



# **Public Presentation of the Findings of the Environmental Impact Assessment for Proposed Housing Development at Florence Hall, Trelawny**

**Presented by  
Environmental Solutions Limited  
On behalf of  
Gore Developments Limited**

**April 14, 2009 at the William Knibb Memorial High School - Martha Brae,  
Trelawny**

# Presentation Outline

## ❖ Description of the Project

- ◆ Location
- ◆ Design of the Development
- ◆ Typical GDL House
- ◆ Amenities

## ❖ The EIA Process

- ◆ Purpose of the EIA
- ◆ Methodology
- ◆ TORs
- ◆ Role of the Consultants
- ◆ The EIA Team
- ◆ Work Plan

## ❖ The Existing Environment

- ◆ Physical
- ◆ Biological
- ◆ Socio-economic

## ❖ Potential Environmental Impacts

- ◆ Water resources
  - Groundwater
  - Drainage and run-off
  - Sewage
  - Wetland
- ◆ Geology: karst
- ◆ Soils and landscape
- ◆ Ecology
- ◆ Socio-economic
- ◆ Air quality
- ◆ Noise
- ◆ Hazardous materials
- ◆ Solid waste

## ❖ Mitigation Measures

- ◆ Construction phase
- ◆ Operation phase

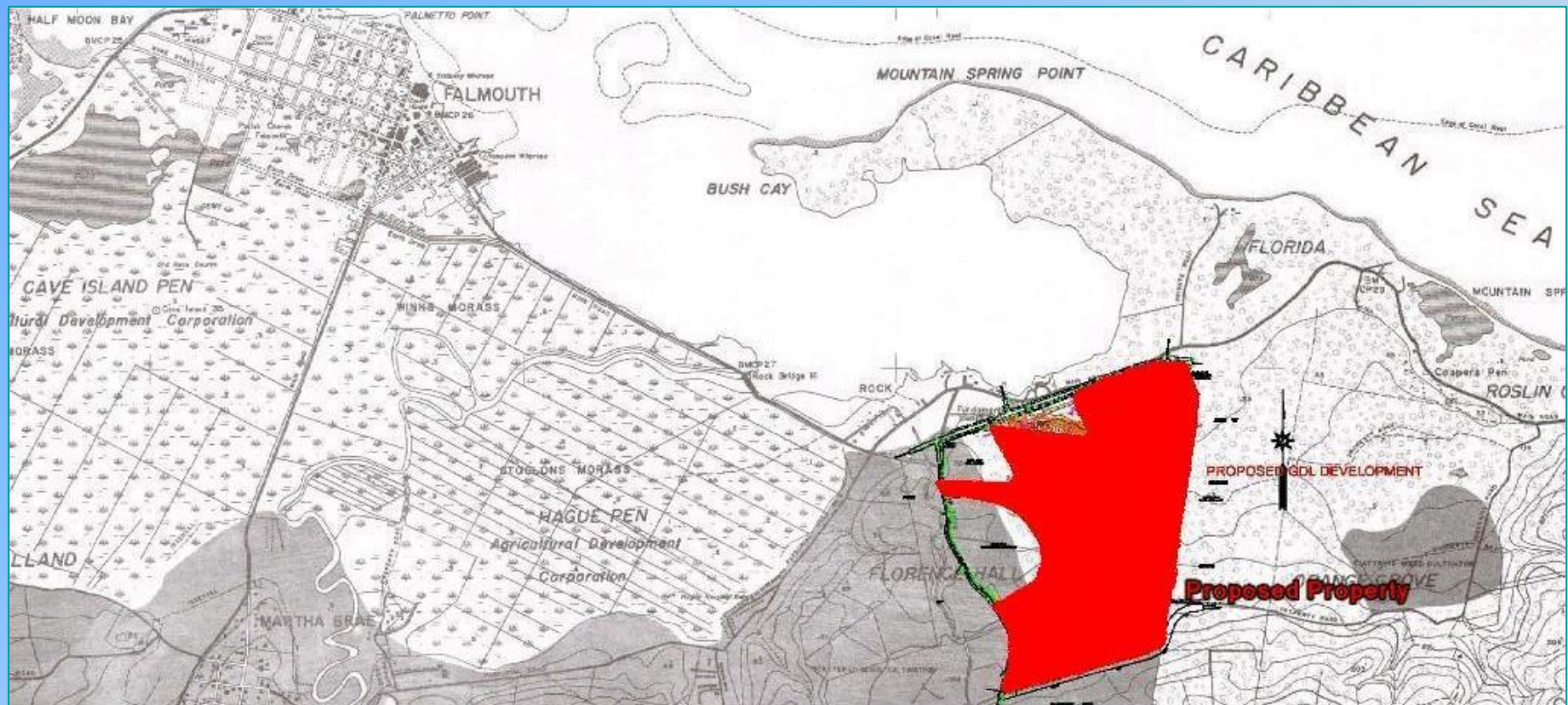
## ❖ Cumulative Impacts

## ❖ Consideration of Alternatives

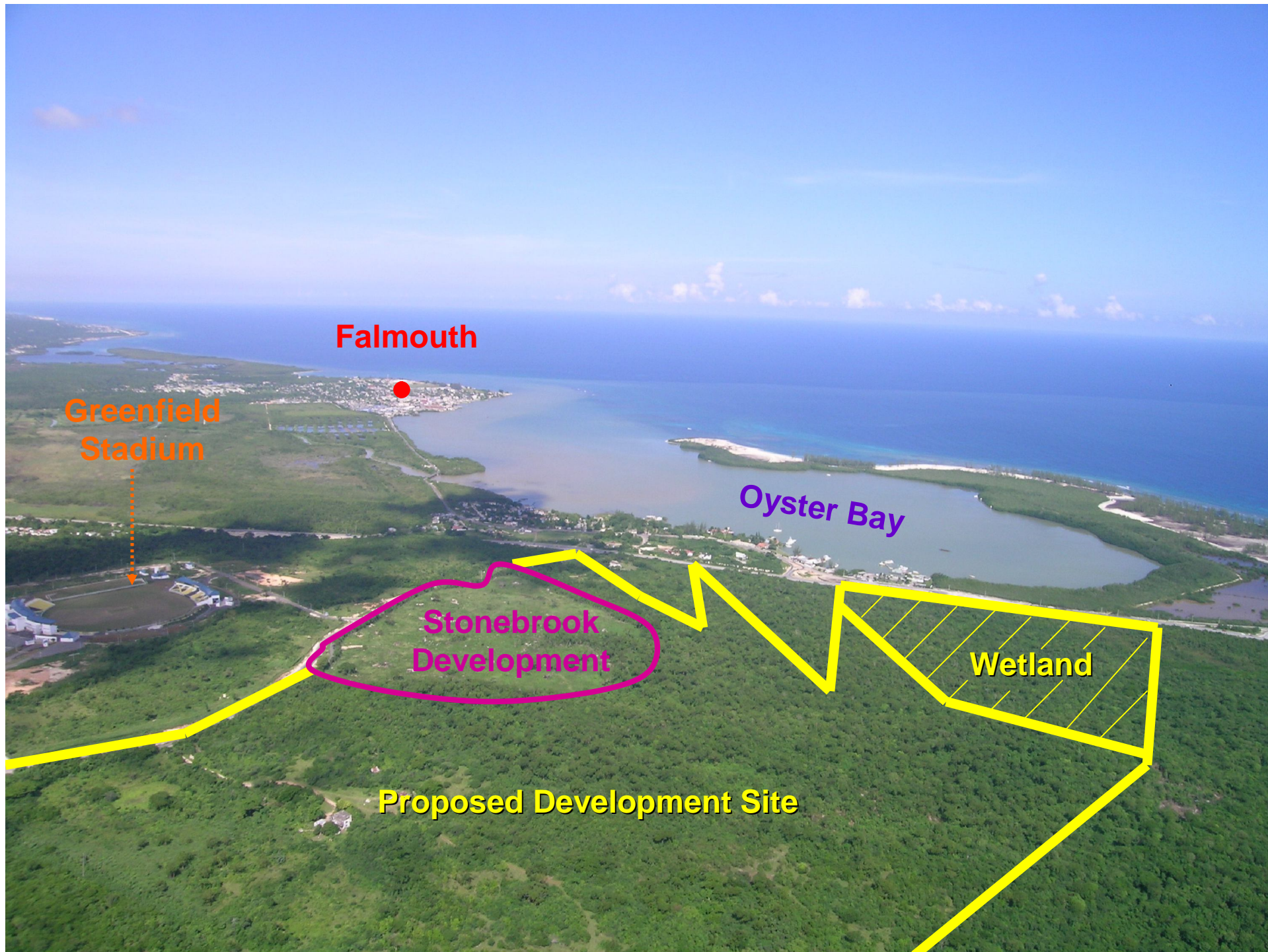


# Project Site Location

72 ha of land located in Florence Hall, New Falmouth, south of the North Coast Highway across from Oyster Bay







**Falmouth**

**Greenfield  
Stadium**

**Oyster Bay**

**Stonebrook  
Development**

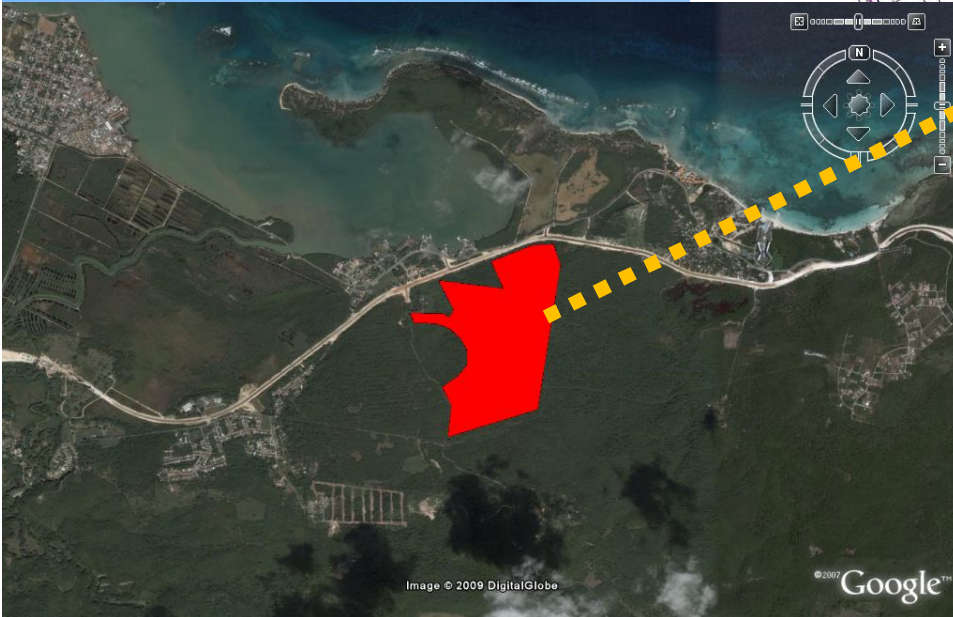
**Wetland**

**Proposed Development Site**



# Design of Development

- ❖ Gated community with 828 lots
- ❖ 2-bedroom houses
- ❖ Lot size 420.5 m<sup>2</sup>





# Typical GDL House







# Amenities

Drain reserves:  
0.119 ha

Commercial Lots

Basic School site:  
0.400 ha

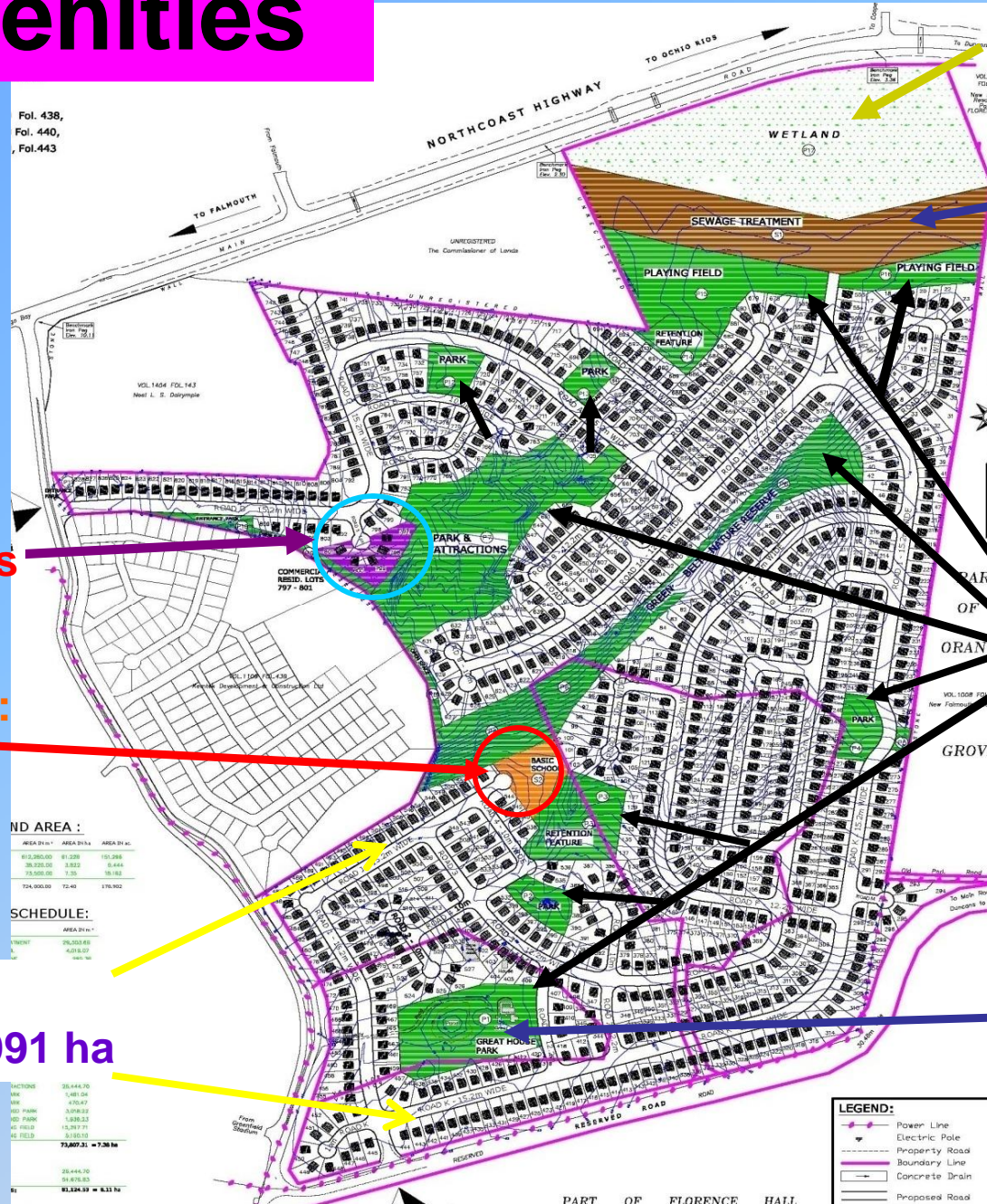
Lots and road  
structures: 51.991 ha

Wetland  
(Mangroves)

Sewage  
Treatment  
Plant:  
2.930 ha

Open Spaces:  
16.960 ha

Heritage Site





# The EIA Process

- ◆ Purpose:
  - ❖ Describe project area and environmental conditions, identify potential impacts & determine mitigation measures
- ◆ Make use of available and new data
- ◆ Conduct assessment and prepare report
- ◆ Conduct public hearing for citizens' response

# Methodology

- Multi-disciplinary team used charette style method for data gathering, analysis and presentation
- Data gathering involved:
  - ◆ Field studies
  - ◆ Intrusive tests
  - ◆ Analysis of maps, plans, aerial photos
  - ◆ Review of reports and background documents
  - ◆ Structured interviews
  - ◆ Laboratory analyses
- Team meetings
- Iterative interaction with Developer

# Terms of Reference

- ❖ Approved by NEPA (Feb. 12, 2009):
  - ◆ Internationally accepted TOR components for Human Habitation Projects
  - ◆ Posted on websites of NEPA, GDL and ESL
  - ◆ Also at Trelawny Parish Council and Parish Library
  - ◆ Included in EIA final report for reference



# Role of the Consultants

- ❖ Collect and analyze all relevant data, information and viewpoints
- ❖ Systematically identify and examine possible consequences of proposed development, and the potential impacts on the environment
- ❖ Determine appropriate means to avoid or reduce (mitigate) impacts to acceptable levels
- ❖ Utilize objectivity and professional integrity in analyzing and reporting all findings
- ❖ Serve as a link between developer and regulatory agency
- ❖ Avoid making recommendation on whether project should be approved or not. i.e. the consultants do not serve as proponents of the project

# The EIA Professional Team

## Specialists

- ❖ **Barry Wade, PhD - Team Leader; Environmental Scientist**
- ❖ **George Campbell, MSc – Economist**
- ❖ **Sharonmae Shirley, MPhil – Environmental Chemist**
- ❖ **Roderick Ebanks, MPhil – Heritage Consultant**
- ❖ **Peter Wilson Kelly, MPhil – Coastal Zone Specialist**

- ❖ **Brian Richardson, MSc – Hydrogeologist**

- ❖ **Brandon Hay MSc – Ecologist**

## Assistants

- ❖ **Kimberly Bryan MSc – Environmental Scientist**
- ❖ **Rashidah Khan MPhil – Environmental Chemist**
- ❖ **Annmarie Barnett BSc – Project Officer**

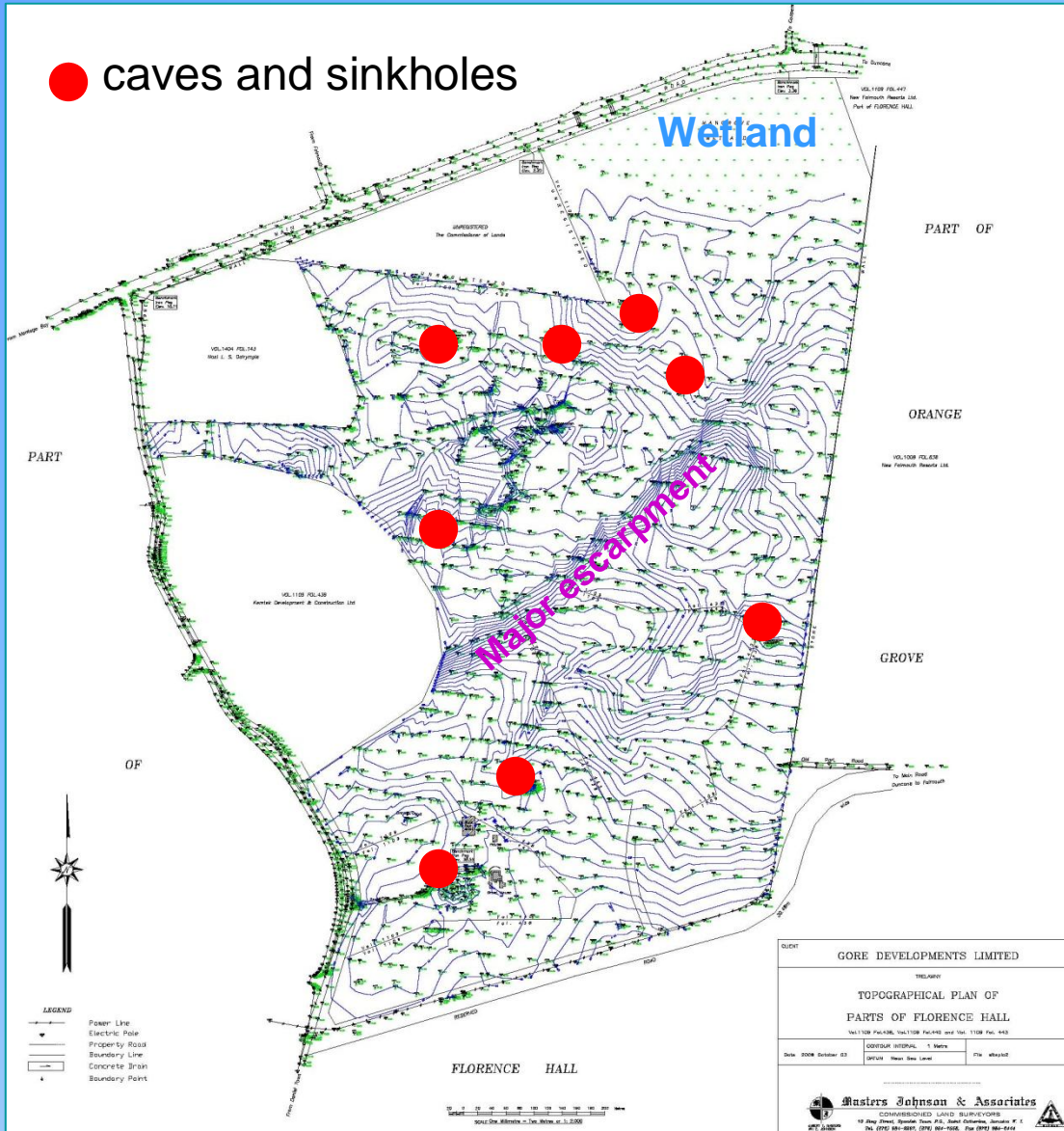
# Work Plan August 2008 to March 2009

- ❖ Client meetings
- ❖ Review of documents
- ❖ Review of legislation
- ❖ Site investigations
- ❖ Community surveys
- ❖ Water and Air analyses
- ❖ Vegetation surveys
- ❖ Faunal surveys
- ❖ Cave surveys

- ❖ Hydrological surveys
- ❖ Data review and analysis
- ❖ Analysis of impacts
- ❖ Draft report
- ❖ Client review
- ❖ Final report to NEPA
- ❖ Public notices
- ❖ Public presentation of findings



# The Existing Environment



## Site Topography:

- ◆ Slopes gently toward NCH
- ◆ Ground elevations range from 45 m at its highest along the southern boundary to just over 1 m asl toward highway



- Rugged karstic surface features over most of site





# Geology and Soils

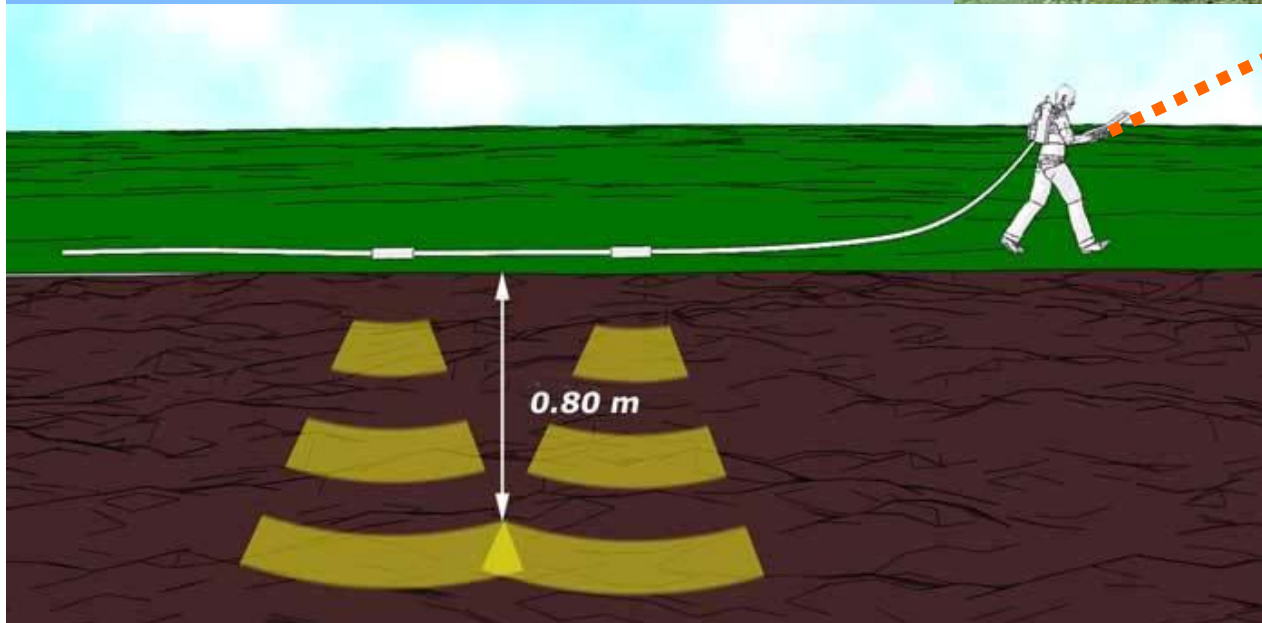
Project site dominated by limestone and karst features such as voids, caves, sink holes and cracks





# Geotechnical Investigations of the Site

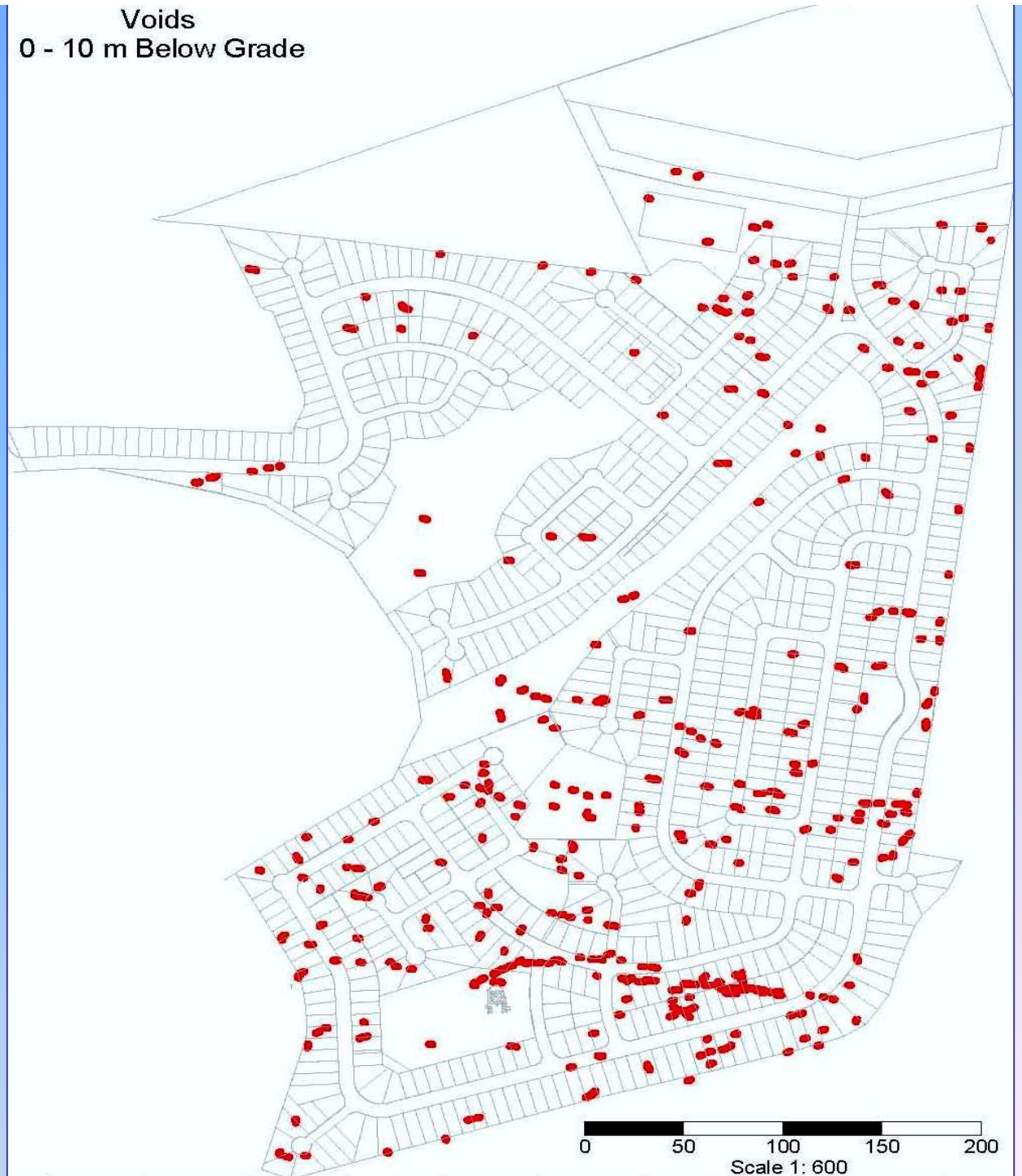
- ♦ Voids detected (over 100) by Ground Penetrating Radar (GPR)





# Results of the GPR Survey

Voids  
0 - 10 m Below Grade





# Water Quality

- ◆ No surface water features on site
- ◆ Ground water in some lower level caves and sinkholes
- ◆ Small wetland at northeastern corner of site; has tidal flows under NCH with Oyster Bay (Glistening Waters Lagoon)



# Water Quality at FLH Wetland and Wetland connected to Oyster Bay

- ◆ Both sites were recorded to have high organic, nitrate and phosphate loading
- ◆ Oil and grease as well as bacterial levels are also high in both wetlands
- ◆ These elevated levels indicate the influence of the various activities practiced upstream



# Biological Environment

## 1. Dry Limestone Forest

### 1. Flora:

- ❖ 101 species of plants observed, with six endemics identified
- ❖ Trees – Upper canopy dominated by Red Birch; secondary canopy dominated by Dogwood, Braziletto, Bull Hoof, Logwood and Burnwood

### 2. Fauna

- ❖ Birds – no endangered, threatened or rare spp. observed
- ❖ 13 of Jamaica's 28 extant endemic species were observed
- ❖ Commonly seen were the Jamaican Woodpecker, Jamaican Vireo, Jamaican Euphonia, White-chinned Thrush and Jamaican Lizard Cuckoo
- ❖ Night birds included the Jamaican Owl and Barn Owl
- ❖ Eight species of butterflies; none range restricted or endangered



# Biological Environment

## Dry Limestone Forest – Open Natural Woodland



Major bird habitat and bird  
feeding site – 59 spp. observed





## 2. Wetland

~5 ha northeastern corner of site – dominated by black, white and red mangroves





### 3. Caves

A photograph showing a person wearing a striped shirt and a cap, using a machete to clear dense green vegetation from a rocky, cave-like opening in a hillside. The scene is outdoors, with sunlight filtering through the leaves. The person is positioned in the lower center of the frame, facing away from the camera towards the cave entrance. The surrounding area is covered in thick green foliage and large, light-colored rocks.

Eight known caves on site – major habitat for avifauna such as bats and birds



# Cave Fauna



Outer view of cave



View from inside



Fruit Bat droppings



Jamaican Fruit Bat colony in cave antechambers



# Other Caves at Florence Hall





# Socio-Economic Environment

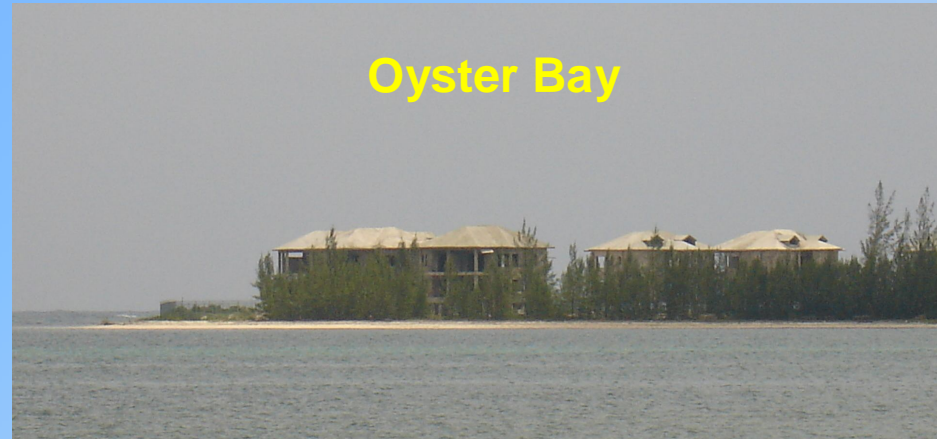
❖ Proposed project lies in an area of:

- ◆ Historic town of Falmouth
- ◆ Rural Communities
- ◆ Agriculture and Fisheries



# Socio-Economic Environment

- ◆ Tourism Developments
- ◆ Heritage Attractions
- ◆ Proposed Port Development – Falmouth Harbour
- ◆ Housing Development
  - ❖ Stonebrook





# Road Communication

- ❖ The new North Coast Highway has considerably improved the Montego Bay to Ocho Rios Corridor, making Trelawny a significant traffic node with easy access for the motoring public, including daily commuters





# The Communities of Interest are:

1. Falmouth: Parish capital and main commercial centre; population 8,188
2. Coopers Pen: Population 350; mainly fishing and tourism related activities
3. Hague: Population 600
4. Martha Brae: Population 1,000; tourism, domestic and construction

5. Daniel Town: Population 500
6. Rock: Population 500; mainly supported by fishing, construction and tourism related activities



# Social Infrastructure

❖ Mainly centred in Falmouth and hence within proximity to project:

◆ Utilities

➤ Water

➤ Electricity

➤ Telecommunications






# Social Infrastructure

- ◆ Public Health Facilities
- ◆ Education (William Knibb and Holland High)
- ◆ Fire & Police
- ◆ Waste Management
- ◆ Roads & Traffic





# Heritage

A photograph of a two-story house with a mix of stone and yellow siding. The ground floor is constructed from rough-hewn stone, while the upper floor is painted yellow with white trim around the windows. A balcony with a white lattice railing is visible on the second floor. The house is set back from a gravel road by a low stone wall. A small tree is planted in front of the house.

◆ The Florence Hall Estate is one of a number of interesting heritage sites, both pre and post colonial, to be found throughout Trelawny. They include Taino artefacts, remnants of planters' estates and examples of exquisite Georgian architecture



# Heritage

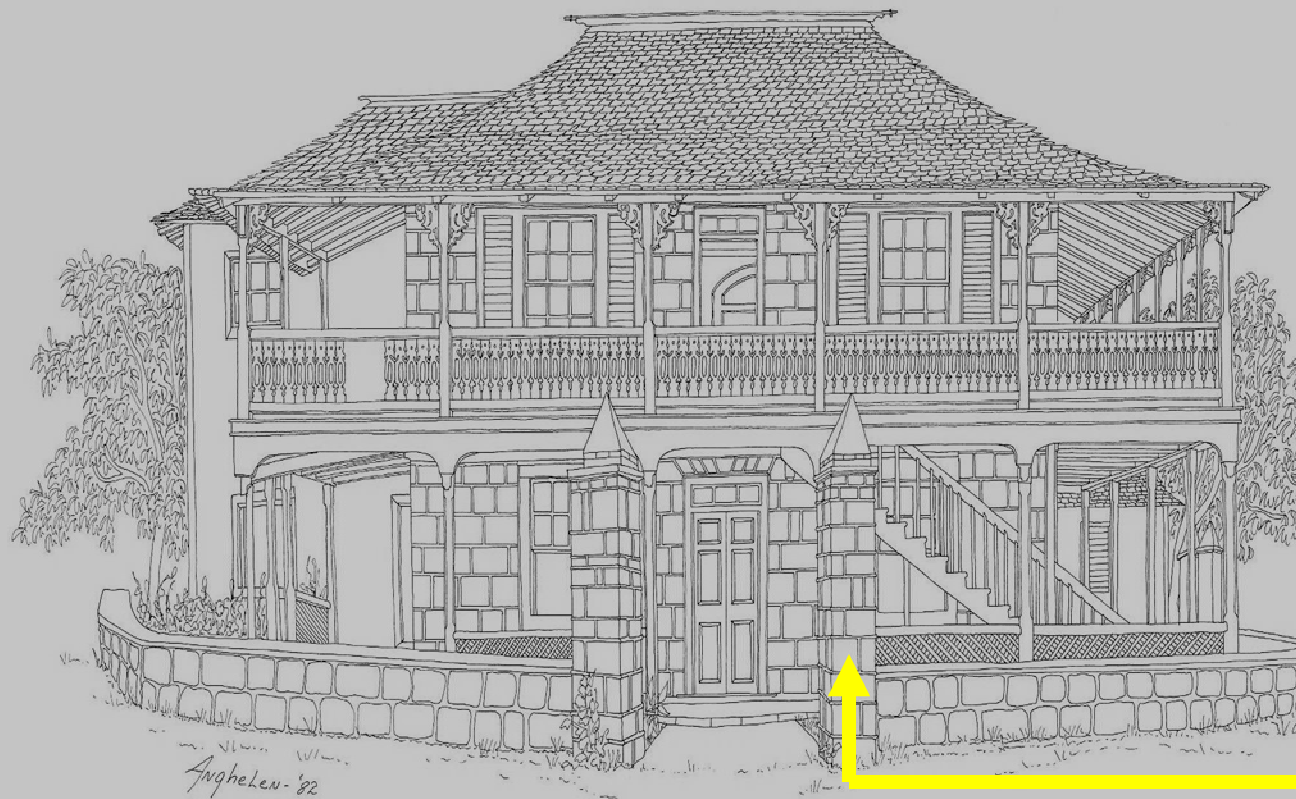
- ❖ The Town and Country Planning (Trelawny Parish) Provisional Dev. Order identifies Florence Hall on list of sites and buildings of architectural and historic importance





# Architectural Reconstruction of Great House at Florence Hall

Project site was a former Cattle Pen and pimento and sugar producing Estate



Existing cut  
stone fence  
column



# Existing Heritage Aspects of the Site



Cut stone  
aqueduct that  
fills catchment  
tank



Well



# Potential Environmental Impacts

## ❖ Occurrence of impacts:

- ◆ Construction Phase (Site Preparation and Construction)
- ◆ Operations

## ❖ Classification of Impacts:

- ◆ Positive or negative
- ◆ Direct or indirect
- ◆ Short or long term
- ◆ Reversible or irreversible
- ◆ Cumulative



# Potential Impacts Water Resources

## 1. Ground Water:

- ◆ Groundwater contamination from dumping in well, caves and voids
- ◆ Release of hazardous material into environment from leaks from machinery used during construction, from fuel and cement/concrete transportation accidents, or from leaks from storage tank facilities





# Potential Impacts

## Water Resources

### 2. Drainage/Run-off:

- ❖ Increased storm water run-off
- ❖ Flooding due to overload of pre-development drainage capacity



# Potential Impacts

## Water Resources

### 3. Sewage:

- ❖ Inadequately treated sewage
- ❖ Aesthetic impairment (odours, flies etc)



# Potential Impacts

## Geology:

- ❖ Destruction of the integrity of the karstic environments, including both surface and sub-surface features as a result of:
  - ◆ Filling of voids
  - ◆ Extension of natural sink holes
  - ◆ Collapse of cave roofs



# Potential Impacts

## Soils and Landscaping:

- ◆ Indiscriminate removal of forest cover could increase erosion and sediment loads in the run-off
- ◆ Scraping of soil for construction and poor temporary storage also could result in increased erosion
- ◆ Improper stockpiling of imported soil could also add to the sediment run-off
- ◆ Application of fertilizers for landscape vegetation could result in increased nutrient loads to the wetland resulting in eutrophication



# Potential Impacts

## Ecology

### 1. Dry Limestone Forest:

- I. Loss of habitat and natural vegetation diversity (e.g. for birds)
- II. Fragmentation of habitats
- III. Reduced infiltration and run-off capacity from clearing

### 2. Wetland:

- I. Reduction in wetland area and habitat for water fowls
- II. Possible eutrophication if effluent is not treated properly
- III. Loss of bioluminescence in Oyster Bay

### 3. Caves and Voids:

- I. Possibility of dumping and hence blocked drainage paths and contamination of ground water



# Potential Socio-economic Impacts

## Demographics:

- ◆ Increase in migrant skilled and unskilled construction workers in search of scarce employment as well as those engaged in hustling occupations
- ◆ Rapid acceleration of population densities
- ◆ Employment opportunities (250-300 during construction)



# Potential Socio-economic Impacts

## Social Infrastructure

### 1. Public Health:

- ❖ Increased pressure on already overburdened Falmouth health system with influx of over 800 families in New Falmouth area
- ❖ Disease outbreak from improper solid and liquid wastes disposal



# Potential Socio-economic Impacts

## Social Infrastructure

### 2. Solid Waste Management:

- ❖ Accumulation of domestic waste as only one garbage truck operates in parish
- ❖ Dumping of garbage in well, caves, voids and sink holes
- ❖ Increase in nuisance species due to dumping of garbage on the site



# Potential Socio-economic Impacts

## Traffic:

- ❖ Influx of 800+ families in area will impact traffic flow unto the NCH in the New Falmouth area as only one entrance and exit – Daniel Town Road



# Potential Socio-economic Impacts

## Heritage:

- ❖ Removal of historic units such as guard house, pack and cut stone fence, the cattle pen area, remnants of sugar mill, African Jamaican worker village

# Other Impacts

- ♦ **Air quality:** increased dust during construction
- ♦ **Noise:** will elevate during construction hours
- ♦ **Natural hazards:** tropical storm or hurricane force winds, flooding due to increased surface run-off post-development
- ♦ **Hazardous materials:** from improper storage of chemicals



# Mitigation Measures

## ❖ Construction Phase

### i. Site planning and clearance:

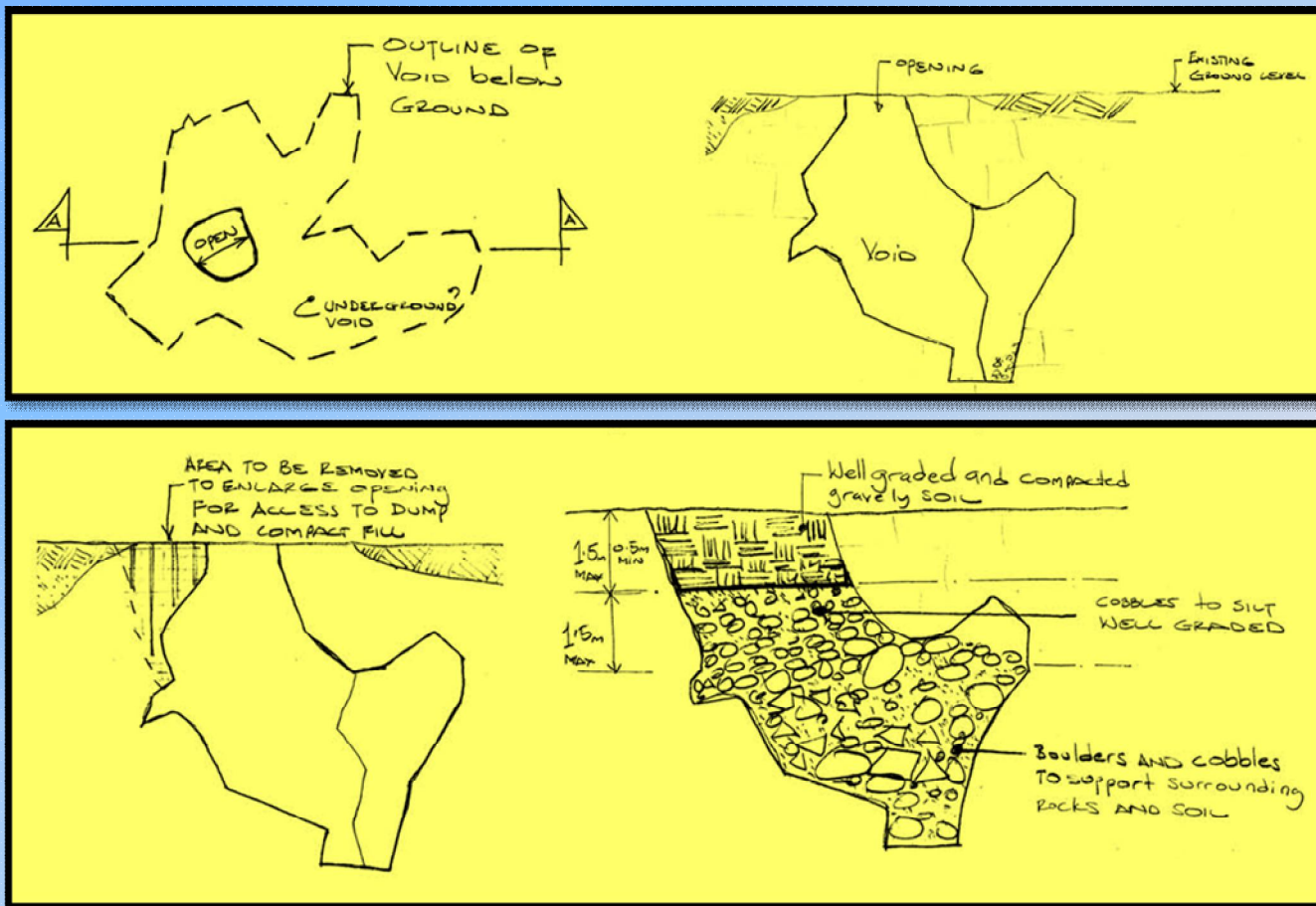
- ◆ Erosion control measure such as construction sequencing to minimize exposure of soils
- ◆ Retention of existing drainage for as long as possible
- ◆ Diverting run-off from denuded areas

### ii. Construction monitoring

- ◆ Inspection and monitoring of construction practices

### iii. Waste Disposal and Engineering Practices

- To prevent dumping in caves a vegetative buffer zone of ~10 m wide will be placed round each cave
- Only voids that need to be filled will be filled as follows:



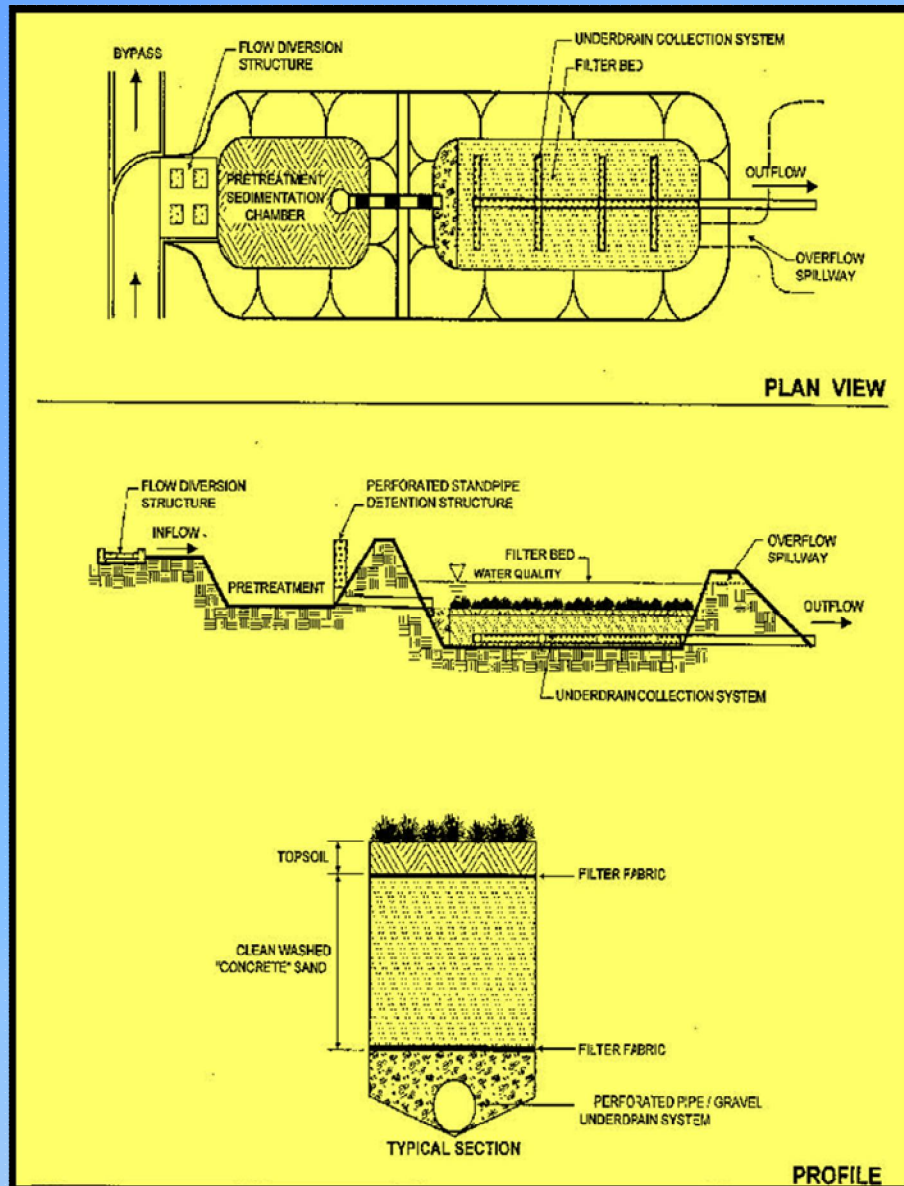


# Mitigation Measures

## Operation Impacts

- ❖ The project was designed (layout and landscaping) to deliberately mitigate the foreseen impacts such as increased surface run-off, flooding, contamination of ground water, etc.

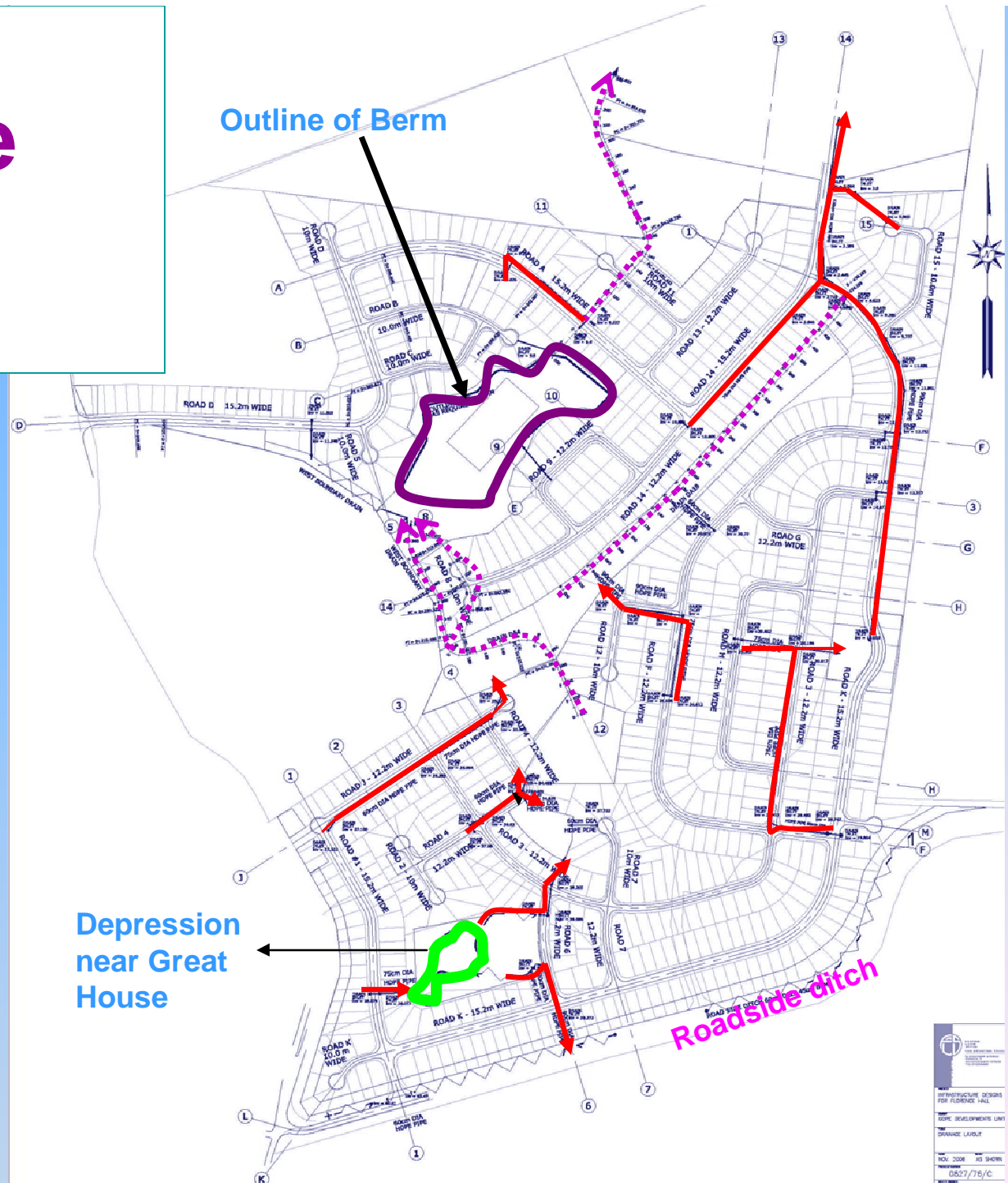
# 1. Drainage Plan and Sediment Trap



- ◆ Main plan is to retain surface runoff flows in excess of the 2 year flows in the central playfield area and in the depression area close to the Great House
- ◆ Water quality management procedures will be incorporated in the design



# Drainage Layout



# Mitigation Measures

## Operation Impacts

### 2. Sewage Treatment and Disposal:

- ❖ Biological treatment has been preferred to mechanical treatment
- ❖ STP system consists of a number of septic tanks discharging into constructed wetlands (reed beds) for final treatment to meet NEPA effluent standards
- ❖ Final treated effluent to be discharged into mangrove wetland for final polishing
- ❖ STP to be buffered from residential area by vegetation



# The Proposed Sewage Treatment System



PROJECT  
INFRASTRUCTURE DES  
FOR FLORENCE HALL

CLIENT  
GORE DEVELOPMENTS

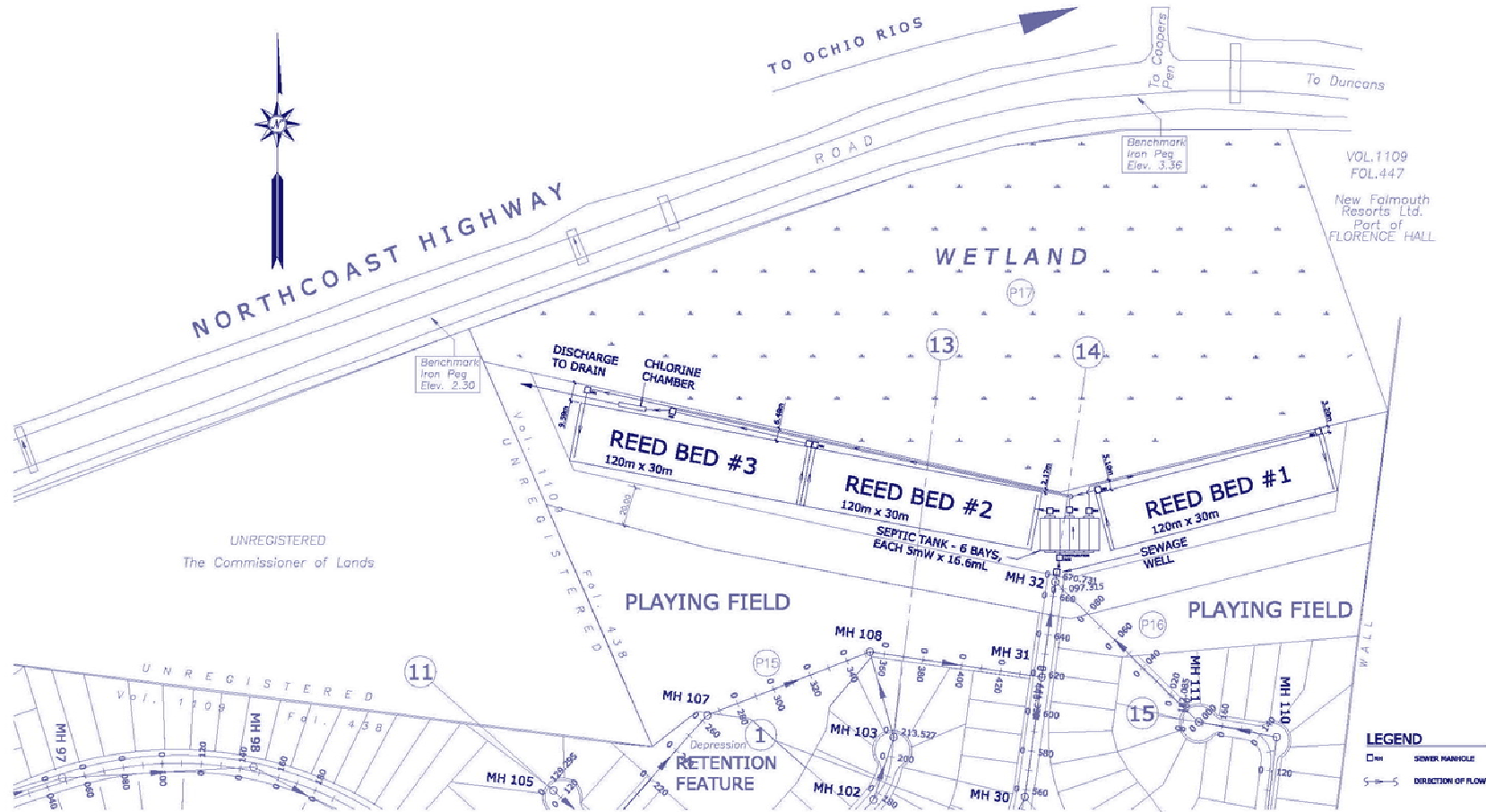
TITLE  
SEWAGE TREATMENT P  
PLAN AND SCHEMATIC

DATE  
NOV. 2008

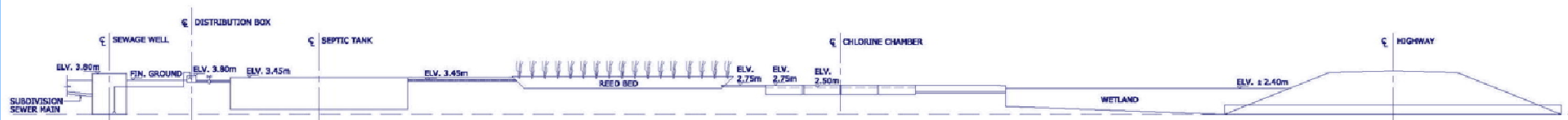
SCALE  
AS SH

PROJECT NUMBER  
0827/76/C

SHEET NUMBER  
STP-01c



PLAN OF SEWAGE TREATMENT PLANT



SCHEMATIC OF SEWAGE TREATMENT PLANT



# Proposed Site of Sewage Treatment Plant

Woodland

Wetland





# Inside the Wetland





# Mitigation Measures

## Operation Impacts

### 3. Cave Protection and Safety:

- ❖ 10 m vegetative buffer around each cave
- ❖ Fencing may also be necessary

### 4. Heritage Retention:

- ❖ Maintenance and restoration of the Great House and immediate area
- ❖ The Developer is consulting heritage experts to determine how best to manage the heritage features as a functional site



# Cumulative Impacts

## Traffic:

- ♦ Traffic flows expected to increase with introduction of some 800+ family into the immediate area
- ♦ In addition, when the Greenfield Multi-Purpose Stadium/Complex is hosting a major event traffic flows are likely to peak leading to further congestion
- ♦ Roadways, walkways, entrances and exits must be designed in conjunction with the NWA and Transport Authority

# Cumulative Impacts

## Solid Waste:

- ❖ The proposed development and adjacent residential populations will create a new demand for an adequate solid waste collection and disposal system in immediate area
- ❖ Any inadequacy in system could potentially lead to accumulation of solid wastes with contamination of the wetlands, ground water and built environment
- ❖ Also loss of aesthetic appeal and outbreak of nuisance species



# Cumulative Impacts

## Social infrastructure

### i. Education:

- ❖ More schools to be built to accommodate the present and expected increased student populations
- ❖ Each new housing development including the present proposed project will increase the urgency of this demand

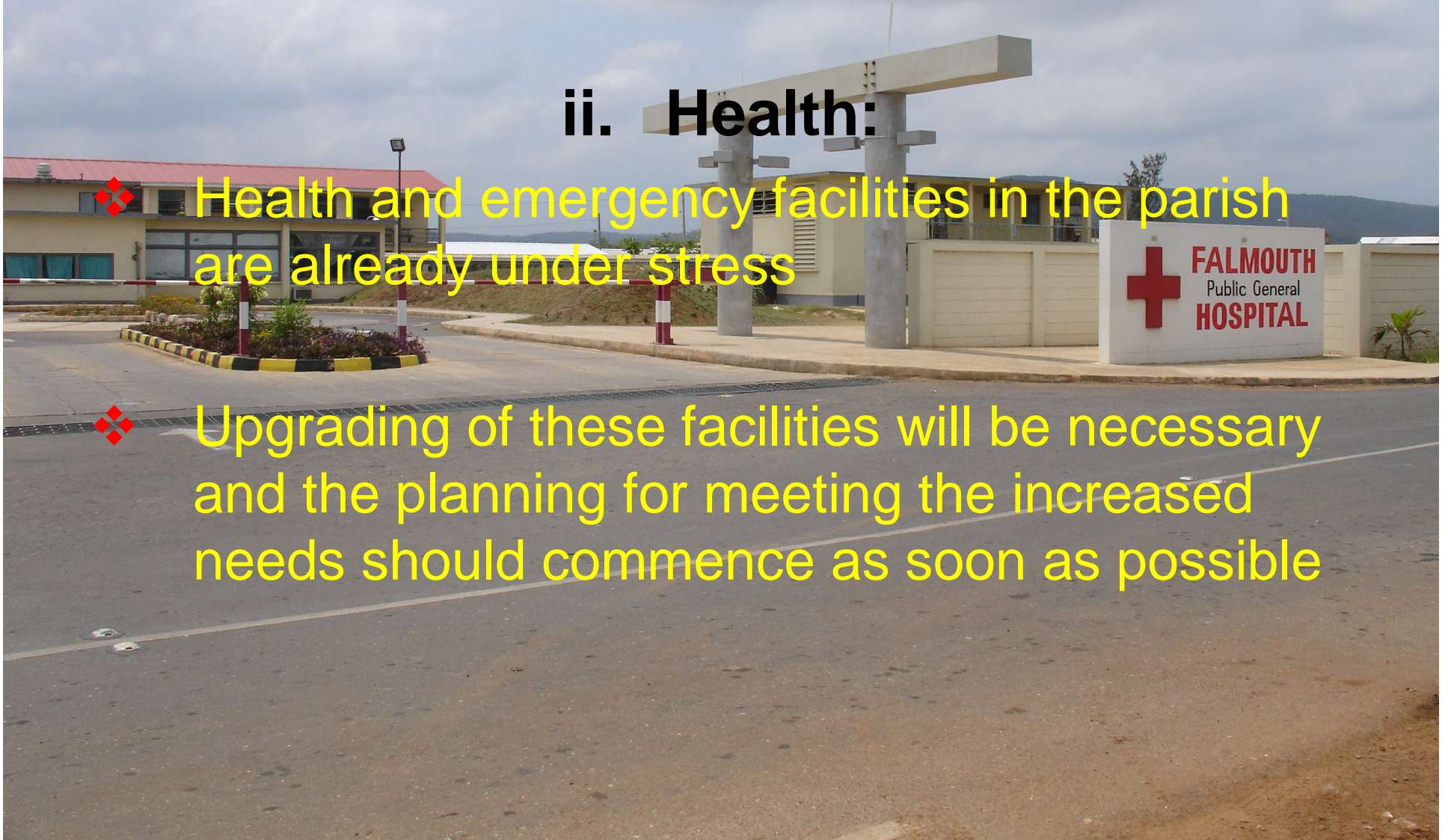
# Cumulative Impacts

## Social infrastructure

### ii. Health:

❖ Health and emergency facilities in the parish are already under stress

❖ Upgrading of these facilities will be necessary and the planning for meeting the increased needs should commence as soon as possible





# Consideration of Alternatives

- ❖ The housing demand – an estimated housing demand of 700 units per year is projected for Trelawny. The Florence Hall project is a major contributor to meeting demand
- ❖ The site is well located to new and planned developments as well as the NCH which allows easy access to Montego Bay and St. Ann



# Consideration of Alternatives

- ❖ Potential impacts identified can be mitigated by careful planning and implementation
- ❖ No other site in the area has been identified or is known to be available for similar development



# The Build Alternative

❖ The Developer is confident that there is demand for the proposed housing development in the New Falmouth area of Trelawny due to the fact that the area is strategically located close to a growing resort town, a major highway, and an area poised for future developments



A photograph of a dense forest with many trees and green foliage. The text "THANK YOU !!!" is overlaid in red.

**THANK YOU !!!**

**QUESTIONS AND ANSWERS ...**