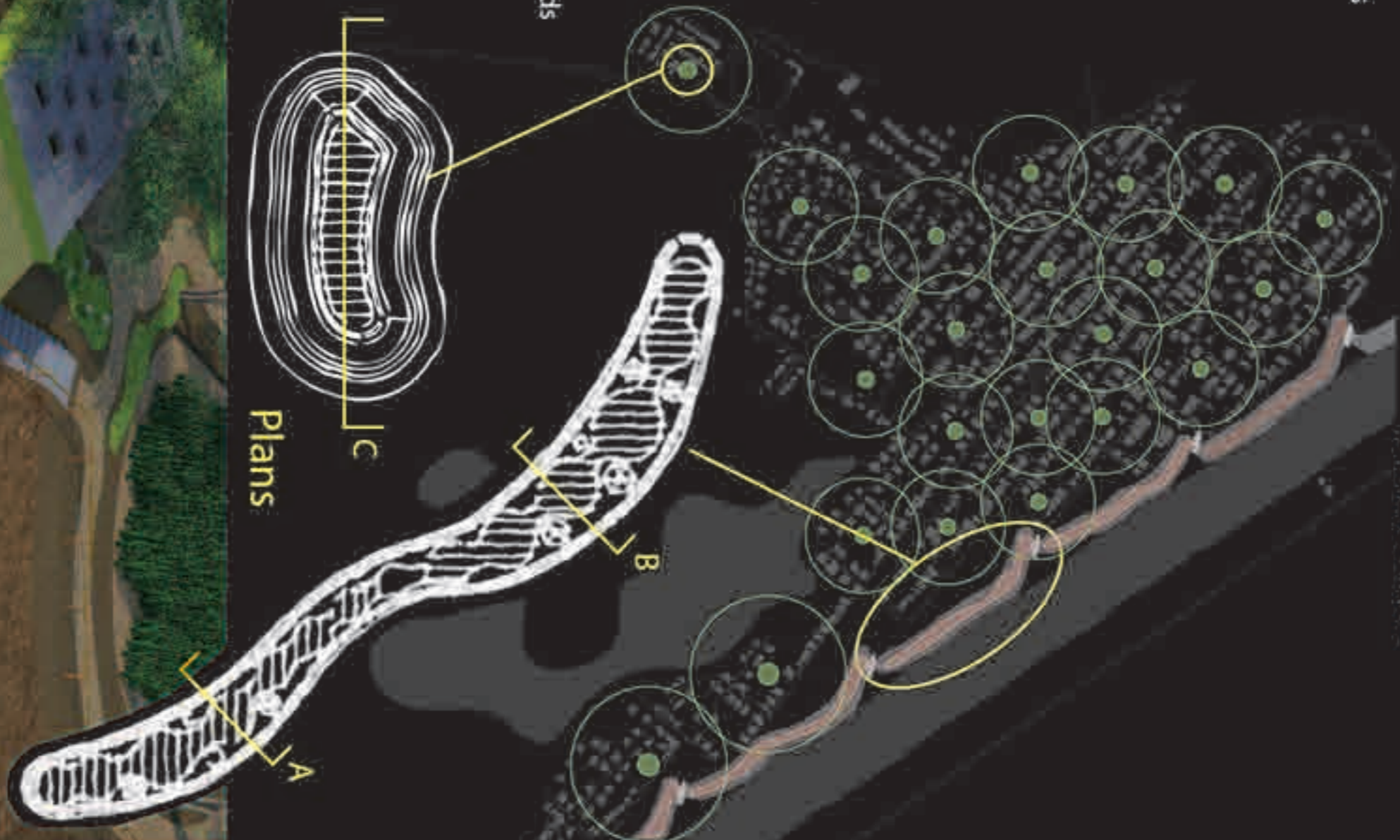
## Stage III: Design and Build Sewer Sanitation Wetlands



Section Cut C

- Pros:** Aerobically generating less odour and flies
- Cons:** May require more maintenance

### Free-Surface Constructed Wetlands



Plans

