

ENVIRONMENTAL IMPACT ASSESSMENT

for the

JAMAICAN HOUSES OF PARLIAMENT

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DRAFT FINAL REPORT

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Draft Final Environmental Impact Assessment
Environmental Impact Assessment for the Jamaican Houses of
Parliament

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TABLE OF CONTENTS

LIST OF FIGURES	VII
LIST OF TABLES	IX
LIST OF ABBREVIATIONS AND ACRONYMS	XI
EXECUTIVE SUMMARY	XIV
1 INTRODUCTION	2
1.1 PURPOSE AND OBJECTIVES OF THE EIA	2
1.2 PROJECT VISION AND PRINCIPLES.....	2
1.3 CONTEXTUAL BACKGROUND	3
1.4 PROJECT LOCATION AND BOUNDARIES	5
1.5 ASSUMPTIONS AND CONSTRAINTS.....	5
2 POLICY, LEGAL AND REGULATORY CONSIDERATIONS	8
2.1 LEGISLATION, REGULATIONS, POLICIES.....	8
2.2 REQUIRED PERMITS.....	11
3 METHODOLOGY AND APPROACH	13
3.1 GENERAL APPROACH.....	13
3.2 PHYSICAL ASSESSMENT	13
3.2.1 <i>Topography, Geology and Soils</i>	13
3.2.2 <i>Hydrology and Drainage</i>	13
3.2.3 <i>Climate and Climate Change</i>	19
3.2.4 <i>Natural Hazard Risk</i>	19
3.2.5 <i>Air Quality and Noise</i>	19
3.2.6 <i>Water Quality</i>	27
3.3 ECOLOGICAL ASSESSMENT	27
3.3.1 <i>Avifauna</i>	27
3.3.2 <i>Vegetation</i>	27
3.3.3 <i>Other Fauna</i>	28
3.4 ARCHAEOLOGICAL/ HERITAGE ASSESSMENT.....	28
3.4.1 <i>Archival/Desk Research</i>	28
3.4.2 <i>Walking Survey</i>	28
3.5 SOCIO-ECONOMIC ASSESSMENT	29
4 PROJECT DESCRIPTION	33
4.1 THE HOUSES OF PARLIAMENT BUILDING	35
4.1.1 <i>Design Concept</i>	35
4.1.2 <i>Building Components</i>	36
4.2 LANDSCAPING OF NATIONAL HEROES PARK (ACCESS, FOOTPATHS AND INTERNAL ROAD NETWORK)	44
4.3 DRAINAGE DESIGN.....	48
4.4 WATER SUPPLY AND SEWAGE	50
4.5 SUSTAINABILITY	50
4.5.1 <i>Rainwater Harvesting</i>	52
4.5.2 <i>Energy Efficiency</i>	55
4.6 TRAFFIC MANAGEMENT	56
4.7 EXTERNAL INFRASTRUCTURE REQUIREMENTS	58

4.8	PROJECT TIMELINE	58
5	DESCRIPTION OF THE ENVIRONMENT.....	60
5.1	PHYSICAL ENVIRONMENT	60
5.1.1	<i>Topography</i>	60
5.1.2	<i>Geology and Soils</i>	60
5.1.3	<i>Hydrology and Drainage</i>	64
5.1.4	<i>Climate</i>	67
5.1.5	<i>Natural Hazards</i>	69
5.1.6	<i>Water Quality, Air Quality and Noise</i>	74
5.2	ECOLOGICAL ENVIRONMENT	77
5.2.1	<i>Situational Context</i>	77
5.2.2	<i>Flora</i>	78
5.2.3	<i>Fauna</i>	79
5.2.4	<i>Ecosystem Function and Services of the site</i>	79
5.3	ARCHAEOLOGY/ HERITAGE	80
5.3.1	<i>General History of Study Area</i>	80
5.3.2	<i>Artefacts with Potential Historical/Heritage Significance</i>	83
5.4	SOCIO-ECONOMIC ENVIRONMENT	84
5.4.1	<i>General</i>	84
5.4.2	<i>Existing Uses of the Site</i>	85
5.4.3	<i>Land-use Patterns</i>	85
5.4.4	<i>Existing and Projected Population for the Surrounding Communities</i>	85
5.4.5	<i>Employment and livelihoods of surrounding communities</i>	87
5.4.6	<i>Existing Social and Community Infrastructure</i>	88
5.4.7	<i>Community Challenges</i>	90
6	PUBLIC PARTICIPATION	93
6.1	COMMUNITY QUESTIONNAIRES	93
6.1.1	<i>Socio-Economic Survey</i>	93
6.2	KEY STAKEHOLDER INTERVIEWS	99
6.3	PUBLIC FEEDBACK.....	102
6.3.1	<i>Community Focus Groups</i>	102
6.4	PUBLIC CONSULTATION.....	108
7	IMPACTS IDENTIFICATION AND ANALYSIS	110
7.1	CONSTRUCTION PHASE	111
7.1.1	<i>Physical</i>	111
7.1.2	<i>Ecological</i>	113
7.1.3	<i>Archaeology/ Heritage Impacts</i>	113
7.1.4	<i>Socio-Economic</i>	113
7.2	OPERATION PHASE.....	114
7.2.1	<i>Physical</i>	114
7.2.2	<i>Ecological</i>	118
7.2.3	<i>Archaeology/ Heritage Impacts</i>	119
7.2.4	<i>Socio-Economic</i>	119
7.3	CUMULATIVE IMPACTS.....	120
8	POSITIVE ENHANCEMENTS AND MITIGATION MEASURES	125
8.1	CONSTRUCTION PHASE	125
8.1.1	<i>Physical</i>	125
8.1.2	<i>Ecological</i>	128

8.1.3	Archaeology/Heritage	129
8.1.4	Socio-Economic.....	129
8.2	OPERATION PHASE.....	131
8.2.1	Physical.....	131
8.2.2	Ecological.....	133
8.2.3	Archaeology/Heritage	133
8.2.4	Socio-Economic.....	133
8.3	SUMMARY OF IMPACTS AND MITIGATION MEASURES.....	135
9	PROJECT ALTERNATIVES	147
9.1	THE NO-ACTION ALTERNATIVE.....	147
9.2	PUBLIC GARDEN, PLEASURE PARK, AND RECREATION AREA.....	147
10	ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN.....	151
10.1	AIR QUALITY.....	151
10.1.1	Monitoring Standards	152
10.1.2	Monitoring Equipment and Stations	152
10.1.3	Monitoring Frequency.....	153
10.1.4	Management and Mitigation Measures	153
10.1.5	Key Performance Indicators	153
10.1.6	Roles and Responsibilities	154
10.1.7	Data Analysis and Reporting.....	154
10.2	NOISE.....	155
10.2.1	Monitoring Standards	155
10.2.2	Monitoring Equipment and Stations	155
10.2.3	Monitoring Frequency.....	155
10.2.4	Management and Mitigation Measures	156
10.2.5	Key Performance Indicators	156
10.2.6	Roles and Responsibilities	157
10.2.7	Data Analysis and Reporting.....	157
10.3	WASTE MANAGEMENT.....	157
10.3.1	Monitoring Frequency.....	157
10.3.2	Management and Mitigation Measures	158
10.3.3	Key Performance Indicators	159
10.3.4	Roles and Responsibilities	159
10.3.5	Data Analysis and Reporting.....	160
10.4	HEALTH AND SAFETY MANAGEMENT	160
10.4.1	Monitoring Frequency.....	160
10.4.2	Management and Mitigation Measures	160
10.4.3	Key Performance Indicators	162
10.4.4	Roles and Responsibilities	163
10.4.5	Data Analysis and Reporting.....	163
10.5	WATER QUALITY– SEDIMENT AND EROSION CONTROL.....	163
10.5.1	Monitoring Standards	163
10.5.2	Monitoring Frequency.....	163
10.5.3	Management and Mitigation Measures	163
10.5.4	Key Performance Indicators	163
10.5.5	Roles and Responsibilities	164
10.5.6	Data Analysis and Reporting.....	164
10.6	EMERGENCY RESPONSE	164
10.6.1	Monitoring Standards	164
10.6.2	Monitoring Frequency.....	164

10.6.3	<i>Management and Mitigation Measures</i>	164
10.6.4	<i>Key Performance Indicators</i>	165
10.6.5	<i>Roles and Responsibilities</i>	165
10.6.6	<i>Data Analysis and Reporting</i>	165
10.7	FLORA AND FAUNA.....	165
10.7.1	<i>Monitoring Standards</i>	165
10.7.2	<i>Monitoring Frequency</i>	165
10.7.3	<i>Management and Mitigation Measures</i>	165
10.7.4	<i>Key Performance Indicators</i>	166
10.7.5	<i>Roles and Responsibilities</i>	166
10.7.6	<i>Data Analysis and Reporting</i>	166
10.8	SUMMARY OF MONITORING FREQUENCY	166
10.9	CHANCE FIND PROGRAMME/ WATCHING BRIEF	167
11	CONCLUSION AND RECOMMENDATIONS	170
12	REFERENCES	171
13	APPENDICES	174
13.1	APPENDIX 1– TERMS OF REFERENCE	174
13.2	APPENDIX 2- WATER QUALITY RESULTS.....	182
13.3	APPENDIX 3 – SPECIES LISTS	190
13.4	APPENDIX 4– HISTORICAL PHOTOS: NATIONAL HEROES PARK	191
13.5	APPENDIX 5– SURVEY FORMS	194
13.5.1	<i>Business Survey Form</i>	194
13.5.2	<i>Community Survey</i>	195
13.7	APPENDIX 6 – MODERATOR’S DISCUSSION GUIDELINES FOR FOCUS GROUP.....	196
13.8	APPENDIX 7 – SUMMARY SOCIO ECONOMIC PROFILES FOR EACH COMMUNITY.	198
13.9	APPENDIX 8 – CDC LEADERSHIP (PERSONAL OPINION) QUESTIONNAIRE	209

LIST OF FIGURES

Figure 1-1: National Heroes Park (JNHT, 2011)	4
Figure 1-2: Location of project.....	5
Figure 3-1: National Heroes Park elevation map.....	14
Figure 3-2: Flow accumulation path and sub basins – National Heroes Circle.....	15
Figure 3-3: Local soil map	15
Figure 3-4: Determining imperviousness of study area.....	16
Figure 3-5: Air quality monitoring sites within the project sphere of the Houses of Parliament Project, September 2019.	26
Figure 3-6: Walking survey trail map.....	29
Figure 3-7: The National Heroes Park and environs within the 1km buffer.....	31
Figure 4-1: Location Map of the Project (Scale 1:12,500)	33
Figure 4-2: Project schematic design plan.....	34
Figure 4-3: Houses of Parliament design elements	35
Figure 4-4: Building design – Jamaican Houses of Parliament	35
Figure 4-5: Elevations – Jamaican Houses of Parliament	36
Figure 4-6: Building sections showing location of parliamentary chambers.....	37
Figure 4-7: Landscaped atriums.....	37
Figure 4-8: Artist's impression – Landscaped atriums.....	38
Figure 4-9: Artist's impression – Houses of Parliament debate chambers.....	39
Figure 4-10: Houses of Parliament building plan – Debate chambers	40
Figure 4-11: Houses of Parliament building plan – Level 1.....	41
Figure 4-12: Houses of Parliament building plan – Level 2.....	42
Figure 4-13: Houses of Parliament building plan –Level 0 and Basement	43
Figure 4-14: Houses of Parliament building plan –Level 0	43
Figure 4-15: Houses of Parliament building plan – Level Mezzanine/ Roof.....	44
Figure 4-16: Overall Site Design Plan.....	45
Figure 4-17: National Heroes Park – Circulation.....	46
Figure 4-18: Artist's impression – Proposed landscaping of project site.....	47
Figure 4-19: Onsite Drainage Areas	48
Figure 4-20: Detention Areas and Storm Sewer Plan	49
Figure 4-21: LEED summary of possible points for the Jamaican Houses of Parliament	52
Figure 4-22: Water integrated design.....	53
Figure 4-23: Proposed irrigation Water Tank Diagram.....	54
Figure 4-24: Percolation Diagram	55
Figure 4-25: Future Road Alignment.....	57
Figure 5-1: Contour map of the proposed site (extracted from: Sheet 18, Jamaica 1:50,000 (Metric Edition) Source: NLA, 2010.....	60
Figure 5-2: Geological map of the proposed site (extracted from: Sheet 18, Geological Map 1:50,000 (Metric Edition) Source: MGD, 2008.....	61
Figure 5-3: Test location sites (Source: NHL, 2019).....	62
Figure 5-4: Hydro-stratigraphic map of Hope River watershed	64
Figure 5-5: Location of the drainage path from project area to Barnes Gully	65
Figure 5-6: HeCHMS model schematic of the project area.....	66

Figure 5-7: Average temperature – KSA. (Source: Meteorological Office of Jamaica, 20 year mean temperatures 1996-2015).....	67
Figure 5-8: Average rainfall – KSA (Source: Meteorological Office of Jamaica, 30 year period between 1971 and 2000).....	68
Figure 5-9: Historic storms passing within 100km of Jamaica (n.d.) (Source: Mona Geoinformatics Institute)	69
Figure 5-10: Jamaica seismic activity – 1998–2010	71
Figure 5-11: Jamaica – Probability of exceedance of 50-year acceleration values (Source: Organization of American States)	74
Figure 5-12: Habitat map of study area (Source: Google Earth, 2019)	77
Figure 5-13: Examples of flora observed at study area (September 5, 2019)	79
Figure 5-14: Four categories of ecosystem services	80
Figure 5-15: Location of old gate and historic ceramics.....	83
Figure 5-16: Track that could be part of the original race track, but more likely prepared for recent track meets ..	84
Figure 5-17: Employment versus unemployment (Source: SDC, 2011).....	87
Figure 6-1: Community members' environmental concerns.....	94
Figure 6-2: Business owners' perception of acceptance of project by community members	96
Figure 6-3: Business owners' perceived potential impact of project on business	97
Figure 6-4: Business owners' environmental concerns	97
Figure 7-1: Water detention areas and storm sewer plan	116
Figure 7-2: Proposed development's impervious areas	117
Figure 7-3: Master Plan Study Areas to be developed over 2 phases (Source: One People..One Place, National Heroes District Master Plan)	121
Figure 7-4: Mixed use framework (Source: One People...One Place, National Heroes District Master Plan).....	121
Figure 7-5: Three Concepts for the buildings surrounding Government Oval.	122
Figure 8-1: Construction Traffic Routing (Source: Traffic Impact Study, 2020).....	130
Figure 8-2: Overlay – Sub-basins and natural waterways over water story.....	131
Figure 9-1: National Heroes Park Development Past Proposal	149
Figure 13-1: Black and white version of Adolphe Duperley’s lithograph, ‘Commemorative of the Extinction of Slavery on the 1st of August 1838’ which shows the gathering at the Race Course to celebrate emancipation.	191
Figure 13-2: Kingston Race Course 1844	191
Figure 13-3: The City of Kingston from Starks History and Guide to Jamaica 1897– showing location of Kingston Race Course	192
Figure 13-4: One of the refugee camps at the Race Course.....	192
Figure 13-5: Performance at the Simon Bolivar statue	193

LIST OF TABLES

Table 2-1: Legislation, regulations and policies	8
Table 3-1: Loss computation data	16
Table 3-2: Overland flow and channel flow computation parameters	17
Table 3-3: Cavaliers rainfall vs return period.....	17
Table 3-4: Intensity duration frequency data (NMIA)	18
Table 3-5: DDF distribution for NMIA	18
Table 3-6: Cavaliers DDF data	19
Table 3-7: Description of air quality and noise monitoring sites within the project sphere of the Houses of Parliament Project, September 2019	20
Table 4-1: LEED Points	50
Table 4-2: Overall project timeline	58
Table 5-1: Summary of soil parameters.....	63
Table 5-2: Predevelopment peak flows and runoff volumes	66
Table 5-3: Impacts of selected storm events on Jamaica	70
Table 5-4: Jamaica's most damaging earthquakes	71
Table 5-5: Well water results compared to the NRCA Irrigation Standards (January results)	75
Table 5-6: Particulate matter and noise results for monitoring sites within the project sphere of the Houses of Parliament Project, September 2019	75
Table 5-7: Habitat classes defined for the study area	78
Table 5-8: Timeline of events of historical significance at the National Heroes Park	81
Table 5-9: Community Estimated Populations 2020 and Projections for 2030.....	86
Table 5-10: Estimated Population In each community falling within the 1km Project Radius (2020)	86
Table 5-11: Proportion of toilets linked to sewer system	89
Table 5-12: Proportion of households that share toilet facilities.....	90
Table 6-1: Issues probed in the socio-economic survey.....	93
Table 6-2: Community members' most frequently selected alternative land use for Emancipation Park	94
Table 6-3: Summary – Community members' responses (D.K. – Doesn't Know; N. R. – No Response)	95
Table 6-4: Business owners' suggested alternative land use for National Heroes Park.....	98
Table 6-5: Summary – Business owners' responses	98
Table 6-6: Focus group participants by community	102
Table 6-7: Issues discussed in each focus group.....	102
Table 6-8: Focus group results – Socio-demographic issues	103
Table 6-9: Focus group results – The economy and social conditions	104
Table 6-10: Focus group results – The project, the environment and project acceptance.....	105
Table 7-1: Impact assessment criteria for quantitative analysis	110
Table 7-2: Definition of impact durations.....	111
Table 7-3: Type of impact	111
Table 7-4: Differences in pre- and post-development peak flows and runoff volumes.....	114
Table 7-5: Sub-basins' imperviousness.....	117
Table 7-6: Post-development peak flows and runoff volumes.....	117
Table 8-1: Differences in sub-basin pre- and post-development runoff volumes.....	132
Table 8-2: Summary of impacts and mitigation measures	135
Table 10-1: Identified risks and the relevant sections of the management plan.....	151
Table 10-2: Air quality monitoring standards and timing.....	152

Table 10-2: Key Performance Indicators.....	154
Table 10-3: Noise standards	155
Table 10-4: Key performance indicators.....	156
Table 10-5: Key performance indicators.....	159
Table 10-6: Key performance indicators.....	162
Table 10-8: Key performance indicators.....	163
Table 10-9: Key performance indicators.....	165
Table 10-10: Key performance indicators.....	166
Table 10-11: Monitoring frequency in Construction and Operation.....	166
Table 13-1: List of flora identified in study area (September 5, 2019).....	190
Table 13-2: List of avian species observed at National Heroes Park (September 5, 2019)	190

LIST OF ABBREVIATIONS AND ACRONYMS

ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
CBO	Community-based organization
CDC	Community Development Committee
CN	Curve Number
Cumecs	Cubic Metres Per Second
dB(A)	A-weighted decibels
DCL	Design Collaborative Limited
DDF	Depth Duration Frequency
DEM	Digital Elevation Model
EHS	Environment Health and Safety
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMS	European Macroseismic Scale
EMP	Environmental Management Plan
ESL	Environmental Solutions Limited
GIS	Geographic Information Systems
HEC-GeoHMS	Geospatial Hydrologic Modelling Extension
Hec-HMS	Hydrologic Engineering Centre Hydrologic Modelling System
HOP	Houses of Parliament
HPM	Honourable Prime Minister
HSG	Hydrologic Soil Group
HVAC	Heating, ventilation and air conditioning
IDF	Intensity Duration Frequency
IECC	International Energy Conservation Code
IEQ	Indoor Environmental Quality
IFC	International Finance Corporation
IP	Integrative Process

IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
JIS	Jamaica Information Service
JNHT	Jamaica National Heritage Trust
KMA	Kingston Metropolitan Area
KPI	Key Performance Indicator
KSA	Kingston and St. Andrew
LED	Light-emitting diode
LEED	Leadership in Energy and Environmental Design
NEPA	National Environment and Planning Agency
NIOSH	National Institute for Occupational Safety
NLA	National Land Agency
NMIA	Norman Manley International Airport
NRCA	Natural Resources Conservation Authority
NSWMA	National Solid Waste Management Authority
NWC	National Water Commission
ODPEM	Office of Disaster Preparedness and Emergency Management
OESH	Occupational, Environmental, Safety and Health
OSHA	Occupational Safety and Health Administration
PIOJ	Planning Institute of Jamaica
PM ₁₀	Respirable Particulates
PPE	Personal Protective Equipment
PV	Photovoltaic
PVC	Polyvinyl Chloride
REA	Rapid Ecological Assessment
RWH	Rainwater Harvesting
SCS	Soil Conservation Service
STATIN	Statistical Institute of Jamaica

The UWI	The University of the West Indies
TWA	Time Weighted Average
UDC	Urban Development Corporation
UH	Unit Hydrograph
US EPA	United States Environmental Protection Agency
USGBC	U.S. Green Building Council
VIP	Very Important Person
WRA	Water Resources Authority

EXECUTIVE SUMMARY

The current Parliament of Jamaica is located at Gordon House on Duke Street in Downtown Kingston. Since the 1950s, there was this awareness of the need for new Houses of Parliament due to the increasing demand for parliamentary office space. It was crucial for the new location and buildings to be not only important, but also representative of a national symbol for the country. The Kingston Race Course, renamed the George VI Memorial Park in 1953, and known today as the National Heroes Park, was identified from then as the preferred location.

The new Houses of Parliament will be located in the National Heroes Park and they are expected to allow the space to evolve into one that begins to improve the image of the city, uplift the mood of their environs, give added value and a sense of place to this historic site, and continue to provide opportunities for the country's citizens to partake of their democratic rights. It is intended to provide the freedom to socialize, relax, connect with nature and conduct business. It is to become an even more significant public green space, contributing to the quality of urban life, and thus adding vitality to local urbanity by meeting the needs for physical, intellectual, emotional and social stimuli for the healthy development of both young and old. At the same time, the space will continue to accommodate a community for the people: the urban dweller, the rural visitor, the tourist, and all persons engaged in convivial life.

Description of the Project

The project refers to constructing Jamaica's new Houses of Parliament (HOP) that will sit on 11.4 acres of landscaped land within the National Heroes Park. The project will also transform the remaining 38.6 acres of the National Heroes Park into a green area in order to reaffirm the Park's significance as a recreational space for public use.

The design concept of the new HOP incorporates the people as the pillars, the Jamaican legislature as the structure, and the parliament as the system. Combined, these three elements resulted in a circular building which features multiple columns. The building has been designed in a way that there is no distinguishable "front" and "back" and its elevations appear uniform when viewed from all directions.

The building will have an estimated square footage is 15,636m², and will feature three levels atop a podium, a basement, and a roof area. Each of the three levels will be divided into public and private spaces to varying degrees depending on the space usage.

Landscaping within the project site has been designed to enhance connectivity and to engage pedestrians, in particular, by providing access to the largest open space in the Kingston Metropolitan Area (KMA). This will be achieved by having a series of footpaths around the parliament building itself as well as throughout the wider National Heroes Park, as well as creating various activity spaces, points of interest event gathering spaces for public use and enjoyment.

Description of the Existing Environment

Physical Environment – Overview

The proposed site of the Houses of Parliament is within the Kingston Metropolitan Area which sits on the Liguanea Plain. The topography of the study site is generally flat with little undulation and slopes towards

the south. It is located in the Hope River Watershed Management Unit, in the McGregor Gully sub-basin (18b), atop the alluvium aquifer. Currently, drainage from the site passes through a concrete culvert and then into Barnes Gully. The drainage path passes through the backyards of homes and underneath roadways before its confluence with Barnes Gully near St. George's College.

The climate of the National Heroes Park is consistent with that experienced by the rest of the Kingston and St. Andrew (KSA) area. Generally, Jamaica experiences a tropical maritime climate with a bi-modal rainfall season occurring in May and October.

Jamaica is vulnerable to tropical cyclones due to its location within the Atlantic hurricane belt and has been impacted by several hurricanes in the past. Many of the direct hit storms have approached the island from the south, thereby making the southern parishes, including Kingston and St. Andrew, especially vulnerable to the impacts of tropical cyclone hazards. The general area in which the project will be situated has been affected by storms and hurricanes in the past. Flooding was the primary issue related largely to the transportation of solid waste into the drains causing them to back up and overflow into sections of the communities and roadways. Trees fall and damage electrical wires. Hurricane Gilbert (1988) resulted in the most significant damage to the general area.

Jamaica also has a history of droughts. The years 2009–2010 and 2014–2015 showed a decrease in daily rainfall from the yearly totals recorded at all the stations. This corresponded with the years of El Niño in the Atlantic which resulted in below normal rainfall; as a consequence, the island experienced drought conditions with maximum impact in KSA, south St. Elizabeth, and Clarendon. Additionally, every year in the dry periods, the National Water Commission (NWC) reports that there is an average shortfall of 20 million gallons per day. This affects the businesses, schools and organizations in the surrounding communities.

Jamaica, due to its location on the Caribbean Plate margin, is susceptible to seismic activity. Seismicity mapping has indicated that there is a concentration of seismic activities in the country's eastern parishes of St. Thomas, Portland, Kingston and St. Andrew where the project is located. However, the geotechnical assessment has indicated that the soils in the project site are not likely to liquefy.

All eight sampling stations for air quality had PM₁₀ concentrations <150µgm⁻³ with the highest value being 38.4µgm⁻³. Noise levels at all sites exceeded the NEPA Standard of 65dBA for Commercial Areas at 3 of the 8 sites. These sampling locations were influenced primarily by vehicular traffic which is a source of noise.

Ecological Environment – Overview

The study area is not considered to be in an ecologically significant/sensitive area. The ecology of the project site can be characterized as being severely disturbed since historically, it has been subjected to significant vegetation clearance and landscaping for use as a racetrack, park and monument.

Grasslands dominate the study area, accounting for over 90% vegetation coverage, followed by trees and shrubs. Those found on site are typical of urban landscapes and can be described as grassland with low tree density. None of the species observed in the area were of special conservation status (endemic, threatened or protected). Terrestrial faunae observed on site were limited to a few birds, butterflies and feral dogs, none of which are considered sensitive. The observed faunae are common and widespread species that typically occur in disturbed forests or landscapes. Further, none of the rare endemics (that are dependent on natural forests) were observed in the area.

Archaeology/ Heritage

The space now known as the National Heroes Park, or National Heroes Circle, has a long and varied history as a space for entertainment and sports in the city. It currently houses the resting places for some of the country's National Heroes, along with other notable national figures. Additionally, a number of monuments has been erected in the Park to honour these persons.

The known history of the site goes as far back as 1754 when the site was located on a property called Montgomery Pen in St. Andrew, not Kingston, which was a 160-acre lot owned by Jen Venhorn. Since then, its utilization has been diverse ranging from the hosting of sports activities to serving as a burial site for cholera victims. Most of the observations made on site were of objects that were more contemporary in nature, however, a few historical items were still visible within the study area.

Despite the study area's prominence in many significant historical events, there was no specific evidence of Shack Town, the refugee camp for the homeless following the 1907 earthquake; the cholera graves of the 1850s; horse racing paraphernalia, 1804 to 1953; dancehall paraphernalia of the 1950s; the presence of the militia in 1809; and cycle racing.

Socio-Economic Environment – Overview

National Heroes Park is located at the northern border of the Kingston and St. Andrew parishes and is surrounded by five communities – Cross Roads to the north, Greater Allman Town to the east, Fletchers Land to the south, Hannah Town to the south west, and Jones Town in the west.

The socio-economic survey was a non-random survey that targeted 456 respondents via a formal instrument. The project team administered two survey instruments: a business community questionnaire (94 respondents), which contained a set of questions for community members who operated businesses; and a second questionnaire (362 respondents) which targeted non-business operating community members.

The project does not appear to be widely favoured by the surrounding communities due to fear of the impact on their communities and how they have traditionally used the park. However, generally persons expressed a limited knowledge of the project which could be the reason for this fear. Some members in these communities are sensing that the project is a prelude to a major longer-term urban renewal movement that will make incursions into their communities, particularly in relation to increasing displacement with or without resettlement. In the long run, everyone benefits from urban renewal. Currently, not everyone understands its full implications. This is part of the communication challenge that the promoters of the HOP Project must overcome.

Impact Identification, Analysis and Mitigation

A summary of the potential impacts of the proposed development and the related mitigation measures are presented in the Table ES1 below:

Table ES1- Summary of potential project impacts and proposed mitigation measure

MAIN ISSUES	POTENTIAL IMPACTS	PROPOSED MITIGATION MEASURES
CONSTRUCTION PHASE		
Increased sediment runoff	The increase in sediment could infill drainage channels and gullies resulting in a reduced capacity for water and potential flooding.	<ul style="list-style-type: none"> • Install silt traps and screens; • Cover stored material; • Stored material should be bermed.
Increase in runoff during site clearance and preparation	Can potentially result in increased flooding	<ul style="list-style-type: none"> • Clear the site in stages; • Contour the site during clearance to allow for infiltration prior to replanting of vegetation to allow for infiltration.
Increase in air pollutants and dust	<p>Can potentially result in adverse impacts on the health of construction workers, surrounding businesses and institutions</p> <p>Deterioration of air quality</p>	<ul style="list-style-type: none"> • Vehicles on the construction site should be properly maintained to ensure they are always working optimally; • Speed limits in the project area should be set and enforced to reduce fugitive dust generation especially on unpaved surfaces; • Frequent wetting on the site should be mandated to reduce the levels of fugitive emissions; • Dust screens should be used especially for activities which generate a lot of fugitive dust and do not have an existing buffer zone, for example, those created by mature trees; • Periodic monitoring should be carried out to ensure compliance with the regulatory requirements and environmental best practice levels; • All fine earth material transported to the site should be properly covered; • Avoid storage of fine earth material for extended period of time on the site.

MAIN ISSUES	POTENTIAL IMPACTS	PROPOSED MITIGATION MEASURES
Elevated noise levels	Adverse health impact on contractors, employees, residents and animals	<ul style="list-style-type: none"> • All equipment and vehicles should be properly maintained; • Noise assessment should be conducted during start-up to identify areas where there may be elevated noise levels. If mitigative measures, such as the use of noise reduction dampers, cannot be implemented, persons should wear the appropriate personal protective gears; • The use of mobile acoustic/noise barriers without gaps around activities which generate high noise levels and are close to sensitive areas, particularly schools and health care facilities, etc.; Schedule noisy activities to reduce the magnitude of their impacts to people, businesses and the environment.
Flora and fauna could be displaced/removed during construction works.	Loss of flora and fauna during construction Habitat fragmentation	<ul style="list-style-type: none"> • Use equipment outside of peak bird activity (daybreak and sunset); • Nests of birds identified during clearance should be gently relocated to a section of the property that will not be clear-cut (if applicable); • All construction sites should be clearly demarcated; • Areas where priority plant species are growing must be demarcated as no-go zones (if applicable); • No clearing of vegetation, storage of materials or other construction-related activities shall be permitted outside the demarcated construction area; • Works should be undertaken as much as possible in the dry season.
Potential to boost ecosystem services through the	Increase in habitat quality, carbon sequestration value, seed dispersal potential	<ul style="list-style-type: none"> • Ensure that replanting is done with native/local species; • Develop a landscape or urban greening management plan.

MAIN ISSUES	POTENTIAL IMPACTS	PROPOSED MITIGATION MEASURES
provision of urban green space		
Traffic Congestion	Loss of travel time Compromise to road user safety Danger to pedestrians, particularly children	<ul style="list-style-type: none"> Execute a comprehensive traffic plan to cover both internal and the external traffic environment.
Increased social apprehension and tensions including anxiety and anger	Mainly psychological	<ul style="list-style-type: none"> Consultation and inclusiveness in bringing better community understanding of the project and allaying misgivings.
Employment and Economic Activity	Persons from within the community could be employed during construction. Businesses surrounding the Park are likely to see an increase in business during construction when workers buy snacks, lunch, etc. from them.	<ul style="list-style-type: none"> The possibility of employing persons from within the communities should be announced as early as possible to reduce anxiety and concerns.
Potential to uncover items of significant cultural heritage value	Enhanced knowledge of cultural heritage and history of Jamaica	<ul style="list-style-type: none"> Implement watching brief to ensure that any items discovered are properly identified and catalogued.
Potential for damage to items of significant cultural heritage value	Damage or loss of heritage features	<ul style="list-style-type: none"> Prepare a watching brief prior to the start of construction; Make arrangements for a team of archaeologists and the Jamaica National Heritage Trust (JNHT) to be on standby particularly during excavation and land clearance. Prior to construction a record of the monuments and grave sites should be done prior to the start of construction

MAIN ISSUES	POTENTIAL IMPACTS	PROPOSED MITIGATION MEASURES
		to mitigate against any damage during construction.
OPERATION PHASE		
Increase in runoff due to increase in impermeable surfaces	Can result in possible flooding in downstream areas	<ul style="list-style-type: none"> • Implement the proposed designs to capture and reduce runoff on the site to allow for Rainwater Harvesting (RWH) and infiltration.
Increase in green area within the project area	Has the potential to create ecological corridors and habitat for local fauna, e.g., birds, butterflies, etc., which are able to survive in urban, semi-disturbed landscapes	<ul style="list-style-type: none"> • Prepare a landscaping plan; • Use local species as much as possible.
Increase in the volume of cars in the area	Increase in traffic and drive time for commuters passing through the area	<ul style="list-style-type: none"> • Use of traffic signals as much as possible to control the flow of traffic.
Increase in visitors to the Park to view the heritage features	Heritage features will be more visible.	<ul style="list-style-type: none"> • Utilize signs as much as possible to educate persons as to the history of the site.
Exclusion of community members from the use of the space	Loss of common space to be used by the surrounding communities for sports and other social events	<ul style="list-style-type: none"> • During the consultation, the communities provided the following suggestions: <ol style="list-style-type: none"> 1. A play zone for children; 2. Elements of an amusement park that will have broad appeal to users; 3. A running and exercise track; 4. Facilities that will cater to the recreational needs of park-goers, such as access to refreshments; 5. Incorporation into the Parliament Building of cultural offering out of the communities, inclusive of their

MAIN ISSUES	POTENTIAL IMPACTS	PROPOSED MITIGATION MEASURES
		fine arts, music, drama, culinary offerings or fashion displays; 6. A space where events can be held; 7. A space for soft sporting activities; 8. Hard surface sporting facilities and a gym are examples cited. 9. Outreach that is sensitive to the heritage elements inherent in most communities; 10. Outreach and sensitivity to the cultural offerings that communities can mount within their communities to be available to users and visitors of the Park;

Conclusion and Recommendations

The project has the potential to generate both positive and negative impacts. The negative impacts are anticipated to be short in duration and reversible. The positive impacts are significant and would result in an overall improvement in the area and nearby communities.

As a result, based on the findings of the environmental impact assessment, the Consultant’s professional opinion is that, once the recommended mitigation measures are followed, the project is not likely to result in significant environmental impacts.

However, given the wider development plans for the general area, it is important that serious consideration be given to improving the water supply, sewage and general solid waste management of the area. New developments should be encouraged to use permeable parking spaces, rooftop green spaces, rainwater harvesting and solar energy. Traffic Management will also be an important consideration especially once the Master Plan for the Government Area has been implemented.



INTRODUCTION

1 INTRODUCTION

1.1 Purpose and Objectives of the EIA

In 2018 there was a public competition to design the new Jamaican Houses of Parliament to be located in the northern portion of the National Heroes Park. The ‘Out of Many, One People’ Team was successful, and this project now involves the implementation of those designs. It is anticipated that the new Houses of Parliament will transform this section of Kingston and be the flagship project for the redevelopment of the area to be known as the Government Oval. The new Houses of Parliament are expected to allow the space to evolve into one that begins to improve the image of the city, uplift the mood of its environs, give value and a sense of place to communities in this urban setting, and continue to provide opportunities for citizens to partake of their democratic rights. It is intended to provide the freedom to socialize, relax, connect with nature and conduct business. It is to become an even more significant public green space, contributing to the quality of urban life, adding vitality to local urbanity, and meeting the needs for physical, intellectual, emotional and social stimuli for the healthy development of both young and old. Additionally, this public space will continue to accommodate a community for the people: the urban dweller, the rural visitor, the tourist, and all persons engaged in convivial life.

Environmental Solutions Limited (ESL) was contracted by Design Collaborative Limited (DCL) to prepare the Environmental Impact Assessment (EIA) for the Jamaican Houses of Parliament project. The EIA represents Phase II of the contracted work. This document represents the draft EIA. This draft report has been informed by site visits and assessments, key stakeholder and community consultations, and supported by document review and analysis of both primary and secondary data.

This EIA provides the overview of the project, the physical and environmental setting in which it is located, as well as the likely environmental and social impacts and risks of the project. The EIA also suggests actions that should be taken to mitigate these environmental and social risks as per the Terms of Reference (Appendix 1).

1.2 Project Vision and Principles

The project has six goals which were both stated and implied from the team’s understanding of the Client’s intent (Programme Verification Document Submittal for Government of Jamaica New Houses of Parliament Project, 2019). These objectives were listed in the competition brief, emerged during the stakeholder consultations and were reiterated by the Honourable Prime Minister (HPM) and approving agencies:

1. **Design** – Timeless design that will age well over time, and which is programmatic, transparent and incorporates its surroundings;
2. **Flexibility** – Programme spaces and technical infrastructure should allow the building to evolve over its lifetime;
3. **Sustainability** – Incorporate principles that shadow Leadership in Energy and Environmental Design (LEED) Gold standards for a “green” building.

4. **Functionality** – Provide optimal functionality which allows the government to more efficiently execute the work of the people.
5. **Operation and Maintenance** – The building design should facilitate the ease of maintenance and operations;
6. **Security** – The site and building shall provide security systems and controls that optimize the security of the Park and the Houses of Parliament through a series of incorporated “Visible and Invisible” controls.

1.3 Contextual Background

The current Parliament of Jamaica is located at Gordon House on Duke Street in Downtown Kingston. It does not meet the standard of internationally iconic parliament buildings and it has inadequate space, limited technology and generally does not conform to global standards (UDC, 2018).

Since the 1950s, there was this awareness for the need for new Houses of Parliament due to the increasing demand for parliamentary office space. It was of critical importance that the new location and buildings be not only a significant landmark, but also a national symbol for the country. The preferred location was identified from then as the National Heroes Park (UDC, 2018).

The area on which the National Heroes Park now stands was once one of the most popular locations in Kingston:

- For 101 years, the land was the centre for horse racing in Jamaica;
- Other sporting activities that took place on the site included cricket and cycle racing;
- The area was also the venue for travelling circuses that visited the island from time to time.

The property was purchased in 1818, by the Kingston Council for £985 and 10 shillings. At the time, it was part of a property called Montgomery Pen, however, the area later became known as the Kingston Race Course because of its dominant activity which continued up until 1953 when horse racing was transferred to Knutsford Park (JNHT, 2011). The track was then converted to a public park and renamed George VI Memorial Park in honour of King George VI of the United Kingdom. Jamaica gained independence from the United Kingdom in 1962 and the site was officially renamed the National Heroes Park in 1973. This Park is now a permanent place for honouring Jamaican heroes whose monuments are erected in an area known as the Shrine (Figure 1-1).



Figure 1-1: National Heroes Park (JNHT, 2011)

Additionally, the National Heroes Park is the final resting place of several prominent Jamaicans:

- Three of Jamaica’s national heroes – Marcus Garvey, Norman Washington Manley and Sir Alexander Bustamante;
- Former prime ministers – Hugh Shearer, Sir Donald Sangster, Michael Manley and Edward Seaga; and
- Other notable Jamaican icons including Louise Bennett and Dennis Brown.

Situated on some fifty (50) acres within the urban zone designated as Downtown Kingston, the Park is the largest open space in Kingston and is a major “historic green space” in the nation’s capital. Over the years, successive Governments have had plans to transform the space to uphold and enhance the purpose and rich history of the National Heroes Park and its immediate environs.

Eight concept master plans have been developed through the collaborative efforts of various agencies with a vision to provide infrastructure renewal, upgraded housing stock, improved security and new recreational spaces for the communities surrounding the Park. In 2017, the current administration was presented with an opportunity, through an unsolicited proposal, to explore the design and implementation of development plans for the National Heroes Park and the wider development of Downtown Kingston.

The proposed urban renewal vision for the Government Oval is slated to take approximately eight years and would be approached in three broad phases:

- Phase I– Planning and design phase, which will run from 2018 through 2020;
- Phase II– Rebuilding phase which will run through to 2024;
- Phase II– Execution phase, 2025 through 2026 (JIS, 2018).

1.4 Project Location and Boundaries

As previously stated, the project is located within the boundaries of the National Heroes Park, located at the northern sections of the parishes of Kingston and St. Andrew. The National Heroes Park is bounded by a number of government buildings including, but not limited to, the Ministry of Finance and The Public Service to the west, and the Ministry of Education, Youth and Information to the south. Additionally, the National Heroes Park is surrounded by five communities – Cross Roads to the north, Allman Town to the east, Fletcher’s Land to the south, and Hannah Town and Jones Town to the west (Figure 1-2).



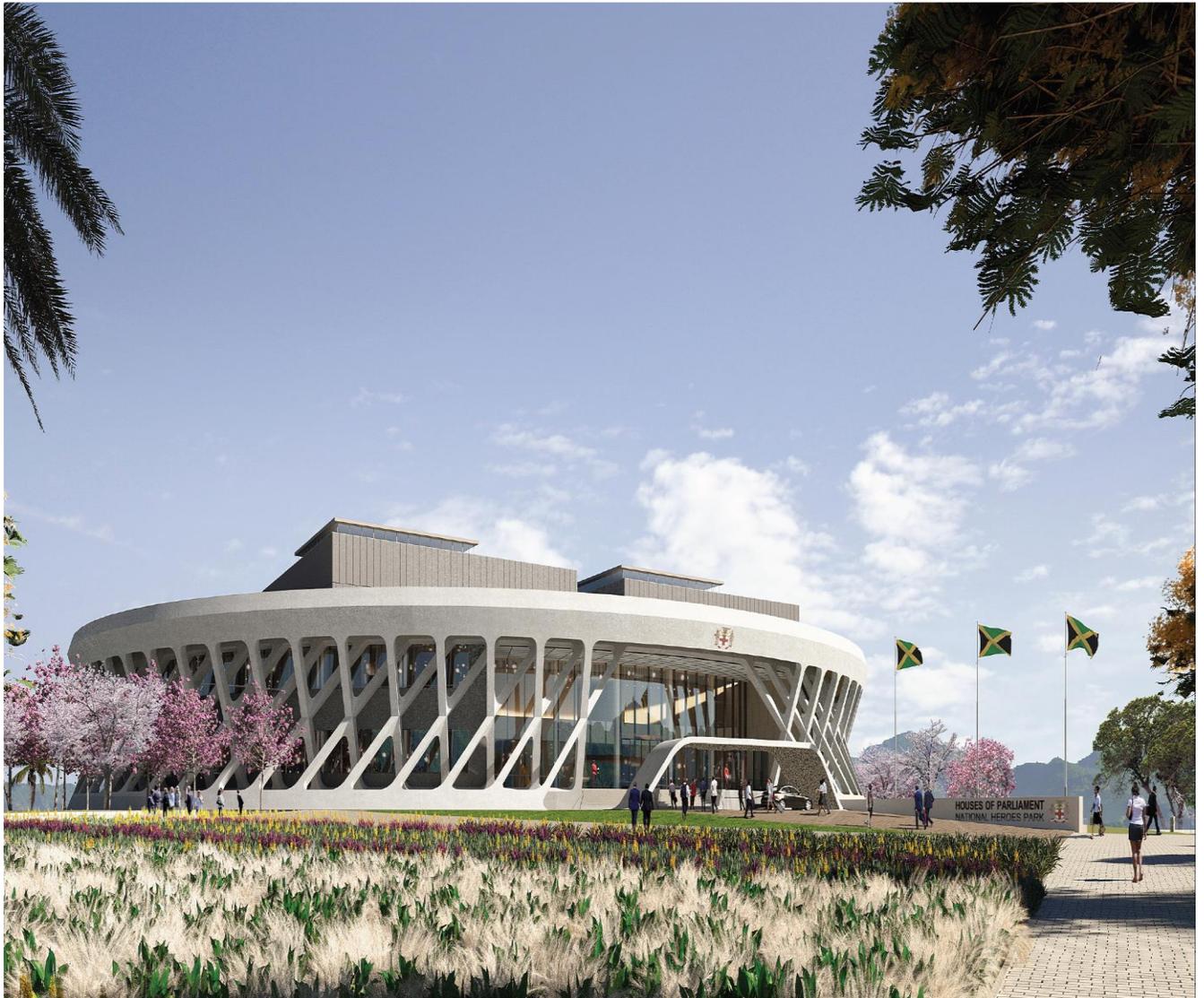
Figure 1-2: Location of project

1.5 Assumptions and Constraints

The following should be noted:

- There were approximately 700 respondents, but these cannot be assumed to be the views of the remaining population. However, in the experience of the Consultants the opinions and results achieved are indicative of those of the wider population.
- Similarly, the sources of the quantitative data used in drawing inferences about the demographic and socioeconomic environment was several years old. However, the very slow population growth rate and the tendency for socio demographic features to change slowly, supports the assumption that the data holds reasonably true for the current period.
- It was not possible to canvas the opinions of senior political representatives for the communities. Neither was it possible to interview a cross section of select older members of the community who would have had a retained community history and experience to offer on the project.

- Community members were generally aware of but not very informed about the Project. This meant that opinions expressed may not have benefited from the considered reflection that pre awareness brings.
- Rumours of or one or two acts of actual violence, required caution and the support of community identified assistance to effectively move around the project area at times. This did not prove to create a problem, rather more of an occasional delay.



POLICY, LEGAL AND REGULATORY CONSIDERATIONS

2 POLICY, LEGAL AND REGULATORY CONSIDERATIONS

2.1 Legislation, Regulations, Policies

There are several national environmental and planning laws and regulations that are relevant to the Houses of Parliament Project. These also include regulations for the construction and operation of the development and supporting activities, such as sewage treatment and water supply facilities (Table 2-1).

Table 2-1: Legislation, regulations and policies

LEGISLATION/REGULATIONS/POLICIES/ INTERNATIONAL TREATY	RELEVANCE TO PROJECT
LEGISLATION	
<p>Natural Resources Conservation Authority Act, 1991</p>	<p>This Act is responsible for environmental management; governs all pollution activities within Jamaica, the EIA regulatory framework (where this is applicable) is governed by the Natural Resources Conservation Authority (NRCA) Act.</p> <p>NRCA’s powers and responsibilities include among others:</p> <ul style="list-style-type: none"> • Establishing and enforcing pollution control and waste management standards and regulations; • Monitoring and enforcing environmental laws and regulations, especially those included in the NRCA, Beach Control, Watershed Protection, and Wildlife Protection Acts. <p>The NRCA Act binds the Crown and as such supersedes all other legislation relating to environmental issues. The Minister is empowered to request an Environmental Impact Statement (EIS) in relation to certain major projects.</p> <p>The project requires the conduct of an EIA and the preparation of an Environmental Permit as per the Act.</p>
<p>Town and Country Planning (Kingston) Confirmed Development Order, 1966</p>	<p>This Order makes provision for the orderly and progressive development of land, cities, towns and other areas whether urban or rural, to preserve and improve the amenities thereof, and for other matters connected therewith.</p> <p>The project will be required to submit building permit applications to the KSAMC.</p>
<p>Town and Country Planning (Kingston and St. Andrew and the Pedro Cays) Provisional Development Order, 2017</p>	<p>This Order, made under section 5 of the Town and Country Planning Act, provides for a wide variety of matters regarding the administration and development of the areas of the Parishes of Kingston and St. Andrew and the Pedro Cays as described in the First Schedule.</p> <p>Matters regulated by this Order include planning permission for development, control on subdivision of land, consultation with national authorities by the local planning authority before granting planning permission and appeals.</p> <p>The project will be required to submit building permit applications to the KSAMC.</p>
<p>Building Act, 2018</p>	<p>It facilitates the adoption and efficient application of national building standards to be called the National Building Code of Jamaica for</p>

LEGISLATION/REGULATIONS/POLICIES/ INTERNATIONAL TREATY	RELEVANCE TO PROJECT
	<p>ensuring safety in the built environment, enhancing amenities and promoting sustainable development, and for connected matters.</p> <p>The project will be required to submit building permit applications to the KSAMC.</p>
Jamaica National Heritage Trust Act, 1985	<p>An act to repeal and replace the Jamaica National Trust Act which includes changing the name of the Jamaica National Trust, and to make new provisions for governing its operations as well as to provide for matters incidental thereto or connected therewith.</p> <p>The Trust, in functioning under the Jamaica National Heritage Act, is responsible for promoting the preservation of national monuments and anything designated as protected national heritage for the benefit of Jamaica. It also carries out related development that is deemed necessary for the preservation of any national monuments or anything designated as protected national heritage. Additionally, the Trust records any precious objects or works of art to be preserved and to identify and record any species of botanical or animal life to be protected.</p> <p>The site is of historical and cultural importance. As such, the project is required to preserve as much as possible and to have a Chance Find Procedure/ Watching Brief.</p>
National Solid Waste Management Act, 2001	<p>This Act provides for the regulation and management of solid waste. It established the National Solid Waste Management Authority (NSWMA) for matters connected therewith or incidental thereto.</p> <p>Solid waste management will be essential in the construction phase and will require the removal and proper disposal of vegetative matter, soil, and construction rubble. The NSWMA should be contacted regarding an approved disposal site.</p> <p>NSMWA is also currently manages the maintenance of the Park.</p>
Wildlife Protection Act, 1945	<p>This Act specifically protects designated species of animals and regulates hunting in Jamaica. The Act also regulates the hunting of game birds and provides for the declaration of game sanctuaries and game reserves in which no hunting is allowed.</p>
Water Resources Act, 1996	<p>The Water Resources Act established the Water Resources Authority (WRA). This Authority is mandated to regulate, allocate, conserve and manage the water resources of the island.</p>
Watersheds Protection Act, 1963	<p>This Act provides for the protection of watersheds to include areas adjoining watersheds and the conservation of water resources for Jamaica.</p>
Flood-Water Control Act, 1958	<p>This Act makes provision for the construction, improvement, repair and maintenance of works for the control of flood water, and for other matters connected therewith.</p> <p>A Drainage Plan will be required for this project.</p>

LEGISLATION/REGULATIONS/POLICIES/ INTERNATIONAL TREATY	RELEVANCE TO PROJECT
Disaster Risk Management Act, 2015	<p>The Disaster Preparedness and Emergency Act established the Office of Disaster Preparedness and Emergency Management (ODPEM) which is responsible for carrying out the provisions of the Act.</p> <p>This Act outlines the needs for agencies to have emergency response plans and contingency plans for specific hazards.</p>
Registration of Titles Act, 1989	<p>This Act sets out the legal basis for land registration in Jamaica. Under this system, land registration is not compulsory, although once a property is entered in the registry system the title is continued through any transfer of ownership.</p>
Public Health Act, 1976	<p>This Act establishes the Central Health Committee with the local bodies being resident under the Parish Council of respective parishes. The Public Health (air, soil and water pollution) Regulations 1976 aim at controlling, reducing, removing or preventing air, soil and water pollution in all possible forms.</p> <p>The excavation and construction work and use of heavy machinery and equipment may result in the temporary generation of fugitive dust. Proper care and standard best practices for the construction industry should be applied to minimize public health risks.</p>
The Access to Information Act, 2002	<p>It gives citizens and other persons a general legal right of access to official government documents which would otherwise be inaccessible. This allows for informed knowledge of the functioning of government.</p>
King George VI Memorial Park Act, 1956	<p>This Act makes reference to the development and improvement of land designated as the King George VI Memorial Park (previously the Kingston Race Course) in Kingston and St. Andrew, the power of which stands with the KSAC.</p> <p>Under the Act, the park may be used as a public garden, pleasure park, and recreation area for the benefit of the inhabitants of the Corporate Area or be used for the construction of Parliament buildings and such administrative and other buildings, along with the burial of the remains of distinguished persons, and is subject to approval by the Minister of Local Government.</p> <p>This Act identifies that the KSAC has power of the land and identifies how it can be used. This is relevant in the EP application process.</p>
REGULATIONS / STANDARDS AND GUIDELINES	
The Natural Resources Conservation (Wastewater and Sludge) Regulations, 2013	<p>These Regulations are designed to prevent pollution of the environment (land, surface and marine water) from manufacturers, developers, operators of various (trade and sewage) treatment facilities and other relevant sectors, etc.</p>
The Natural Resources Conservation Authority (Air Quality) Regulations, 2002	<p>The Regulations state that no person shall emit or cause to be emitted from any air pollutant source at a new facility, any visible air pollutants the opacity or pollutant amount of which exceeds the standards.</p> <p>Every owner of a facility with one or more air pollutant source or activity shall employ such control measures and operating procedures</p>

LEGISLATION/REGULATIONS/POLICIES/ INTERNATIONAL TREATY	RELEVANCE TO PROJECT
	<p>as are necessary to minimize fugitive emissions into the atmosphere, and such owner shall use available practical methods which are technologically feasible and economical, and which reduce, prevent or control fugitive emissions to facilitate the achievement of the maximum practical degree of air purity.</p> <p>The UDC must ensure that contractors employ emission control measures to minimize fugitive emissions during construction.</p>
Natural Resources Conservation (Permit and License) (Amendment) Regulations, 2015	<p>These regulations were developed in 2013. They require the application for the grant of a permit to undertake an enterprise, construction or development of a prescribed description or category in a prescribed area as set out in Form 1 in the First Schedule.</p>
Public Health (Nuisance) Regulations, 1995	<p>In these Regulations, "nuisance" includes any nuisance specified in the Schedule. It states that no person shall cause or permit "nuisance" on any premises owned or occupied by him.</p> <p>The UDC must ensure that contractors employ noise control measures to minimize excessive noise during construction.</p>
Noise Standards	<p>Jamaica has no national legislation for noise, but World Bank guidelines have been adopted by the National Environment and Planning Agency (NEPA) and are used for benchmarking purposes along with the draft National Noise Standards that are being prepared.</p> <p>The UDC must ensure that contractors employ noise control measures to minimize excessive noise during construction.</p>
POLICIES	
National Hazard Mitigation Policy, 2005	<p>This Policy provides a framework for integrating hazard mitigation into all policies, programmes and plans at national and community levels. It sets out the broad goals and guiding principles for hazard risk reduction and informs the development of national hazard mitigation plans.</p> <p>The EIA must consider the susceptibility of the site to natural hazards and mitigation measures must be included in the designs as much as possible.</p>
The National Land Policy, 1996	<p>The goals and objectives of this Policy are to ensure the sustainable, productive and equitable development, use and management of the country's natural resources.</p>

2.2 Required Permits

The following permit is likely to be required:

- Construction and operation of office and commercial complexes (including shopping centres) of 5,000 square metres or greater.

Others may be required, but NEPA will indicate once the Final EIA and Designs are submitted.



METHODOLOGY AND APPROACH

3 METHODOLOGY AND APPROACH

3.1 General Approach

A multidisciplinary team of experienced scientists and environmental professionals was assembled to conduct the required assessment, including the generation and analysis of baseline data, determination of potential impacts, and recommendations for mitigation measures and development guidelines.

The team utilized the Charette-style approach to data gathering, analysis, and presentation, whereby team members conducted reconnaissance investigations together to determine critical elements for analysis and the issues to be highlighted for review of the design and planning process. Team meetings were utilized to discuss the progress of investigations and analyses and to facilitate integration of data toward an understanding of the systems at work in both the natural and built environment.

Baseline data for the study area was generated using a combination of the following research approaches:

- Field investigations
- Analysis of maps, plans, aerial photos
- Review of reports and background documents
- Structured interviews
- Laboratory analyses.

The following sub-sections describe the approach taken for each category of natural and built environmental parameters.

3.2 Physical Assessment

3.2.1 Topography, Geology and Soils

The approach included field investigations, review of relevant literature, and analysis of topographic, geological and soil maps for the area. The assessment included the analysis of the following maps:

1. The 1:50,000 Geological Map Series, Sheet 18
2. The 1:50,000 Topographic Map Series, Sheet 18
3. The 1:12,500 Topographic Map Series, Sheet 106a.

3.2.2 Hydrology and Drainage

For this assessment, the Hydrologic Engineering Centre Hydrologic Modelling System (HEC-HMS) was used to build the hydrologic model of the area. This model used a deterministic mathematical model that computes runoff from rainfall. Listed below are the main inputs to the model:

- a) Watershed stream network and size
- b) Infiltration loss method
- c) Transform method for transforming excess precipitation into runoff
- d) Flood routing methods
- e) Meteorological data
- f) The time span of the simulation.

Data for the model inputs were collected through the review of documents submitted by the client along with other documentation which details the hydrological processes that characterize the area. Additionally, information on elevation, streamflow, precipitation, soil classification and land use data were acquired from key stakeholder agencies.

3.2.2.1 Watershed and Stream Network

The watershed and stream network was developed in ArcGIS using the elevation data shown in Figure 3-1. This data was extracted from the elevation/contour map submitted by the client.

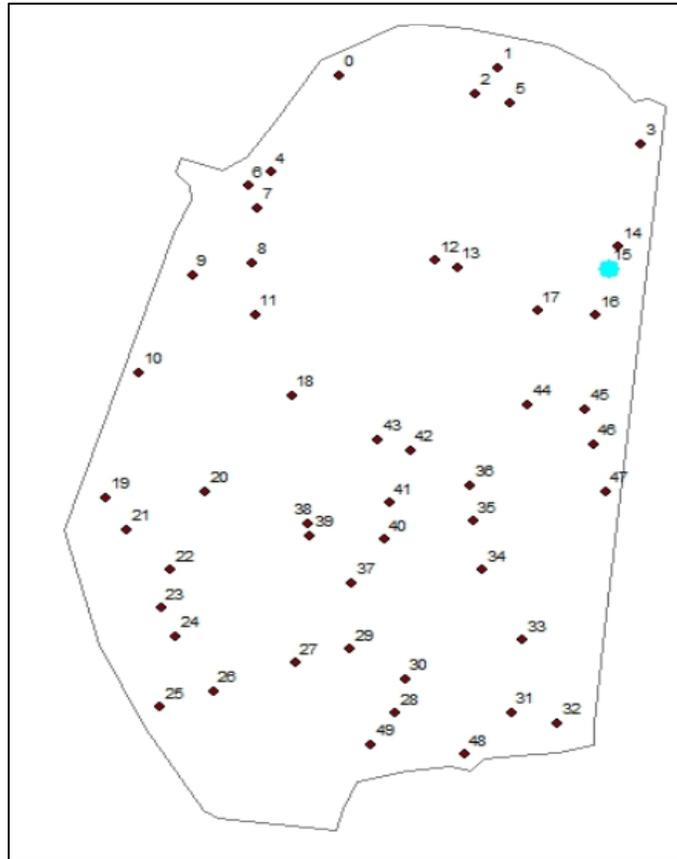


Figure 3-1: National Heroes Park elevation map

From these elevations, a Digital Elevation Model (DEM) was created, which was further processed using the Geospatial Hydrologic Modelling Extension (HEC-GeoHMS) GIS tool, to produce the flow accumulation path and the sub-basins (Figure 3-2).

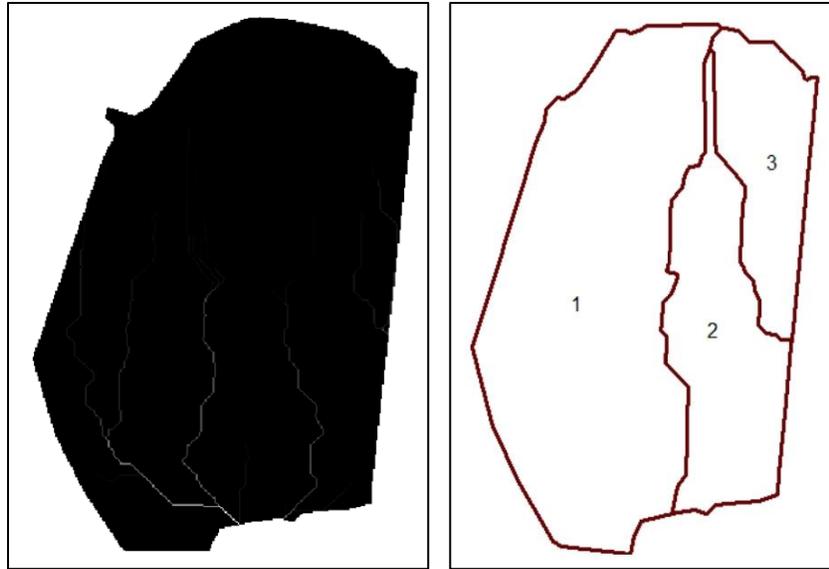


Figure 3-2: Flow accumulation path and sub basins – National Heroes Circle

3.2.2.2 Infiltration Loss

The infiltration loss was accounted for by using the United States Soil Conservation Service (SCS) Curve Number Method. The curve number (CN) is an index of the runoff potential of the area and is a function of the soil type, reclassified as Hydrologic Soil Group (HSG), imperviousness of the area and the particular land use. The study area, as shown in Figure 3-3 is located in an area for which the soil was not identified. Given that the surrounding soil type, 22 and 77, belong to HSG A, it was assumed that the soil characterizing the site is also HSG A.

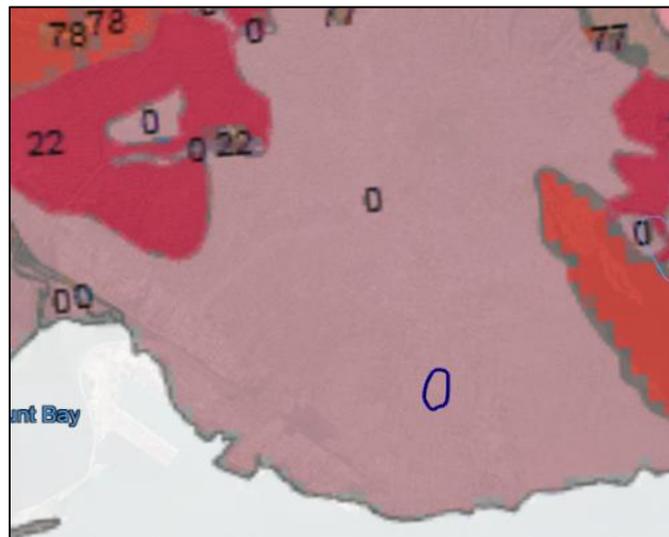


Figure 3-3: Local soil map

Information on the current land use and the extent of imperviousness in each of the sub-basins were derived using Figure 3-4. Imperviousness was determined for each sub-basin by digitizing the impervious areas such the car park, in order to determine the percentage of the area that is covered.

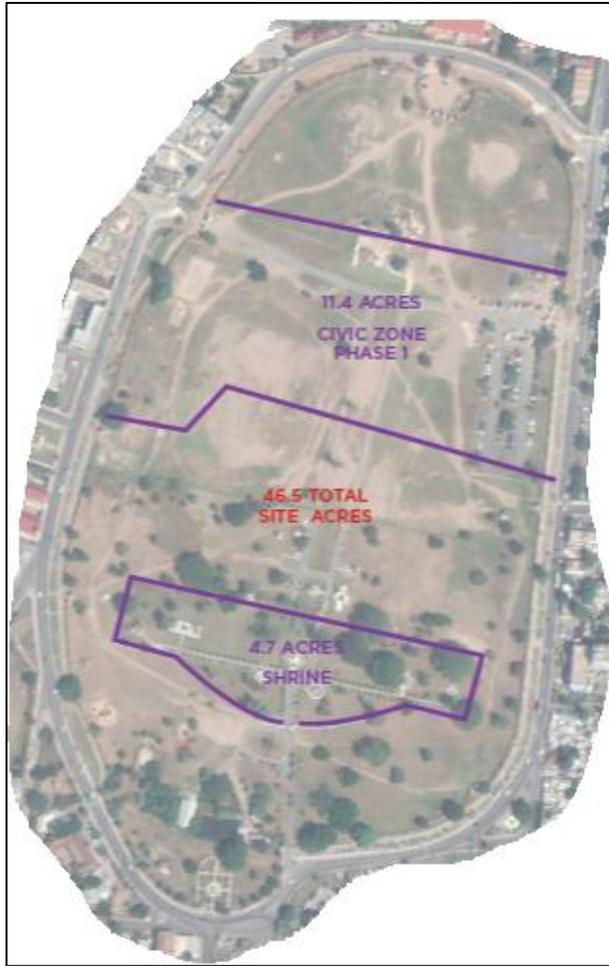


Figure 3-4: Determining imperviousness of study area

The data for the loss computation for each sub-basin is shown in Table3-1.

Table3-1: Loss computation data

SUB-BASIN	AREA (KM ²)	CN	% IMPERVIOUS
1	0.127	40	2
2	0.047	40	2
3	0.029	53	24
Total	0.203		

3.2.2.3 Unit Hydrograph Method for Rainfall-Runoff Transformation

Unit Hydrograph (UH) is the response of the catchment to one unit of rainfall uniformly distributed over the catchment. Assuming linearity and time invariance in the rainfall-runoff relationship of the catchment, the UH was used in the rainfall to runoff simulations.

The SCS Unit Hydrograph was used in this study for transformation of the rainfall depths to runoff. The parameter of the Unit Hydrograph is the lag time measured in minutes. Lag time is the time taken from

the centre of the mass of the rainfall to peak flow. The Lag = 0.6* time of concentration (t_c). The time of concentration was estimated using the **Kerby-Kirpich Method**:

$$t_c = t_{ov} + t_{ch}$$

The computation equations and parameters for each, as shown in Table 3-2, were measured for each of the sub basins using GIS.

Table 3-2: Overland flow and channel flow computation parameters

SUB-BASIN	Overland flow (ov) parameters				Channel flow (ch) parameters Transform				
	ROUGHNESS N	FLOW LENGTH L(M)	SLOPE S	T _{OV} (MINS)	LENGTH L(M)	SLOPE S	T _{CH} (MINS)	T _C	LAG TIME (MINS)
A	0.011	175.00	0.02	4.90	587	0.0204	12	17	10
B	0.011	196.00	0.02	5.17	482	0.0249	9	15	9
C	0.011	190.00	0.03	4.63	314	0.0255	7	11	7
	K=1.44				K=0.0195				

3.2.2.4 Flood Routing Methods

No flood routing was necessary given the small size of the catchment.

3.2.2.5 Meteorological Data

The rainfall gauge located at Cavaliers was considered representative of the rainfall over the area. The rainfall depth for designated frequencies is shown in

Table 3-3.

Table 3-3: Cavaliers rainfall vs return period

Return Period (Years)	5	10	25	50	100
Rainfall Depth (mm)	266.0	346.3	468.7	571.6	682.3

The station at the Norman Manley International Airport (NMIA) is the only long monitoring intensity gauge in the vicinity of the project area. Intensity Duration Frequency (IDF) data for that station are shown in Table 3-4.

Table 3-4

Table 3-4: Intensity duration frequency data (NMIA)

	5yr	10yr	25yr	50yr	100yr
5 Mins	256.5	285.5	315.7	334.3	349.9
15 Mins	117.8	136.3	159.5	176.5	190.3
1 Hour	50.9	61.5	75.6	86.5	97.8
2 Hours	33.6	41	50.5	57.8	65.3
3 Hours	29.7	36.3	45.1	51.88	58.8
6 Hours	17.8	22.5	28.9	33.9	39.2
12 Hours	11.4	14.6	19.1	22.7	26.6
1 Day	7.3	9.5	12.5	14.9	17.5

Source: Meteorological Office of Jamaica

The distribution pattern of each Tyr rainfall of the NMIA gauge was assumed to be the same for the Cavalier Data. The Hydrologic Engineering Centre Hydrologic Modelling System (HecHMS) rainfall model requires Depth Duration Frequency (DDF) data when the analysis is to be done using frequency storms. The intensity data in Table 4.3 was converted to DDF data (Table 3-5).

Table 3-5: DDF distribution for NMIA

	5yr	10yr	25yr	50yr	100yr
5 Mins	21.4	23.8	26.3	27.9	29.2
15 Mins	29.5	34.1	39.9	44.1	47.6
1 Hour	50.9	61.5	75.6	86.5	97.8
2 Hours	67.2	82.0	101.0	115.6	130.6
3 Hours	89.1	108.9	135.3	155.6	176.4
6 Hours	106.8	135.0	173.4	203.4	235.2
12 Hours	136.8	175.2	229.2	272.4	319.2
1 Day	175.2	228.0	300.0	357.6	420.0

The DDF for the Cavaliers rainfall was derived by distributing the Tyr rainfall using the distribution in Table 4-5. The results are given in Table 3-6.

Table 3-6: Cavaliers DDF data

	5yr	10yr	25yr	50yr	100yr
5 Mins	32.5	36.1	41.1	44.5	47.4
15 Mins	44.7	51.8	62.3	70.5	77.3
1 Hour	77.3	93.4	118.1	138.3	158.9
2 Hours	102.0	124.5	157.8	184.8	212.2
3 Hours	135.3	165.4	211.4	248.8	286.6
6 Hours	162.2	205.0	270.9	325.1	382.1
12 Hours	207.7	266.1	358.1	435.4	518.5
1 Day	266.0	346.3	468.7	571.6	682.3

3.2.3 Climate and Climate Change

The climate of the study area was determined by referencing various secondary data sources. Climate data was retrieved from the Meteorological Office of Jamaica and other online resources such as the online Weather Atlas. In addition, reports, including the *State of the Jamaican Climate 2015* (PIOJ, 2017) were reviewed to extract information on climate, climate variability and climate change projections for the study area.

3.2.4 Natural Hazard Risk

The natural hazard risk of the study area was assessed via consultation with various secondary data sources. These include reports produced by the Climate Studies Group at The UWI Mona and The UWI Mona's Seismic Unit. Online resources were also consulted.

3.2.5 Air Quality and Noise

It is important to establish a baseline for air and noise so that these current conditions are not exceeded during construction.

3.2.5.1 Air Quality Assessment

Air quality was assessed primarily through the quantification of particulate matter. Particulate matter is the term given to small solid or liquid particles suspended in either a gas or liquid. The size of these suspended particles not only determines their lifespan within the atmosphere, but also their fate if they enter the lungs. The size range of particulate matter that is of concern to human health lies between 0.1 – 10µm and they are referred to as respirable particulates (PM₁₀). Effects of the exposure of PM₁₀ on human health include, but are not limited to, effects on the respiratory systems, damage to lung tissue, cancer, and premature death. The age, gender and health of the individuals affected will determine the extent of these effects.

To minimize the potential impact of particulate matter on the health of people and the environment the United States Environmental Protection Agency has published the national air quality standard which states that the maximum daily concentration should not exceed 150 µg/m³. A similar 24-hour ambient standard has been adapted by the local regulatory agency, the National Environment and Planning Agency (NEPA).

Particulate matter was measured using calibrated SKC pumps (with flow rates 1–5 L/min), attached to pre-weighed SKC Polyvinyl Chloride (PVC) filters. The pumps are calibrated with a factory calibrated DryCal DC-Lite primary flow meter from Bios International Corporation. This calibration is completed prior to use and their flow rates checked again after the sampling session to ensure they operate within the calibrated flow rate. In the field, the pumps were placed at the approximate respiratory height of the individuals for a 24-hour period. The pumps were then returned to the ESL laboratory where the filters were stabilized and weighed to determine a Time Weighted Average (TWA) value for the particulates.

The results at the end of the sampling period were compared with National Environment and Planning Agency’s (NEPA) and the US EPA’s Ambient Standards.

Site Selection

The objective of the air quality investigation was to determine the normal concentration of respirable particulates in the project area. The selection of the sampling points was done with regards to meteorological conditions. Receptor sites located downwind of the project sphere which may be affected by the activities on the project site were selected along with stations located upwind of the project area. Air quality measurements were taken at eight (8) sites in the project area and its environs, however, two (2) filters were lost in the field.¹ The air monitors were placed away from any known sources of pollutants to prevent bias in the data collected. Each sampling station was geo-referenced for traceability and future monitoring requirements (Table 3-7).

Table 3-7: Description of air quality and noise monitoring sites within the project sphere of the Houses of Parliament Project, September 2019

SAMPLE SITE	DESCRIPTION OF THE LOCATION	GPS COORDINATES (DEGREES, MINUTES, SECONDS)
AQ1 (Ministry of Finance & The Public Service)	The sampling site was located to the east (E) of the proposed construction site. A paved road with light to moderate traffic was located to the west of the sampling station and between the sampling station and the project site. The yard was paved with small grassed sections and a few trees and shrubs. Background noise included vehicular traffic, chatter and rustling leaves.	17° 59’ 0” N 76° 47’ 12” W

¹ A resampling exercise was conducted for the 8 sample sites due to issues with the first set of samples.

SAMPLE SITE	DESCRIPTION OF THE LOCATION	GPS COORDINATES (DEGREES, MINUTES, SECONDS)
	  <p data-bbox="402 1142 1110 1213">Environmental conditions were partly cloudy, sunny skies and light winds in a north-western (NW) direction.</p>	

SAMPLE SITE	DESCRIPTION OF THE LOCATION	GPS COORDINATES (DEGREES, MINUTES, SECONDS)
<p>AQ2 (Ministry of Labour and Social Security)</p>	<p>This sampling station was located to the east (E) of the proposed construction site and a main roadway and just south of AQ1. The yard was both paved and grassed. Background noise included vehicular traffic, chatter and rustling leaves.</p>  <p>Environmental conditions were partly cloudy, sunny skies with light winds in a north-western (NW) direction.</p>	<p>17° 58' 54" N 76° 47' 13" W</p>
<p>AQ3 (Ministry of Education, Youth and Information)</p>	<p>The sampling site was south east (SE) of the proposed construction site and the main roadway which carries moderate to heavy traffic. There was dug up dirt, a heap of sand and gravel indicating work being done close to the sampling station. The yard was paved with trees and flowers in small sections. Background noise included vehicular traffic, chatter and rustling leaves.</p>	<p>17° 58' 49" N 76° 47' 17" W</p>

SAMPLE SITE	DESCRIPTION OF THE LOCATION	GPS COORDINATES (DEGREES, MINUTES, SECONDS)
	 <p data-bbox="402 1142 1089 1213">Environmental conditions were partly cloudy, sunny skies and light winds in a north-western (NW) direction.</p>	
<p data-bbox="201 1228 337 1377">AQ4 (Plant Nursery; South Entrance)</p>	<p data-bbox="402 1228 1109 1499">The sampling site was on a tree inside the plant nursery, near to the south entrance to Heroes Circle. The sampling site was located south east of the proposed construction site. The grounds of the property were dry, unpaved and partially grassed in small sections. Background noise included rustling of leaves, birds chirping, chatter and vehicular traffic.</p>	<p data-bbox="1128 1228 1300 1297">17° 58' 51" N 77° 47' 21" W</p>

SAMPLE SITE	DESCRIPTION OF THE LOCATION	GPS COORDINATES (DEGREES, MINUTES, SECONDS)
	 <p>Environmental conditions were sunny skies and moderate winds in a north-western (NW) direction.</p>	
<p>AQ5 (Voluntary Organization for Uplifting Children)</p>	<p>The sampling site was south west of the proposed construction location. This site was on a column at the entrance of the building, approximately 15ft from the main roadway with moderate to heavy traffic. Background noise included chatter, rustling leaves, birds chirping and vehicular traffic.</p>  <p>Environmental conditions were partly cloudy, sunny skies and light winds in a north-western (NW) direction.</p>	<p>17° 58' 50" N 76° 47' 25" W</p>
<p>AQ6 (Seventh Day Adventist Church)</p>	<p>The sampling site was on the grounds of the Seventh Day Adventist Church, located to the west of the proposed construction site and a main roadway. The yard was paved with few trees and shrubs along the perimeter of the building. Background noise was due to vehicular traffic and birds chirping.</p>	<p>17° 59' 1" N 76° 47' 26" W</p>

SAMPLE SITE	DESCRIPTION OF THE LOCATION	GPS COORDINATES (DEGREES, MINUTES, SECONDS)
	 <p data-bbox="402 1142 1089 1213">Environmental conditions were partly cloudy, sunny skies with light winds in a north-eastern (NE) direction.</p>	
<p data-bbox="201 1226 354 1373">AQ7 (Northern Boundary of Site)</p>	<p data-bbox="402 1226 1110 1625">The sampling site was on the NWC Pump House which is located at the northern boundary of the National Heroes Circle and also north of the proposed construction site. The area was unpaved with grass, flowers and trees around the pump house. This site was also south of Wolmer’s Boys’ School and the main road which separates the two areas and carries moderate to heavy traffic. Background noise included chatter, birds chirping and vehicular traffic. Environmental conditions were partly cloudy, sunny skies and light winds in a north-western (NW) direction.</p>	<p data-bbox="1138 1226 1300 1297">17° 59’ 19” N 76° 47’ 17” W</p>
<p data-bbox="201 1667 358 1780">AQ8 (Inside National Heroes Park)</p>	<p data-bbox="402 1667 1110 1858">The sampling site was on a tree at the southern boundary of the proposed construction site located within the National Heroes Park. The area was unpaved with grass and trees. Background noise included vehicular traffic, rustling leaves, chatter and birds chirping. Environmental</p>	<p data-bbox="1138 1667 1300 1738">17° 58’ 58” N 76° 47’ 21” W</p>

SAMPLE SITE	DESCRIPTION OF THE LOCATION	GPS COORDINATES (DEGREES, MINUTES, SECONDS)
	conditions were partly cloudy, sunny skies and moderate winds in a north-western (NW) direction.	

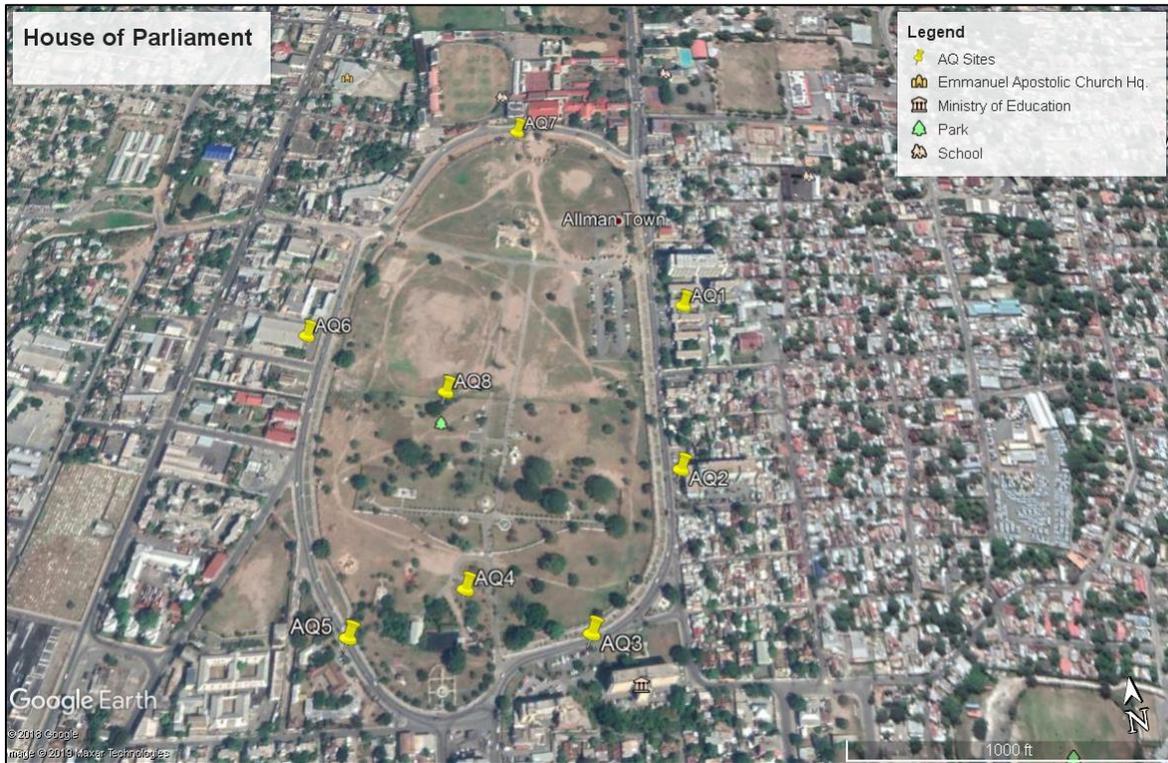


Figure 3-5: Air quality monitoring sites within the project sphere of the Houses of Parliament Project, September 2019.

3.2.5.2 Noise Assessment

Noise level readings were averaged over a 15-minute interval and the average noise level recorded in decibels (dBA). Wind direction and any unusual local noise sources were noted for each sampling location. Noise levels were measured using Quest SoundPro SE/DL series sound level meter, which conforms to the, IEC 616721-1-2002 Class 2, Sound Level Meter Type 2, ANSI S1.4 – 1983 (R2001) Octave Band & 1/3 Octave Band Filter Class 1, IEC 61260:2001 Octave Band & 1/3 Octave Band Filter Class 1, ANSI S1-11-2004 and ANSI S1.43 -1997 (R2002) Type 2 standards. The noise meter was calibrated before and after each set of readings. In addition, before and after the survey, the instrument was checked with a calibrator, which is pre-calibrated at the factory. The results at the end of the sampling period were compared to the NEPA Standard of 65dBA for Commercial Areas. Baseline noise measurements were taken at identified sensitive

receptors in the project area. In all instances, the sampling location for the noise measurements coincided with the sites selected for ambient air quality measurement (Table 3-7; Figure 3-5).

3.2.6 Water Quality

Two water samples were collected from the well at the Park on November 27, 2019 and January 29, 2020 by the UDC and analysed by Environmental, Technical and Analytical Services limited. The approach for collecting the water from the well was as follows:

1. The samples were collected from the pump house on property as this was the only location where sampling was possible.
2. On arrival of the officer the manager of the facility turned on the pump (The water is not used on the property and therefore was only turned on at the request).
3. The pump was allowed to run for a while until clear.
4. A sample was then carefully collected directly from the stream of the hose in sterilized bottles ensuring no contamination of the sample.
5. These were then placed on ice and transported to the lab for analysis.

Several parameters were analysed including BOD, Faecal Coliform, COD, Conductivity, Fats, oil and grease, PH, Nitrate, Phosphorous, Salinity, TDS, TSS. The results were then compared to the National Irrigation Standards.

3.3 Ecological Assessment

The objective of this component of the study was to assess and characterize the ecology within and around the footprint of the National Heroes Park. A Rapid Ecological Assessment (REA) was done on the site on September 5, 2019. In general, it is impractical for an ecological assessment to consider every individual species and habitat that may potentially be impacted by development. Therefore, the focus is given to rare, threatened, endangered, endemic, protected, invasive and economically important species.

The study area was traversed to assess the vegetated areas. They were sparsely populated with clearly demarcated paths that allowed for ease of identification and targeting of any areas likely to have ecological diversity.

Given the extent of the urban stressors that impact the study area, it was not expected that any ecologically significant flora or fauna would be present. Nevertheless, the survey method utilized to assess the vegetation consisted of a series of walkthroughs. All vegetation encountered within the boundary of the study area was recorded. For each species, the name, perceived dominance and its growth form was noted.

3.3.1 Avifauna

Bird sampling was completed on September 5, 2019 using the point count method at two points within the project boundary. The point counts were conducted at six-minute intervals between 6:00am and 9:00am in order to sample during the period of highest activity for most bird species and to maximize detectability.

3.3.2 Vegetation

Plant communities were assessed using Google Earth images and the results used to stratify sampling. During field surveys conducted on September 5, comprehensive lists of plants were developed for the

study area. All plants were identified to the species level by examining morphological features such as leaf arrangement, leaf pattern, pattern of branching, and morphology of floral and fruiting structures in conjunction with the use of Adams' (1972) Flowering Plants of Jamaica. All plant species observed were recorded and each species was given a DAFOR index² rating based on their abundance relative to the entire site.

3.3.3 Other Fauna

Observations and notes were made for any other fauna encountered in the study area. Local persons encountered during the visits were interviewed to gather additional background information about the presence or absence of other fauna and flora including butterflies, amphibians and reptiles.

3.4 Archaeological/ Heritage Assessment

In order to complete the archaeological assessment of the study area, two broad methods were utilized – archival/desk research and site evaluation completed via a walking survey. Both methods shall be discussed in the following sections.

3.4.1 Archival/Desk Research

This data collection method involved the analysis of newspaper articles, books, booklets and maps which addressed the historical to present-day usage of the study area. Additional information was extracted from Peter Espeut's forthcoming publication, *"Encyclopaedia of Jamaican Place Names"*. The Jamaica National Heritage Trust (JNHT) and the Institute of Jamaica were also consulted.

3.4.2 Walking Survey

A site evaluation exercise was completed via the use of a walking survey. The purpose of the walking survey was to substantiate the information identified through the secondary research by locating any structural features and/or artefacts which were still visible on the ground surface in National Heroes Park. The walking survey was conducted on November 7, 2019 by two researchers with the objective of traversing the entire project site. The researchers were positioned 10 feet apart and traversed the track outlined in red on the Walking Survey Trail Map (Figure 3-6). The survey started at the public car park in the eastern portion of the site and proceeded easterly, then northerly and then westerly. Following this, the survey crisscrossed the property in a general southerly direction. Materials of archaeological/heritage importance were recorded. This included roadways and other physical features, objects and artefacts.

² 80–100% occurrence: dominant (D), 60%–79% occurrence: abundant (A), 40%–59% occurrence: frequent (F), 20%–39% occurrence: occasional (O), and no occurrence during survey only: rare (R).



Figure 3-6: Walking survey trail map

3.5 Socio-Economic Assessment

The socio-economic approach involved undertaking the following broad components:

1. Delineating a project area of focus by inscribing a circle on a 1km radius from the centre of National Heroes Park (Figure 3-7). The communities or districts either fully or partially inscribed by this boundary include:
 - Cross Roads
 - Greater Allman Town
 - Fletchers Land
 - Hannah Town
 - Jones Town

In the report, the above communities are referred to collectively as the Rim Communities;

2. Undertaking data collection and analysis on select social characteristics and attitudes of community residents, including opinions on the project, within the project area. This data was collected using a non-random survey that targeted 456 respondents via a formal instrument. Two survey instruments were administered: a business community questionnaire (94 respondents), which contained a set of questions for community members who operated businesses; and a

second questionnaire (362 respondents), which targeted non-business operating community members;

3. Conducting one focus group meeting in each of the named communities to probe a range of socio-economic and other cultural and environmental issues, and in particular, to focus on the participants' opinions and attitudes towards the project concept and suggested land use for the park;
4. Interviewing leaders within each of the communities to better understand the current socio-economic ethos of the communities, but also to have their perspectives on the project and how they interpret their respective community's acceptance of or apprehension regarding the project;
5. Conducting interviews with ad hoc entities operating on the perimeter of the National Heroes Park and persons actually using the Park. These will be included in the Final Report.

The following points are presented to elucidate the purpose of the methodology outlined:

- Neither the socio-economic non-random survey nor the focus groups are representative of the populations of the wider communities or those within the project zone. They are only representative of the population of respondents interviewed and those spoken to in the focus groups;
- Potential traffic impacts were included among the topics discussed in all meetings;
- Similarly, the issue of physical dislocation of structures or persons operating outside of the Park boundaries was not directly addressed within the communities. Since the project was silent on displacement, the Consultants felt it best not to trigger unnecessary anxiety among community members by addressing a speculative issue.

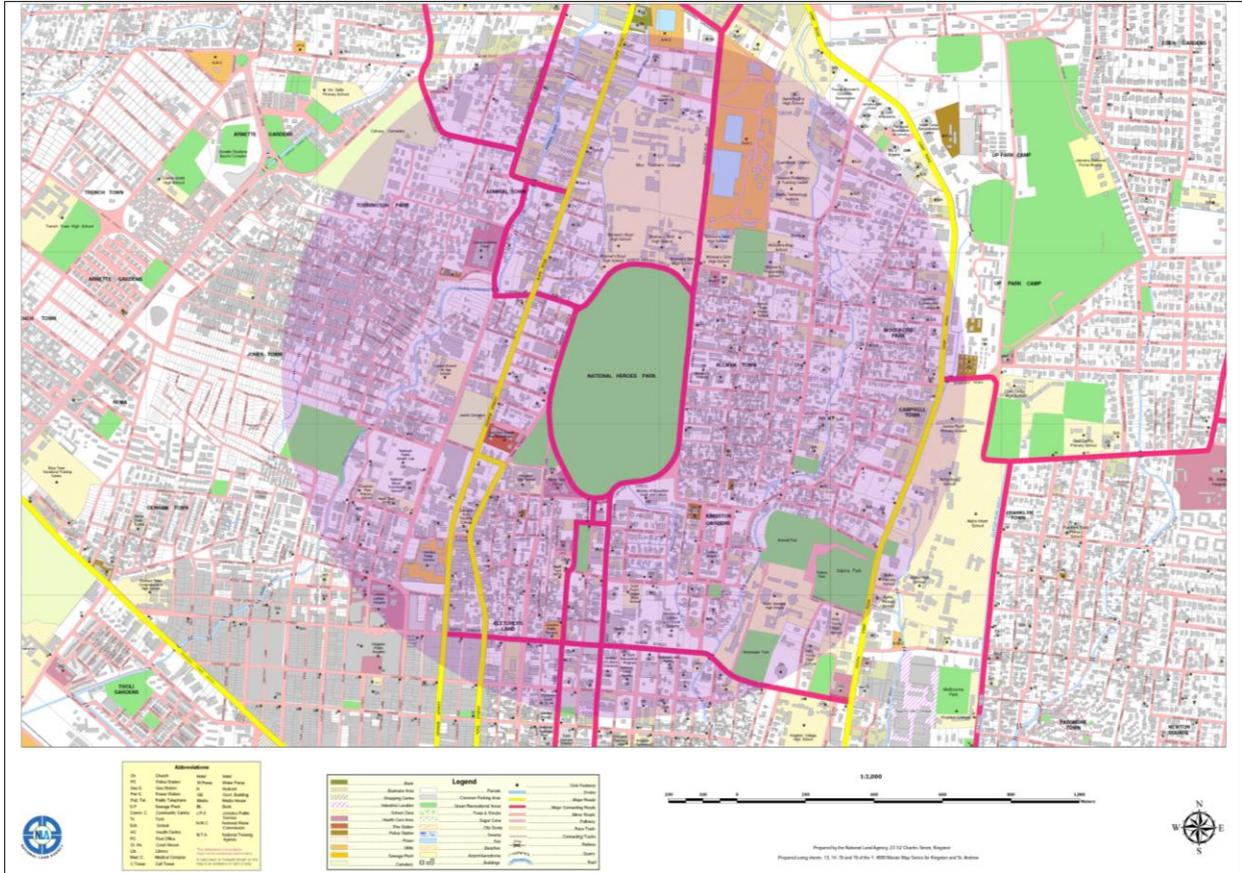


Figure 3-7: The National Heroes Park and environs within the 1km buffer



PROJECT DESCRIPTION

4 PROJECT DESCRIPTION

The Houses of Parliament Project refers to the plan to relocate the Jamaican Houses of Parliament, which are currently located on Duke Street in Downtown Kingston, to a newly constructed building that will sit on 7 acres of landscaped land within the National Heroes Park (Figure 4-1). The project also aims to transform the remaining 38.6 acres of the National Heroes Park into a green area in order to reaffirm the Park’s significance as a recreational space for public use (Figure 4-2).



Figure 4-1: Location Map of the Project (Scale 1:12,500)



Figure 4-2: Project schematic design plan

The project can therefore be divided into two main components:

1. The Houses of Parliament Building
2. Landscaping of the National Heroes Park.

The following sections shall discuss each component in further detail.

4.1 The Houses of Parliament Building

4.1.1 Design Concept

Based on the Jamaican Houses of Parliament competition’s winning design, “Out of Many, One People”, the new Parliament building is expected to better represent the people of Jamaica. The design concept incorporates the people as the pillars, the Jamaican legislature as the structure, and the parliament as the system (Figure 4-3).

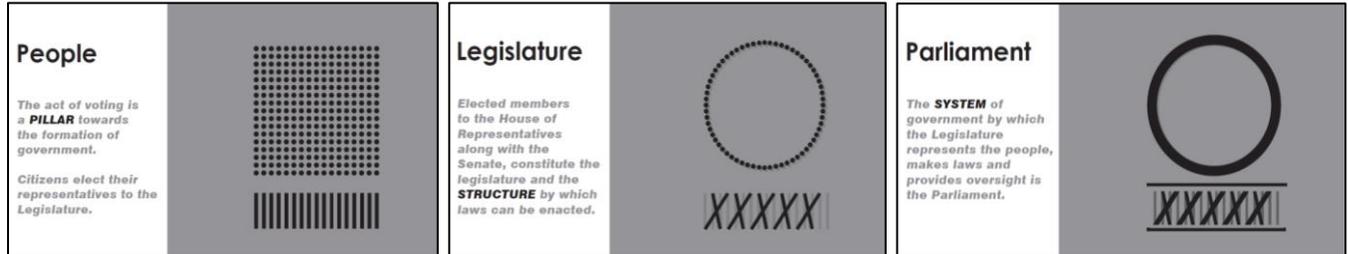


Figure 4-3: Houses of Parliament design elements

Combined, these three elements resulted in a building which is circular in shape and features multiple columns (Figure 4-4).



Figure 4-4: Building design – Jamaican Houses of Parliament

In addition, the building has been designed in a way that there is no distinguishable “front” and “back” and its elevations appear uniform when viewed from all directions (Figure 4-5).

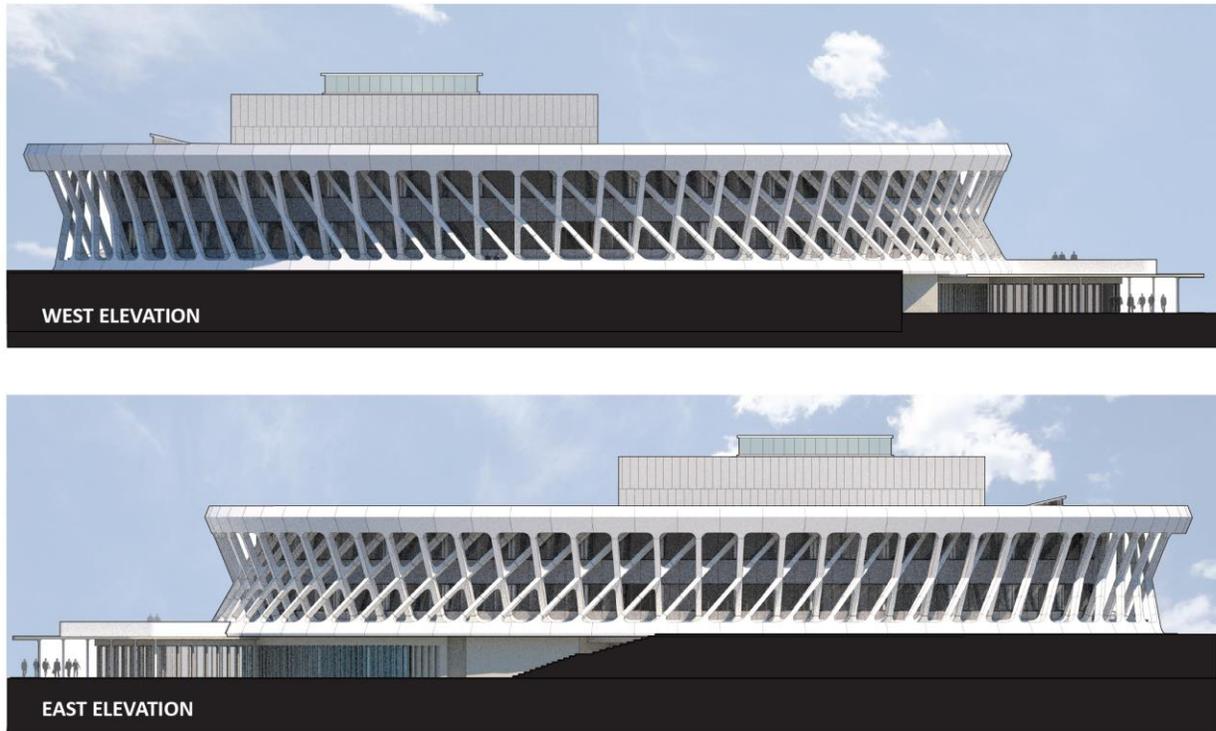


Figure 4-5: Elevations – Jamaican Houses of Parliament

4.1.2 Building Components

With an optimum square footage of 15,636m², the building will feature three levels atop a podium, a basement and a roof area. There is also space dedicated to ancillary, arcade and parking area resulting in a total of 31,232m². Each of the three levels will be divided into public and private space to varying degrees depending on the space usage. The core of the new building is the debate chambers dedicated to the sitting of the Senate and the House of Representatives, both of which will be constructed more towards the northern section of the structure. All other rooms/areas will be built on the periphery of these two chambers in order to maximize the benefit of natural light (Figure 4-6).

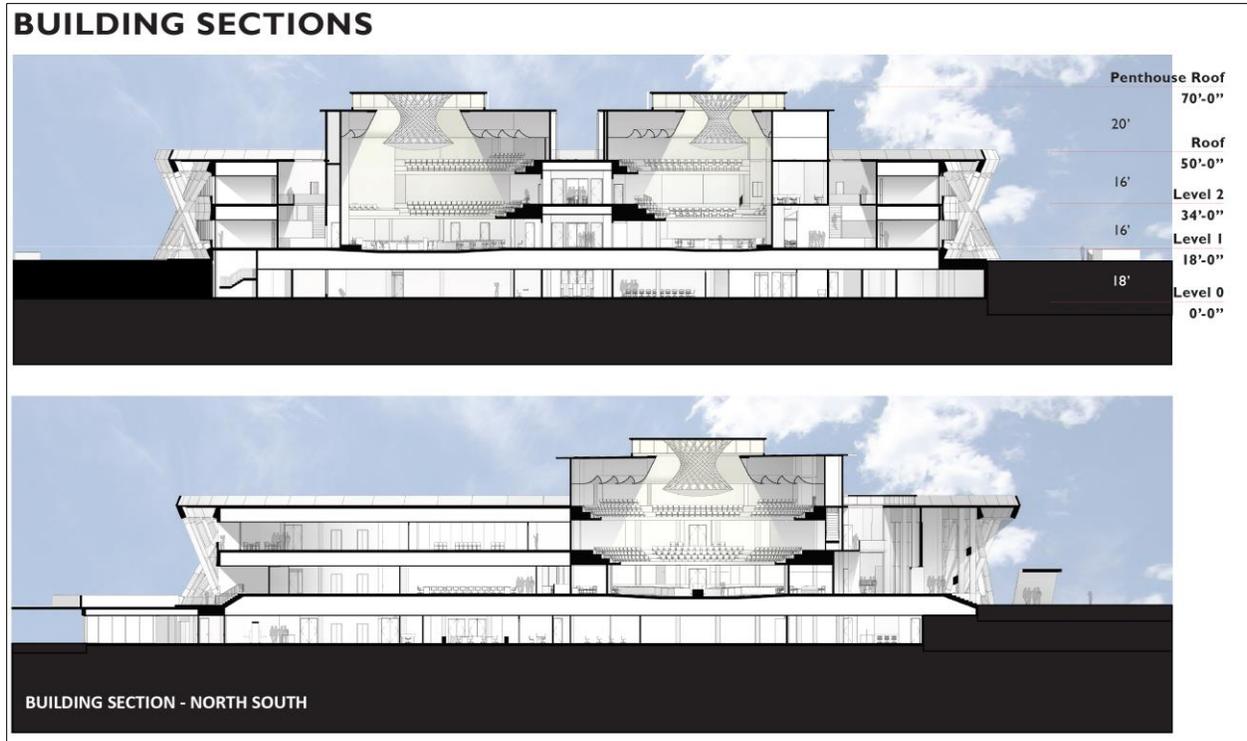


Figure 4-6: Building sections showing location of parliamentary chambers

The building’s circular design creates what is referred to as “leftover” or “in between” spaces around the offices. These “in-between” spaces will be used to create landscaped atriums which will allow light from above to penetrate the interior corridors throughout all building levels. This will have the dual effect of eliminating the traditional long, dark corridors as well as creating inter-floor connectivity (Figure 4-7; Figure 4-8).

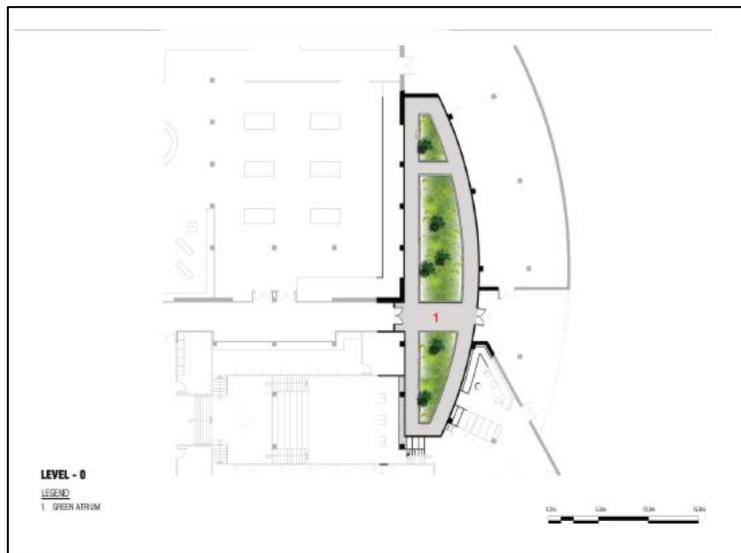


Figure 4-7: Landscaped atriums



Figure 4-8: Artist's impression – Landscaped atriums

4.1.2.1 Parliamentary Debate Chambers

The debate chambers will be adjacent to each other and like the building itself, will be circular in shape – a typology which is common in many countries. This circular shape is preferred because it optimizes layout configuration and visual lines of sight (Figure 4-9).



Figure 4-9: Artist's impression – Houses of Parliament debate chambers

The Senate will be the smaller of the two debate chambers and the House of Representatives will be larger. There will be a lobby area that separates the two from each other on level one of the building (Figure 4-10).

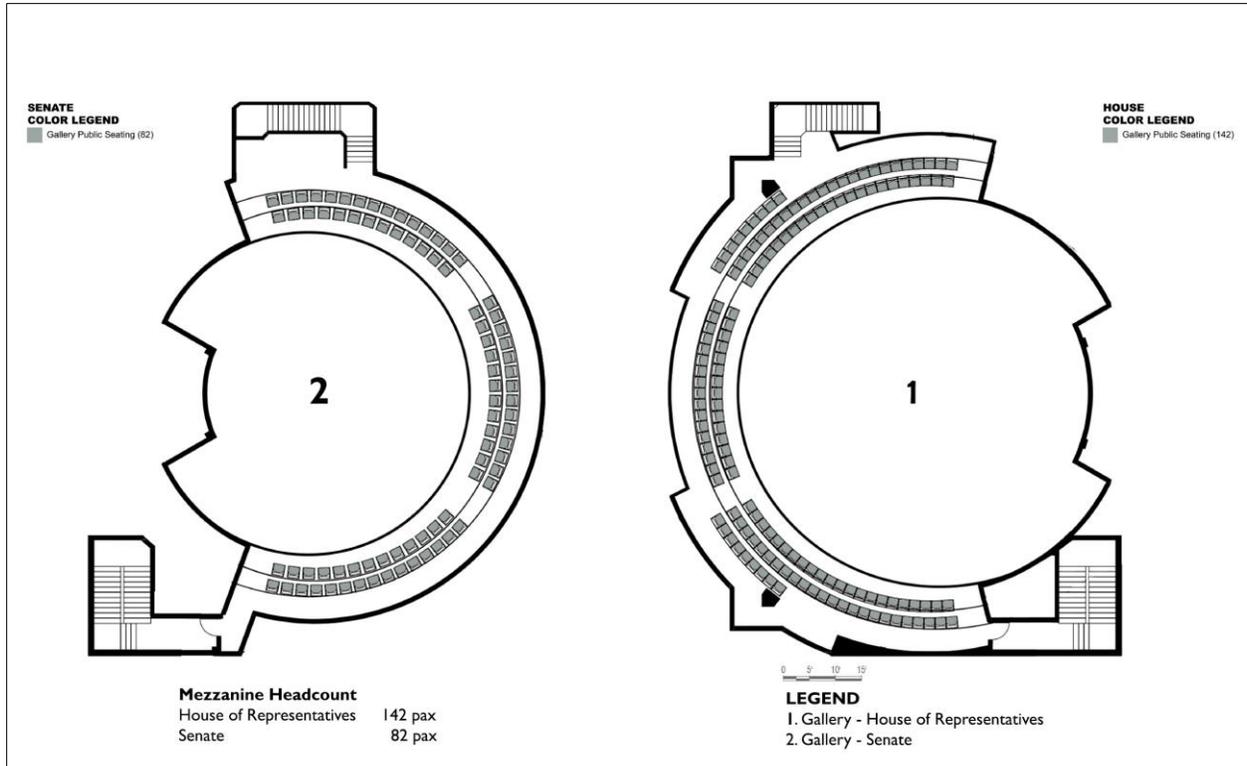


Figure 4-10: Houses of Parliament building plan – Debate chambers

4.1.2.2 Level One

Level one represents the main lobby control centre for access to both public and private areas within the building. It consists of 29 rooms/areas of differing sizes, most with restricted access. These include the main levels for both Houses of Parliament and a Central Lobby. Level one will also consist of spaces designated for various purposes, including but not limited to, offices for the Opposition Leader and the House Leader, a broadcast studio, a government conference room and areas for the media (Figure 4-11).

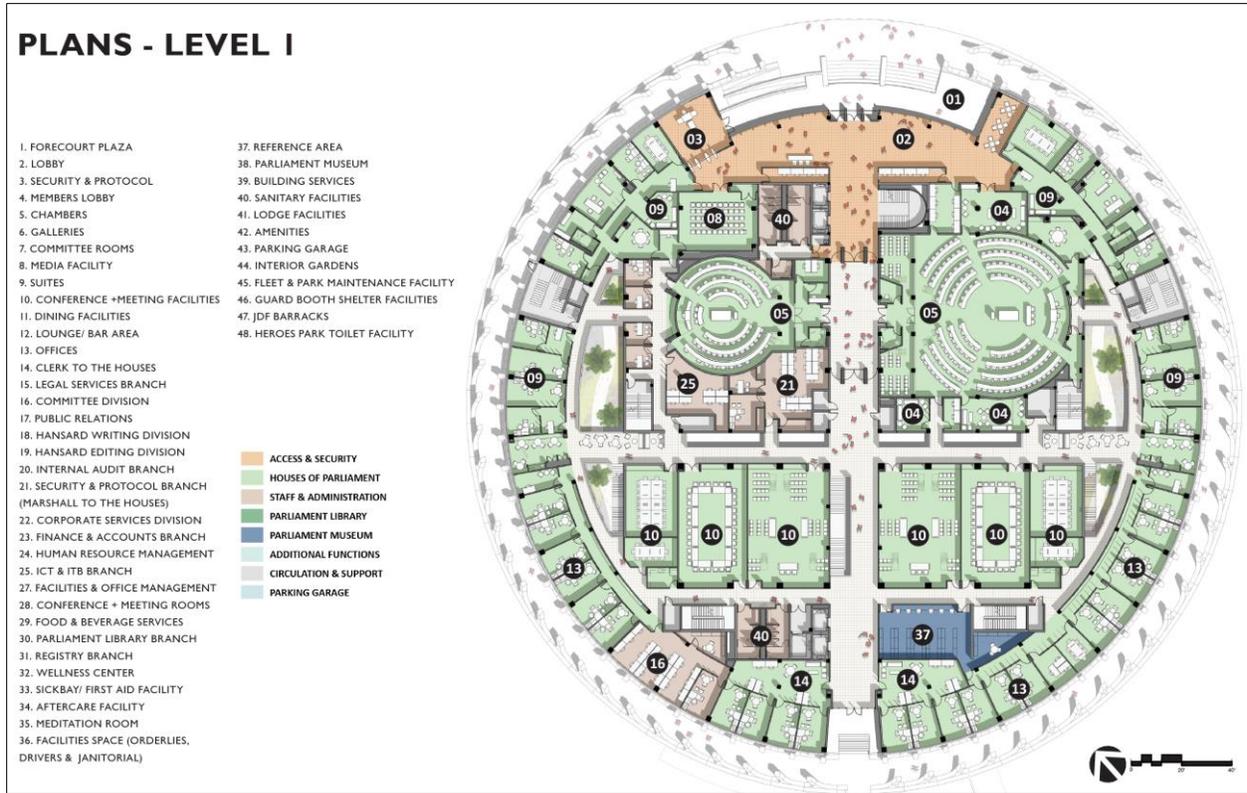


Figure 4-11: Houses of Parliament building plan – Level 1

4.1.2.3 Level Two

Following more or less the same configuration as level one, level two will consist of 25 areas/rooms of differing sizes. Level two will be evenly split between public and private access and will be accessed from the main lobby by a grand staircase. Spaces in level two will include the gallery areas for both Houses of Parliament, specifically, the VIP as well as the public and press galleries. Additionally, level two will contain offices for the Prime Minister, the Houses of Parliament’s Finance and Accounts Branch, the Houses of Parliament’s Human Resource Management and Development Branch and a lounge along with other facilities (Figure 4-12).

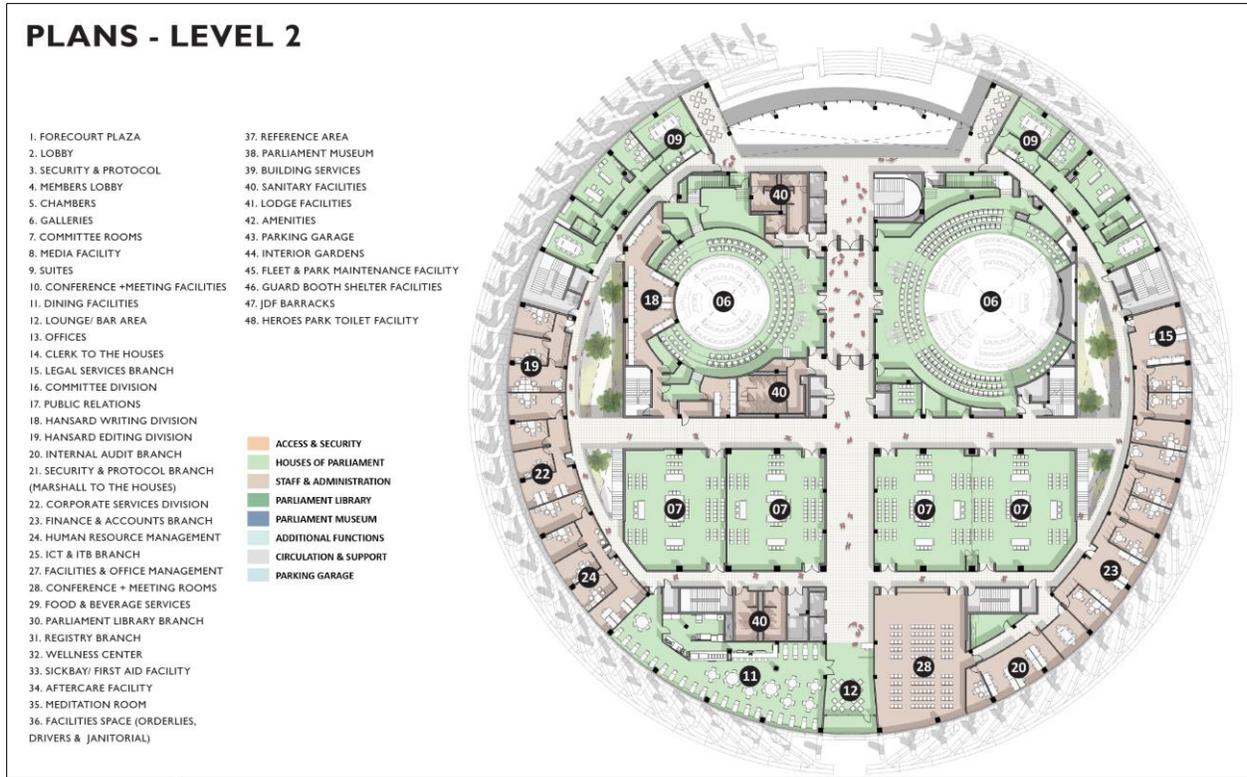


Figure 4-12: Houses of Parliament building plan – Level 2

4.1.2.4 Level Zero and Basement

Level zero will have greatest public access and activities. It will have a security checkpoint at the café to allow public access to spaces at this level. Level zero consists of 23 indoor rooms/areas and the above ground parking lot. Level zero consists of many of the support services for the Houses of Parliament. Spaces that will occupy level zero include a panic room, café, museum, parliament printing facility, janitorial and kitchen staff and the Facilities and Office Management Branch, amongst other facilities. The café, museum and library will be public spaces, whereas all other offices will have restricted access. Additionally, there will be only controlled access from level zero to levels one or two. There will be covered parking on either side of the building that will be restricted with controlled access (Figure 4-13 and Figure 4-14).

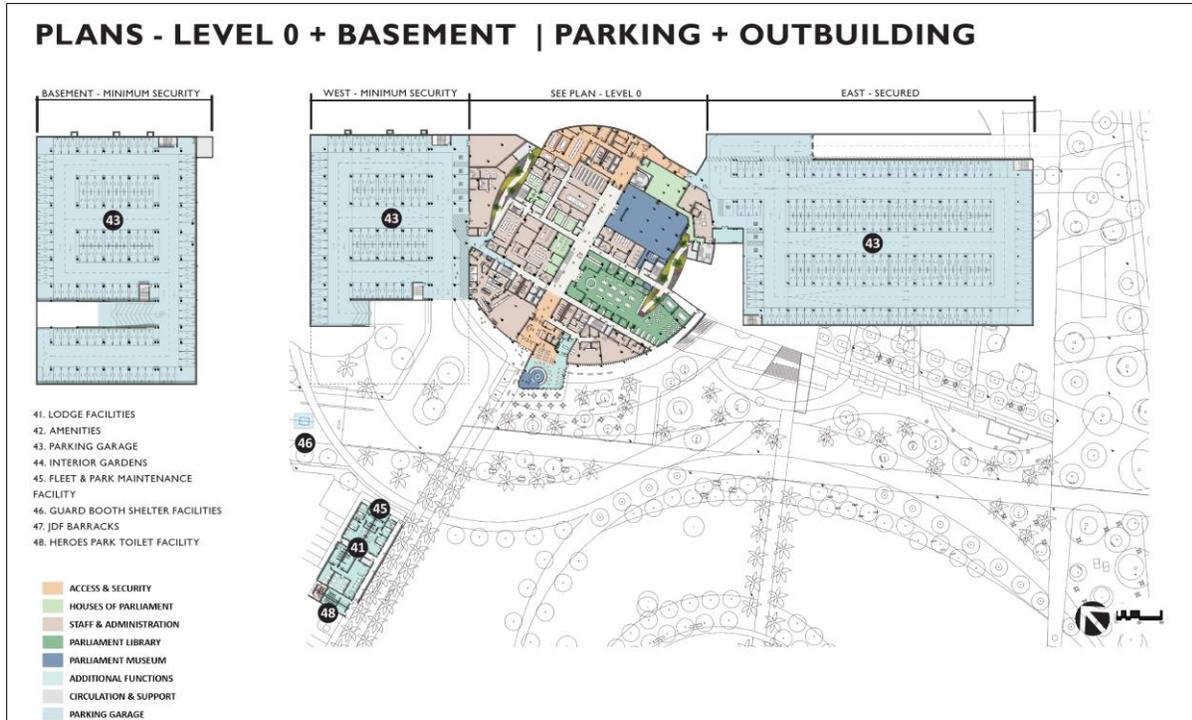


Figure 4-13: Houses of Parliament building plan –Level 0 and Basement

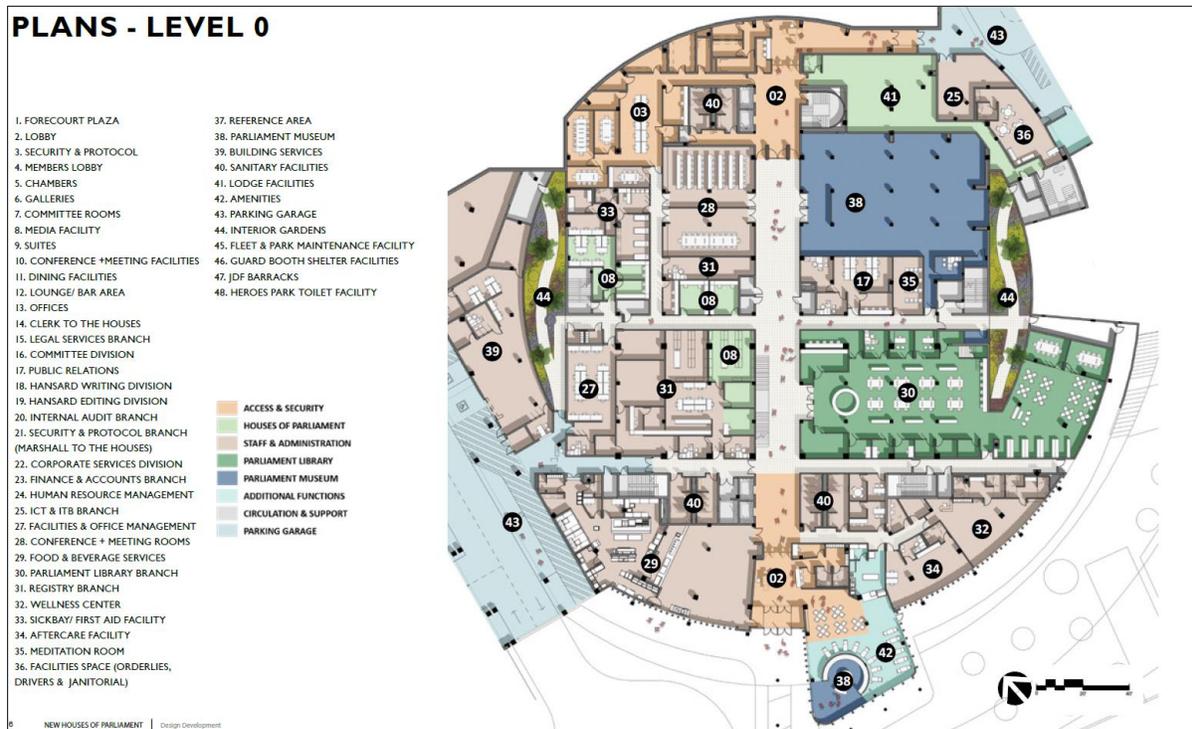


Figure 4-14: Houses of Parliament building plan –Level 0

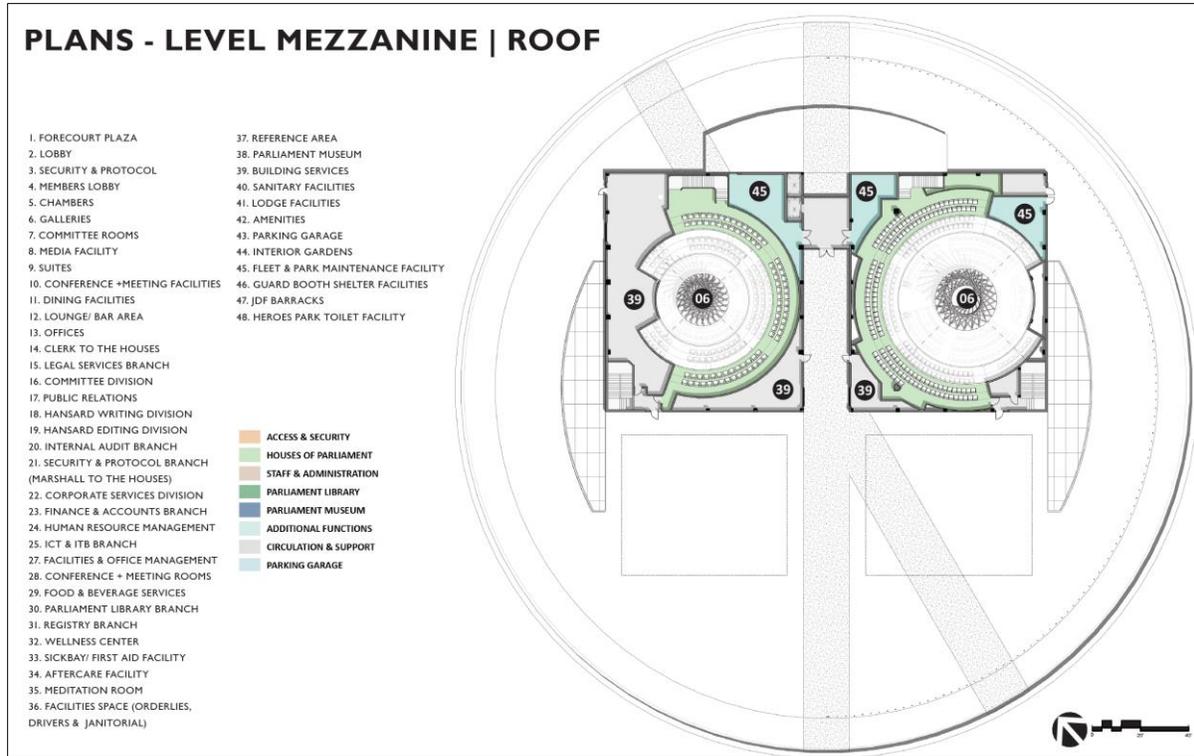


Figure 4-15: Houses of Parliament building plan – Level Mezzanine/ Roof

4.2 Landscaping of National Heroes Park (Access, Footpaths and Internal Road network)

Landscaping within the project site has been designed to enhance connectivity and to engage pedestrians, in particular, by providing access to the largest open space in the KMA. This will be achieved by having a series of footpaths around the parliament building itself as well as throughout the wider National Heroes Park (Figure 4-16 and Figure 4-17). There will be 8 pedestrian access points into the Park.

Within the park, there will be several access points that will not be open to the public and will be secured. There will be two roads that will allow for vehicular access and will run from East to West (Figure 4-17).

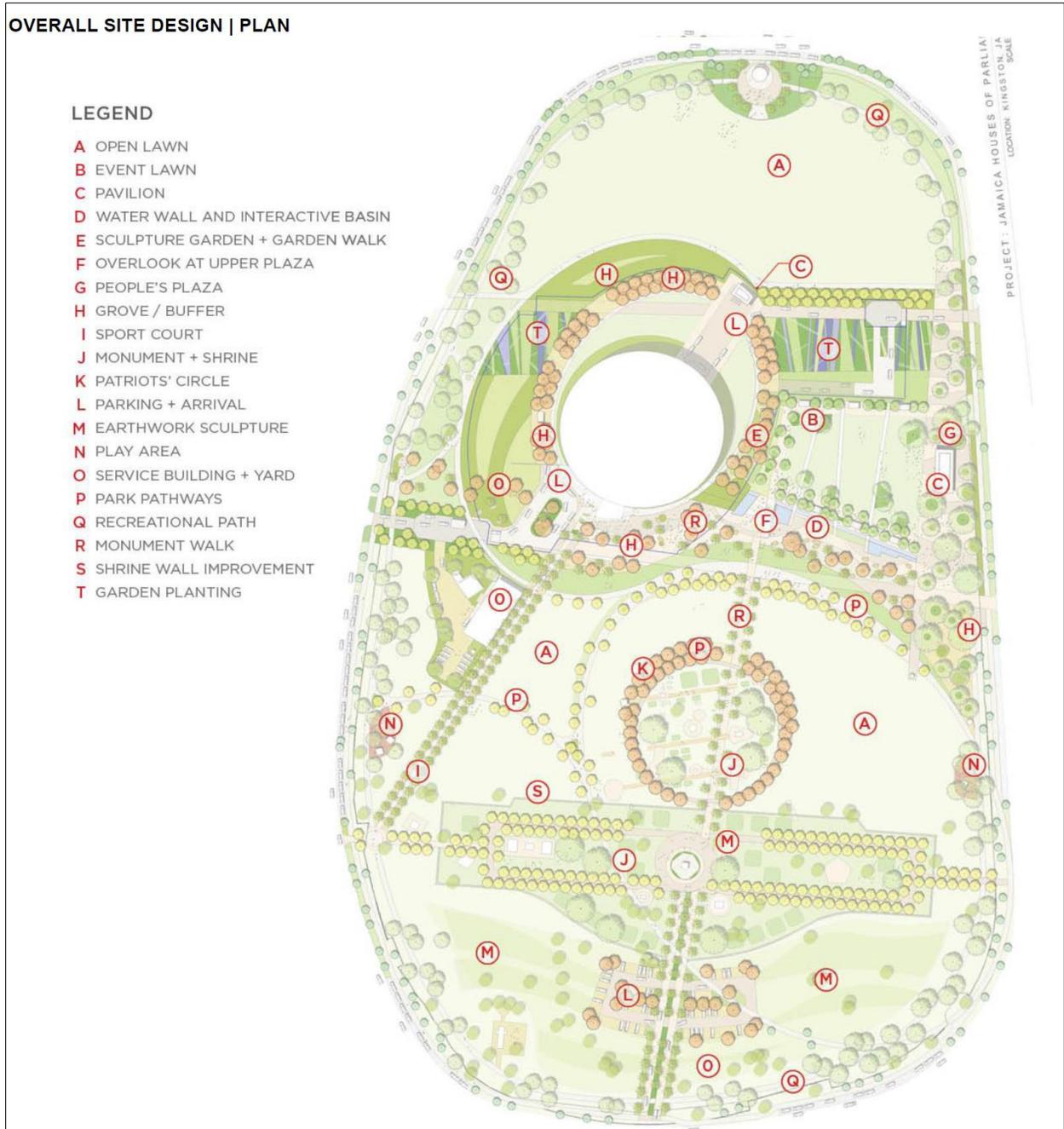


Figure 4-16: Overall Site Design Plan

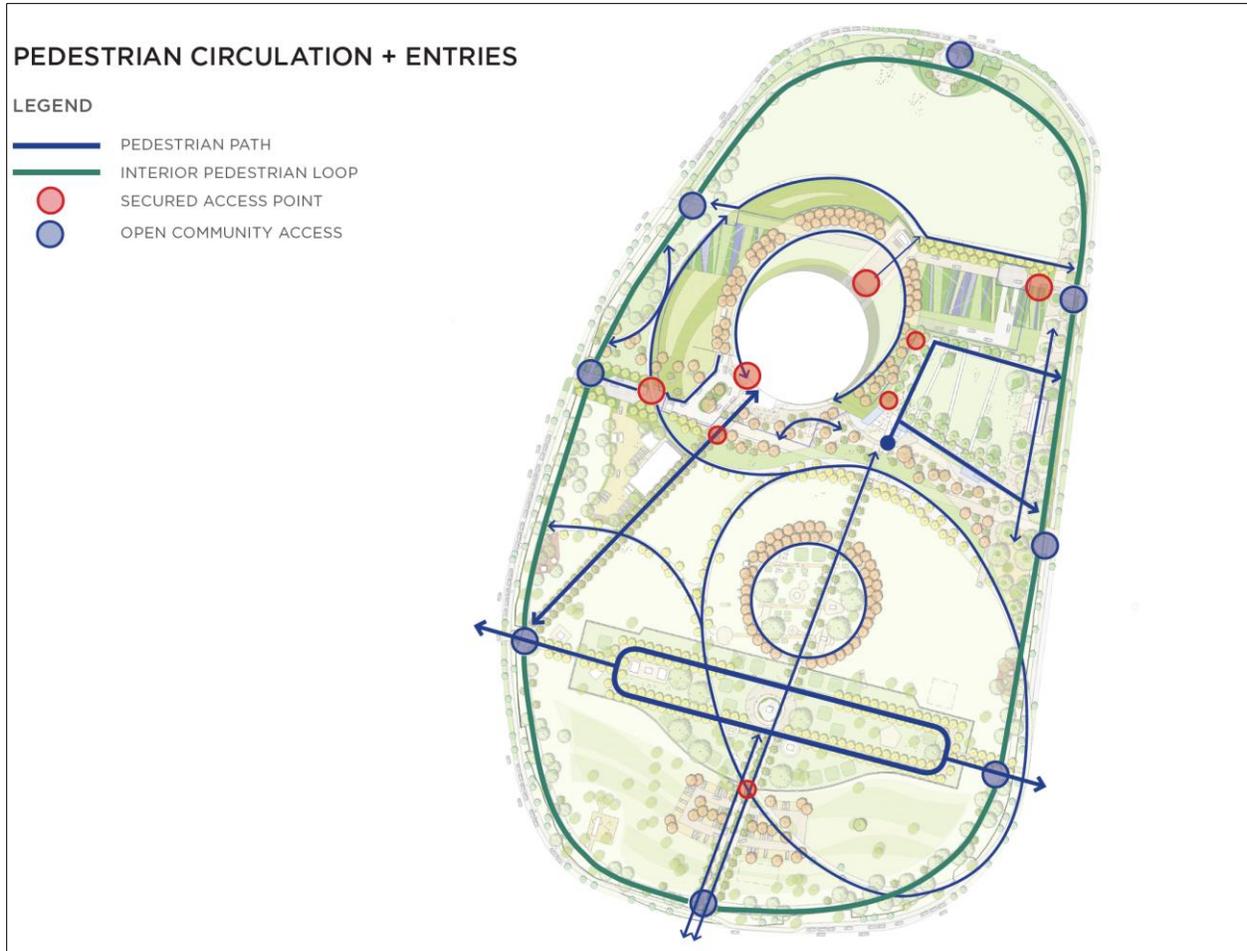


Figure 4-17: National Heroes Park – Circulation

The project site will contain zones of paved areas with landscaped shade trees and benches, similar to those present in Emancipation Park in St. Andrew. The landscape of the site will be integrated with the architecture and designed to manage storm water and bring nature into this part of Kingston. In addition to a stage and paved areas, there will be flexible lawns and water features, both of which will aid in the capturing and reuse of water. Additionally, gathering areas on the grounds of both the 7 acres of the Houses of Parliament as well as in the wider National Heroes Park will consist of porous materials such as decorative gravel which will encourage stormwater infiltration (Figure 4-18 and Figure 4-19).



Figure 4-18: Artist's impression – Proposed landscaping of project site

The landscape around the parliament building will be elliptical which will reinforce the strong circular geometry of the Houses of Parliament Building. The landscape will be private to the employees and the visitors of the building, providing many opportunities for shaded seating. This landscape will be accessed through gated, secure zones, and separated from adjacent public zones by fencing and integrated landscape security components. Planting zones will reinforce the ellipse surrounding parliament. These areas will also contain security measures and artfully hide fencing. Flowering trees will be used to further reinforce the geometry and provide seasonal interest.

East of the parliament building will be the People's Lawn and Plaza (Figure 4-16). These areas will provide framed views of the parliament building and will allow for gathering of large and small groups. To the South of the People's Plaza is the grand water wall and feature plaza. Monument Walk will be a large promenade that serves as the North-South spine connecting the Parliament building to the Southern extents of the site. These pathways will provide shaded pedestrian connections between the existing shrine and the Parliament building. The areas to the East and West of the allee promenade will be additional open and flexible lawn areas that allow for recreational opportunities. Patriots' Circle will be marked by ornamental shade trees in a gravel band with seating for quiet, shaded contemplation in a reverential space.

The existing Shrine is the resting place for many of Jamaica's National Heroes. Minimal landscape intervention is proposed for the existing perimeter wall. The addition of trees and landscape will help to soften the space, making it more welcoming to visitors and tourists. A proposed parking will accommodate visitors and ceremonial needs. This area is also the lowest part of the site, where artful, sculptural berms and detention will assist with stormwater management.

4.3 Drainage Design

The drainage areas have been delineated in Figure 4-19. Areas have been identified for retention of run-off from storm water (Figure 4-20). The project stormwater detention system is designed per the NMIA gauge data and in accordance with the NWA manual and is also designed to manage (but not mitigate for) the 100-year storm event from the modified Cavaliers data. The project detention system will connect to Barnes Gully through a new connection to the existing box culvert under National Heroes Circle.

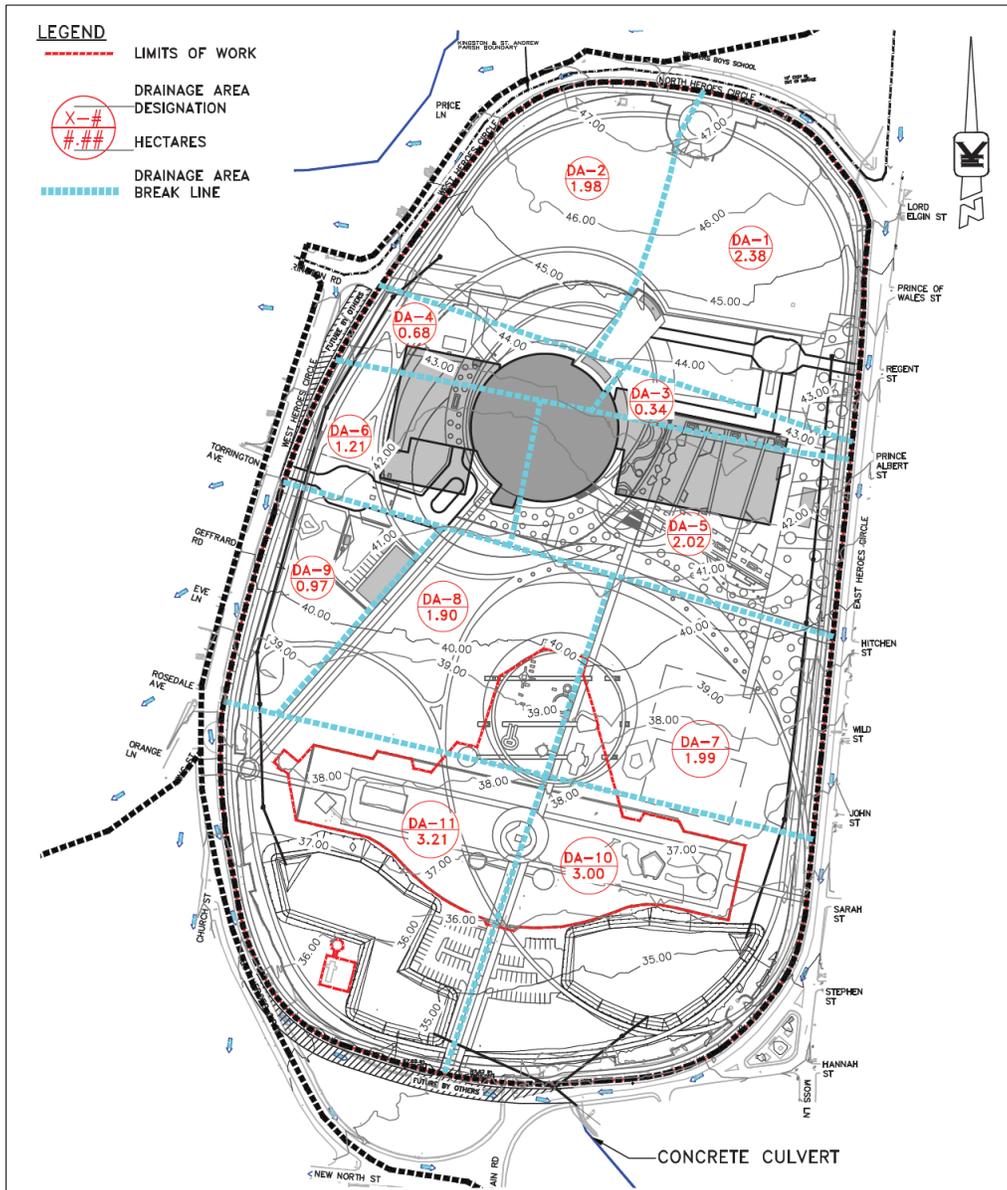


Figure 4-19: Onsite Drainage Areas

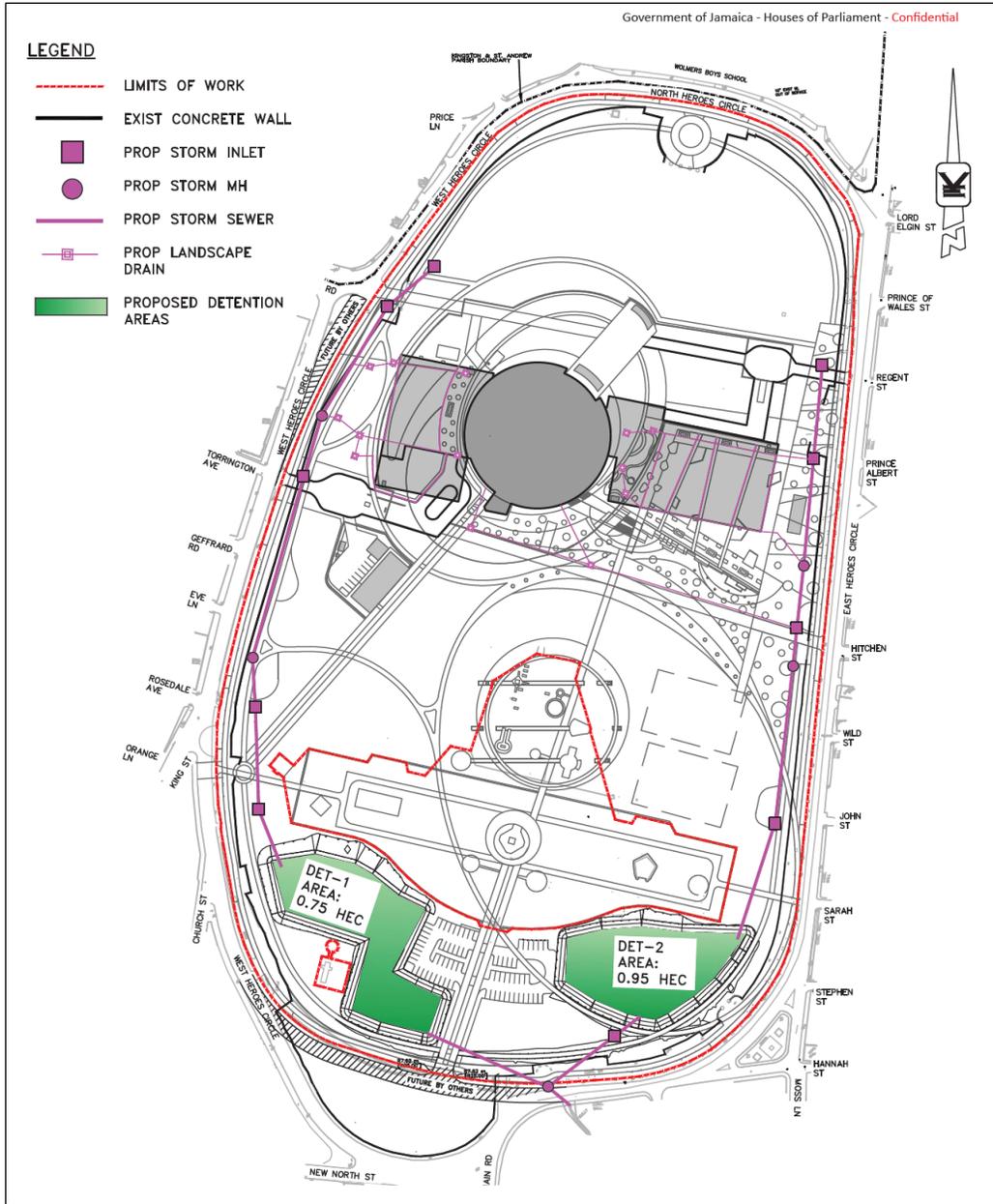


Figure 4-20: Detention Areas and Storm Sewer Plan

The storm water management strategy incorporates designated areas where storm water can infiltrate into the ground and re-charge the aquifer. In addition to the nominal storm event infiltration zones within the detention areas, the storm water detention areas themselves will provide additional opportunities to recharge the aquifer by providing longer residence time on the property. The infiltration zones within the detention areas strata is designed with zones that include gravels and sands and promote infiltration and also provide storm water quality benefits by allowing suspended solids to settle out and floatables to collect along the perimeter grasses. Litter pick up after storm events within these zones will be required after storm events. Hand silt removal by landscaping crews will be required during dry seasons.

4.4 Water Supply and Sewage

The project will depend on a variety of sources of water for construction and operation of the facility. They include:

- NWC Water- Potable water will be provided from a public 7” distribution line along the west side of National Heroes Circle. The water will be metered and will fill a 20,000 gallon storage tank to be used by the project during construction and operation. The water will also be used in the water features. A water storage tank for potable water as well as a fire fighting water storage tank will be provided. The tank will hold 240,000 gallons and is sufficient to provide 2,000 gallons per minute for two (2) hours.
- On site wells- An existing water well on the north end of the site has the capacity and is developed to provide upwards of 400 gallons per minute which is sufficient to irrigate the entire site. The well is 850 feet deep and draws from the alluvial aquifer. It will be used for irrigation purposes. The water will be treated prior to use.
- Rainwater- to be used for irrigation purposes.
- AC Condensate water- This water will be used in the plant nursery which will be located to the south of the site.

Sewage will be sent directly to the NWC for treatment.

4.5 Sustainability

The new HOP building is intended to achieve LEED V4 Certification.³ The credits are intended to be achieved under the following categories.

Table 4-1: LEED Points

Description of Category	Total Possible Points	Credit Breakdown		
		Achievable	Not Achievable	Maybe
Integrative Process (IP)– To identify synergies across disciplines and building systems when there is still maximum opportunity to have an impact on design and before too many critical decisions have been finalized. The IP addresses sustainable design considerations that can have an early and lasting impact on energy consumption, water usage and site conditions.	1	1		
Location and Transport – This category rewards thoughtful decisions about building location, with credits that encourage compact development, alternative transportation, and connection with amenities such as restaurants and parks	16	6		10

³ LEED, or Leadership in Energy and Environmental Design, is the most widely used green building rating system in the world. Available for virtually all building, community and home project types, LEED provides a framework to create healthy, highly efficient and cost-saving green buildings. LEED certification is a globally recognized symbol of sustainability achievement. (<https://new.usgbc.org/leed>).

Description of Category	Total Possible Points	Credit Breakdown		
		Achievable	Not Achievable	Maybe
Sustainable Sites – The prerequisite for the sustainable sites category aims to curtail pollution and soil erosion that often result from construction	10	10		
Water Efficiency – The prerequisite is for the building to use 20 percent less water than the U.S. Green Building Council (USGBC) baseline for buildings of similar size and occupation.	11	6	2	3
Energy and Atmosphere – This category focuses mainly on building commissioning and the energy performance of main systems such as heating, ventilation and air conditioning (HVAC) and lighting.	33	17	8	8
Materials and Resources – This category deals with reuse and recycling of materials, both in the construction and the ongoing operation of the building.	13	5	5	3
Indoor Environment Quality – This category deals mainly with indoor air quality issues including ventilation, off-gassing of materials and thermal comfort.	16	11	-	5
Extra Credit – There are two categories with no prerequisites where you can garner extra credit points: Innovation in Design and Regional Priority. Innovation in Design deals with successful and innovative solutions for environmental and sustainable concerns. Regional Priority focuses on the addressing of region-specific environmental issues <ul style="list-style-type: none"> ○ Innovation and Design Process/Exemplary Performance ○ Regional Priority. 	5	6		
Regional Priority	4	4	-	-
TOTAL POINTS	94	66	31	29

The four levels of certification are:

- Certified (40–49 points)
- Silver (50–59 points)
- Gold (60–79 points)
- Platinum (80+ points).

The project currently has 66 achievable points and 29 possible points. 31 points have been considered ‘not achievable’ as such the HOP project will be able to attain a LEED Silver Certification and possibly Gold (Figure 4-21).

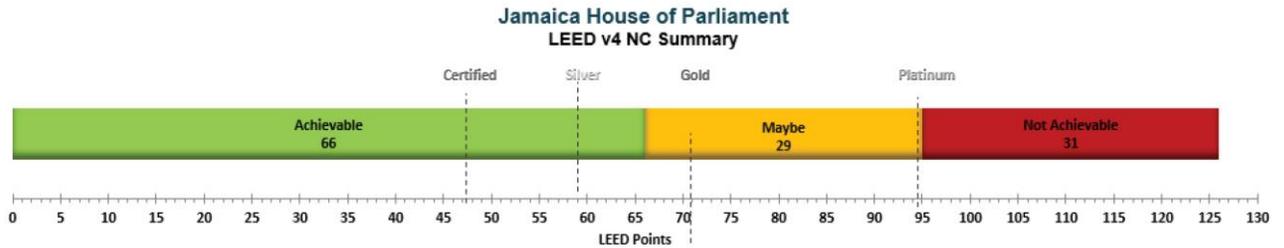


Figure 4-21: LEED summary of possible points for the Jamaican Houses of Parliament

4.5.1 Rainwater Harvesting

The project will include rainwater harvesting of condensate from air conditioning units and runoff from the roof of the parliamentary building. This water will be drained through a gutter into a cistern at ground level for reuse in certain areas of the building, for example, toilets and irrigation. In periods where rainfall exceeds the needs of the building, the cistern will overflow into wetland cells where the water will be treated, infiltrated and slowed down in order to reduce peak flow at site outfall. The wetlands will treat water and outfall into the water feature which will be located right before the site outfall. The proposed system site outfall will be located at the water feature. The dynamic water feature will include a waterfall and will store and attenuate flows before out falling into the historic Barnes Gully. Because of the elevation difference across the site and into the gully, a benefit of the proposed system is that it is dependent on gravity flow and does not require pumping. The key to this design is that it is adaptable to the seasonal changes in rainfall in Jamaica. The system can be customized to optimize water use and outfall conditions during dry seasons, wet seasons or both (Figure 4-22 to Figure 4-24).

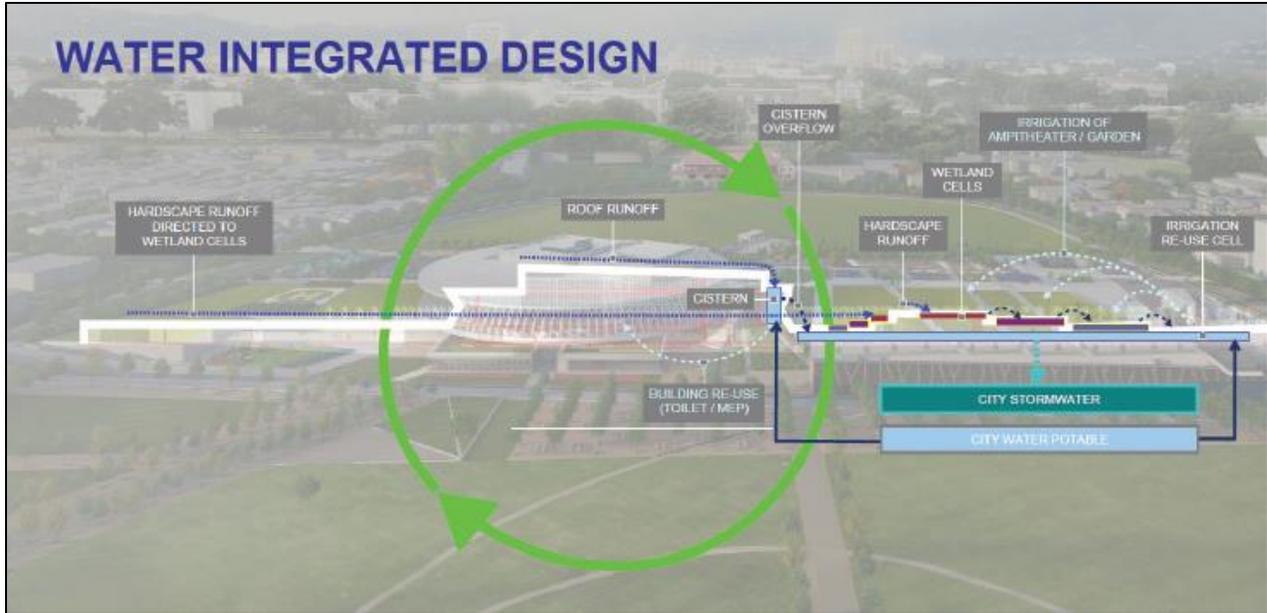


Figure 4-22: Water integrated design

LEGEND

- - - - - LIMITS OF WORK
- PROP FOUNTAINS

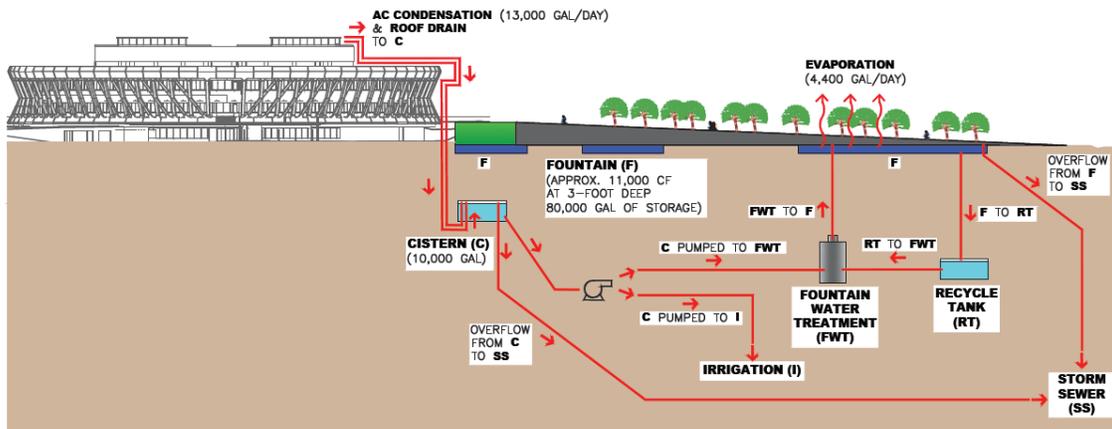
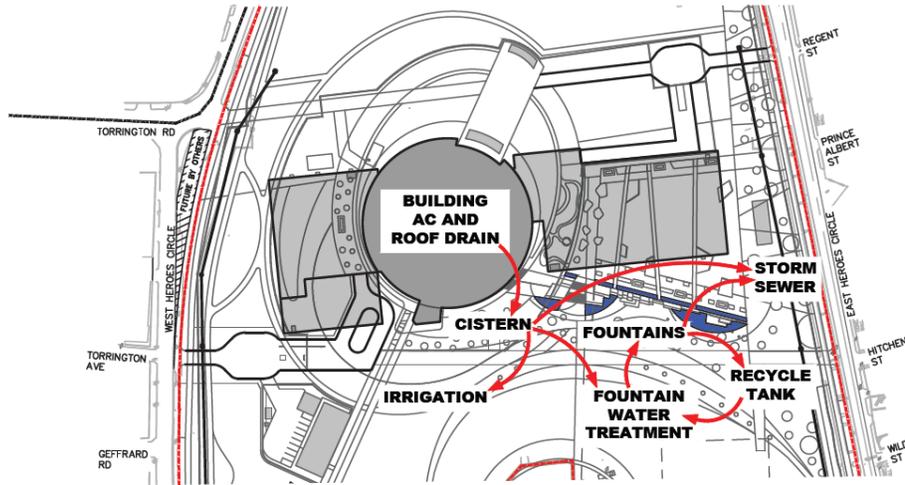


Figure 4-23: Proposed irrigation Water Tank Diagram

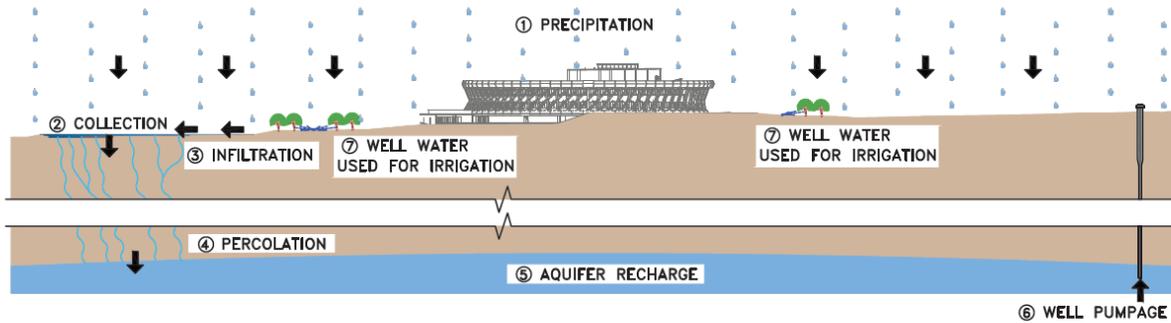


Figure 4-24: Percolation Diagram

4.5.2 Energy Efficiency

The project will promote the use of solar energy through the placing of photovoltaic (PV) cells on the roof as well as PV glass on the skylight to reduce energy usage. Alternative vehicle charging stations have been proposed. Additional energy efficiency measures include electrical systems that propose progressive energy reduction and efficiency as outlined by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 90.1, 2013 and the International Energy Conservation Code (IECC), 2015; the increase in the use of variable speed motors; light-emitting diode (LED) lighting; and low voltage load demands both at equipment and plug outlet as well as the use of energy efficient equipment. The building will also utilize natural light at all levels through the landscaped atriums. These systems will be integrated with strategies outlined by LEED Indoor Environmental Quality (IEQ). Air within the government building will also use LEED recommendations. Low flow air for assembly spaces will be considered.

4.6 Traffic Management

The project is currently considering the following mitigation measures to control traffic once construction has been completed. These include:

- A one-way system around Heroes Circle,
- Uncontrolled Tee intersections at Torrington Ave/Heroes Circle and Heroes Circle/Marescaux Road with merge lanes and long radii bends introduced.
- A raised concrete median at Marescaux Road/Connolley Ave. intersection will streamline both Northbound and Southbound traffic.

Figure 4-25 shows the proposed future road alignments. A long term recommendation is the widening of Marescaux road to four lanes, with relocation of the entrance to the National Water Commission to align with Mico University. This is not proposed to be done in the immediate timeframe.

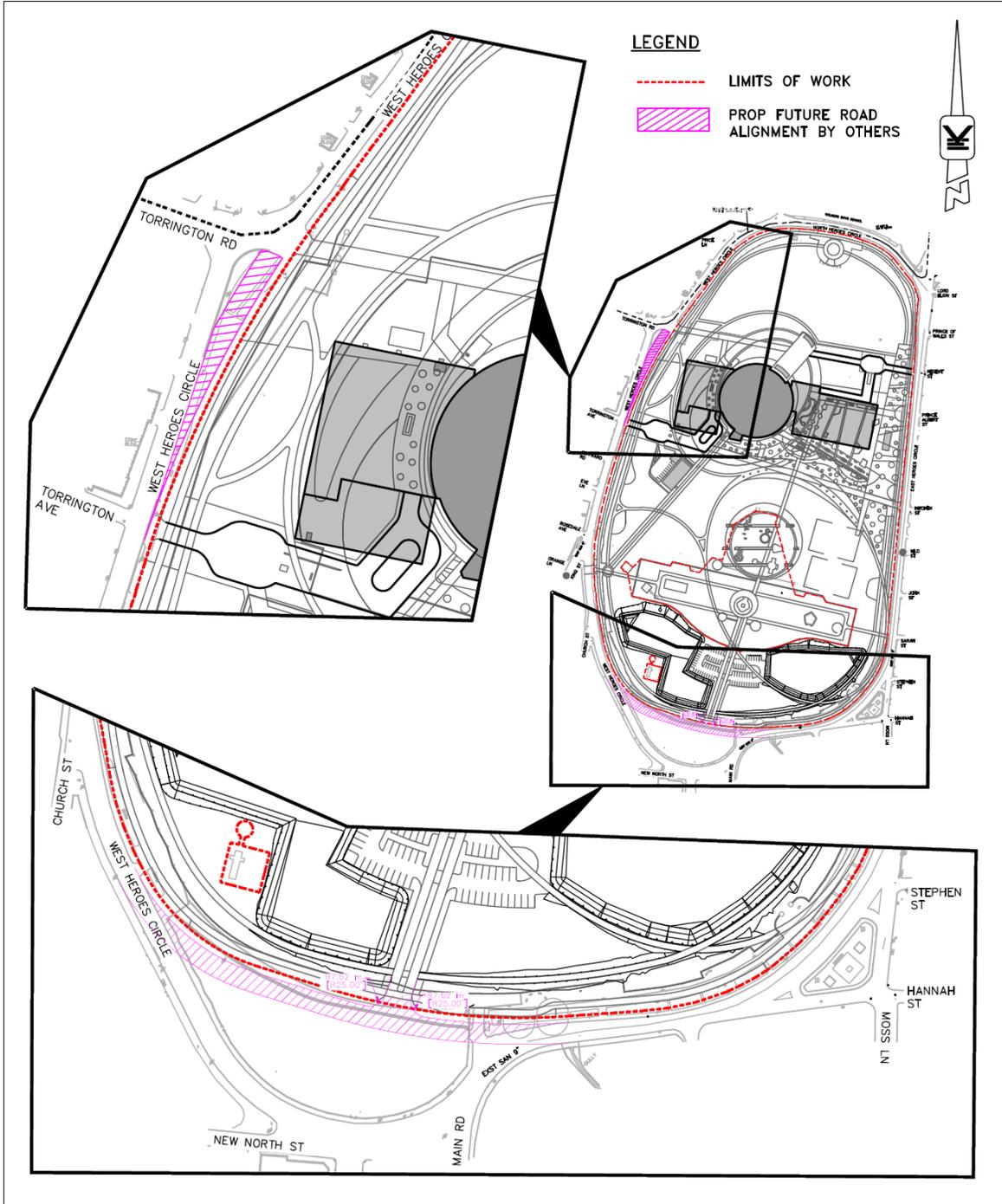


Figure 4-25: Future Road Alignment

4.7 External Infrastructure Requirements

The following external infrastructure will be required for the project:

- The National Water Commission is expected to upgrade their sewage treatment infrastructure to take the sewage from the newly constructed HOP.
- The traffic system around the Park will have to be upgraded as per section 4.6.

4.8 Project Timeline

The following Table presents a summary of the overall project timeline from the schematic design phase (beginning in August 2019) to post-construction services ending in October 2022.

Table 4-2: Overall project timeline

PHASE OF THE PROJECT	TIME FRAME
Schematic Design Phase	August 2019 to October 2019
Additional Consultant Services (Surveying Services, Geotechnical, Traffic and Environmental Assessments)	August 2019 to March 2020
Preparation of Construction Documents	February 2020 to June 2020
Jurisdictional (Code) Review	June 2020 to September 2020
Bid (Tender) and Award	July 2020 to April 2021
Construction and Observation Services	May 2021 to March 2023
Post-Construction Services	December 2022 to October March 2023



DESCRIPTION OF THE ENVIRONMENT

5 DESCRIPTION OF THE ENVIRONMENT

5.1 Physical Environment

5.1.1 Topography

The topography of the study site is generally flat with little undulation. A spot height on the topographical map indicates that the highest point is to the north, with an elevation of 51 metres above sea level (Figure 5-1). The gradient slopes towards the south reaching an elevation of around 38 meters above sea level to the south.

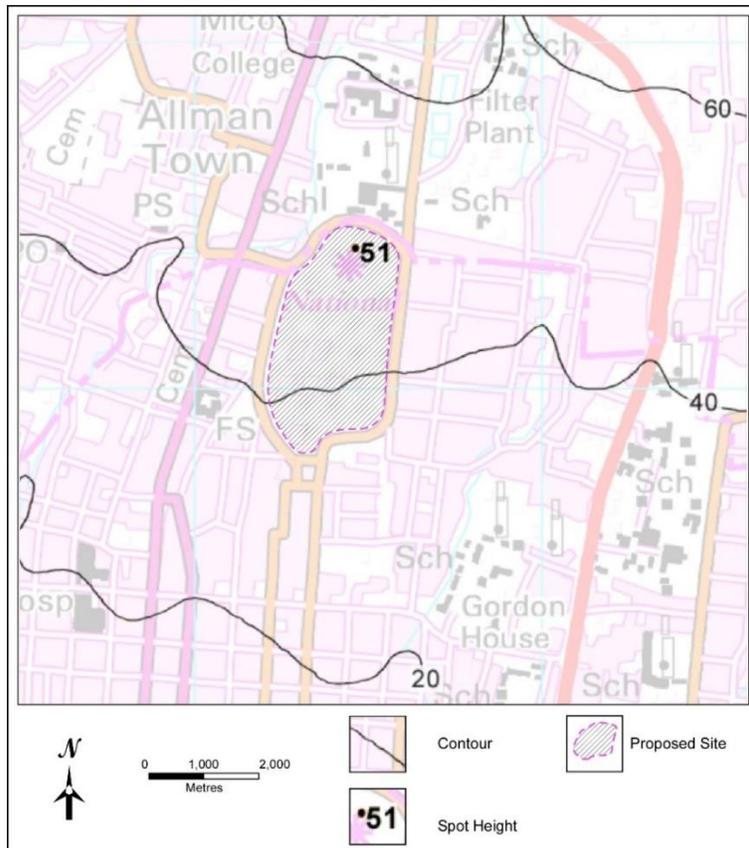


Figure 5-1: Contour map of the proposed site (extracted from: Sheet 18, Jamaica 1:50,000 (Metric Edition) Source: NLA, 2010.

5.1.2 Geology and Soils

The proposed site of the Houses of Parliament is within the Kingston Metropolitan Area which sits on the Liguanea Plain. The geology consists of the Quaternary Liguanea Alluvium which sits on bedrock of Tertiary Limestones which is probably extensively faulted, however, these are not visible on the surface within the overlying alluvium (Wiggins-Grandison, Kebeasy & Husebye, 2003). The alluvium generally consists of poorly sorted sands and gravel interbedded with silts and clays. Boulders and conglomerates are also occasionally found (Ahmad & Robinson, 1994) (Figure 5-2). These were deposited by the Hope River which drains the mountains to the northeast of Kingston (Ahmad & Robinson, 1994). The thickness of the alluvium probably ranges from a few meters in distal areas to several hundred meters in more proximal

areas. The overlying soils in the Kingston area are generally derived from the underlying alluvium. These soils are probably more of a clayey loam and silty clays with some sandy horizons.

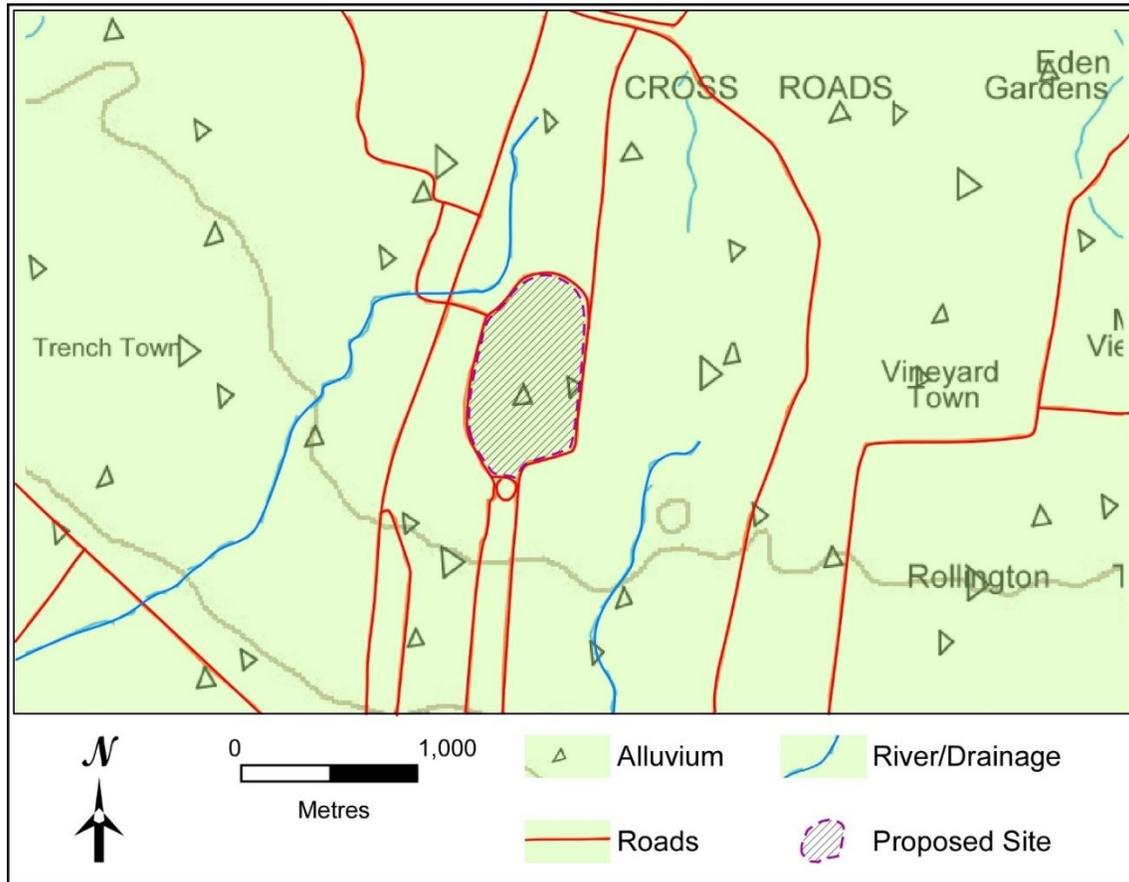


Figure 5-2: Geological map of the proposed site (extracted from: Sheet 18, Geological Map 1:50,000 (Metric Edition) Source: MGD, 2008)

5.1.2.1 Soils

A total of nine (9) boreholes were collected across the site by the consulting engineering team at NHL Engineering Limited. The soil samples tested had measurable coarse-grained content. The samples were classified as inorganic clays of low plasticity. The results indicate the following:

- It is expected that these soils will exhibit low compressibility and swell shrinkage and will therefore have little bearing on the choice and design of the foundations;
- The water table level is very low (not encountered during drilling), the in-situ densities are relatively high, and the soils (gravels/sands) are well graded. All of these characteristics indicate that the soils are unlikely to respond significantly (liquefy) to seismic activities. See Table 5-1 for a summary of the soil parameters.

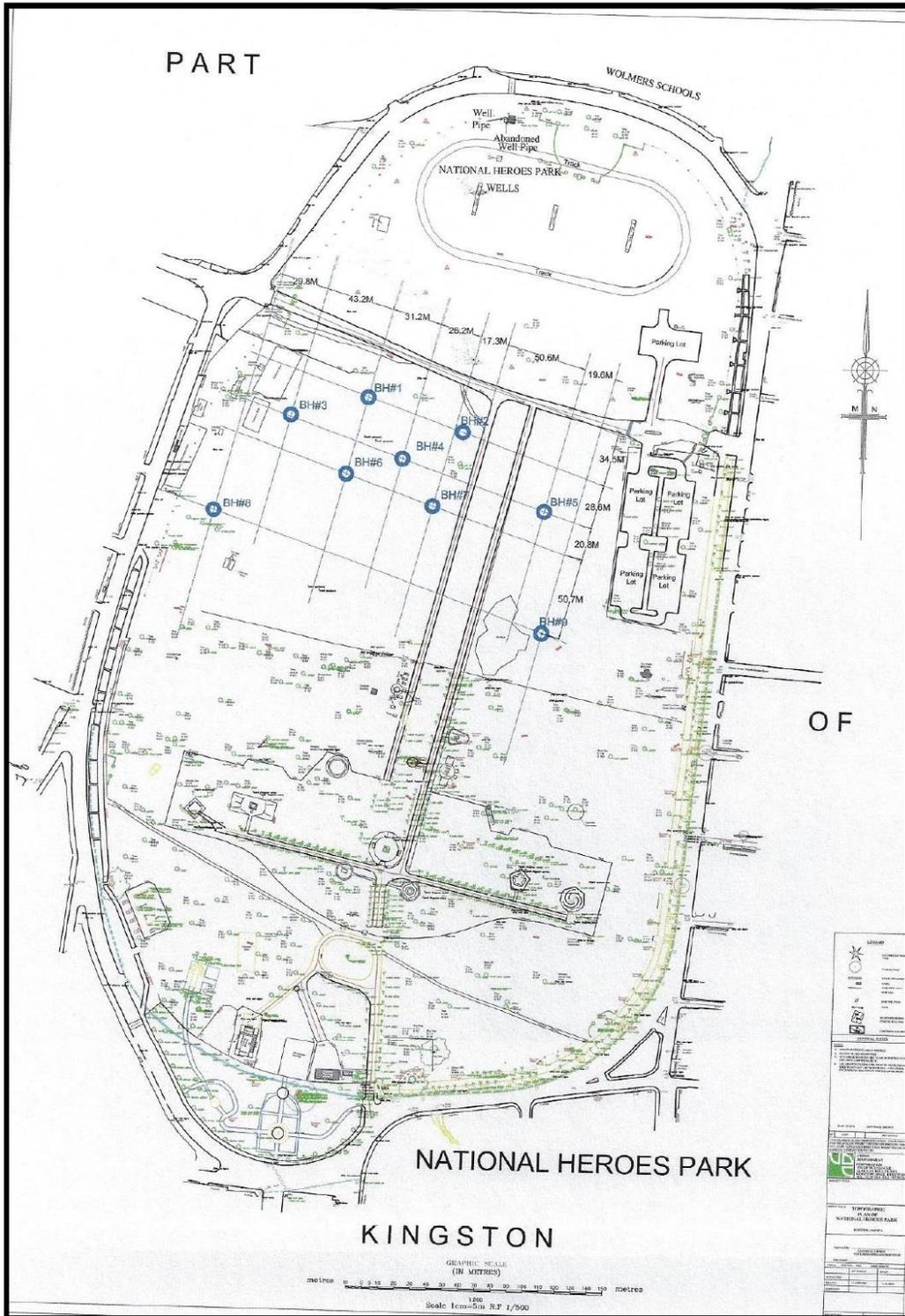


Figure 5-3: Test location sites (Source: NHL, 2019).

Table 5-1: Summary of soil parameters

LAYER IDENTIFICATION	TYPE 1 SOILS	TYPE 2 SOILS	TYPE SOILS
	Sands+ Gravels	Sands+Gravels	Sandy Clays
Bulk Unit Weight	17.1 KN/m ³	16.9 KN/m ³	16.5 KN/m ³
Submerged Unit Weight	9.2 KN/m ³	9.1 KN/m ³	8.8 KN/m ³
Compression Index			0.41
Void Ratio			0.64
Undrained Cohesion (KPa)			54.2
Drained Cohesion (KPa)			
Effective PHI/PHI	36.5 deg.	33.5 deg.	
Relative Density	76.5%	56.0%	
Ka	0.254	0.289	
Kp	3.936	3.464	
Permeability Coef. (k)cm/s	1x10 ⁻³	1x10 ⁻²	1x10 ⁻⁶

Source: NHL, 2019.

The following is a summary of recommendations made by the engineers for consideration in the design:

- The use of conventional shallow foundation is recommended. Due to the limited locations tested, predictions of trends in the soil profile across the building footprints are only presumptive and therefore the possibility of encountering upper strata of plastic soils, unidentified past gullies, pits or pockets of loose granular soils is not unlikely and could lead to deformation problems;
- To allow for the above unforeseen possibilities, a foundation that mitigates the effects of the following is recommended –
 - Settlement due to rearrangement of possible unidentified isolated soft plastic or loose granular soil in the upper strata (3m) below the footprint of the buildings under static and seismic/cyclic loading;
 - Differential deformation due to differences in relative densities beneath adjacent isolated footing (NHL, 2019).

5.1.3 Hydrology and Drainage

As shown in Figure 5-4 the project site is located in the Hope River Watershed Management Unit, in the McGregor Gully sub-basin (18b), atop the alluvium aquifer. The site is located in the northernmost section of the designated “Urban” Parish of Kingston with the “Suburban” section of the Parish of Saint Andrew to the north. It is geographically the high point of the district and historically included water reservoirs with drainage from the park area contributing to the Waggonete Lands Gully. Currently, drainage from the site passes through a concrete culvert and then into Barnes Gully. The drainage path passes through the backyards of homes and underneath roadways before its confluence with Barnes Gully near St. George’s College (Figure 5-5).

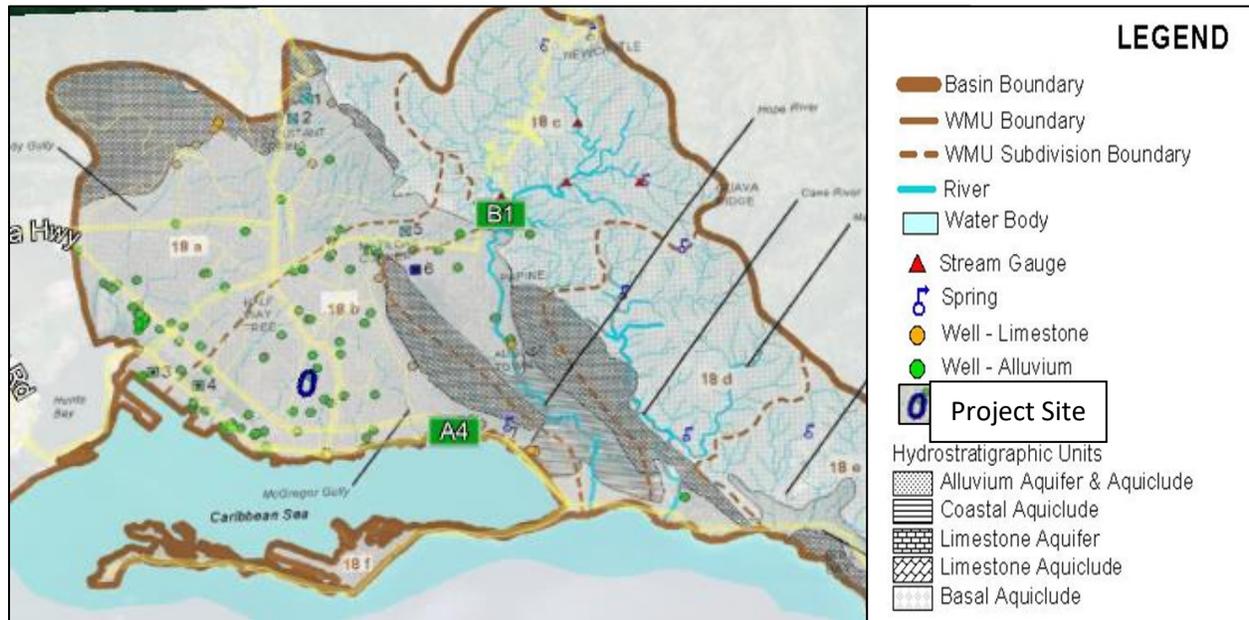


Figure 5-4: Hydro-stratigraphic map of Hope River watershed

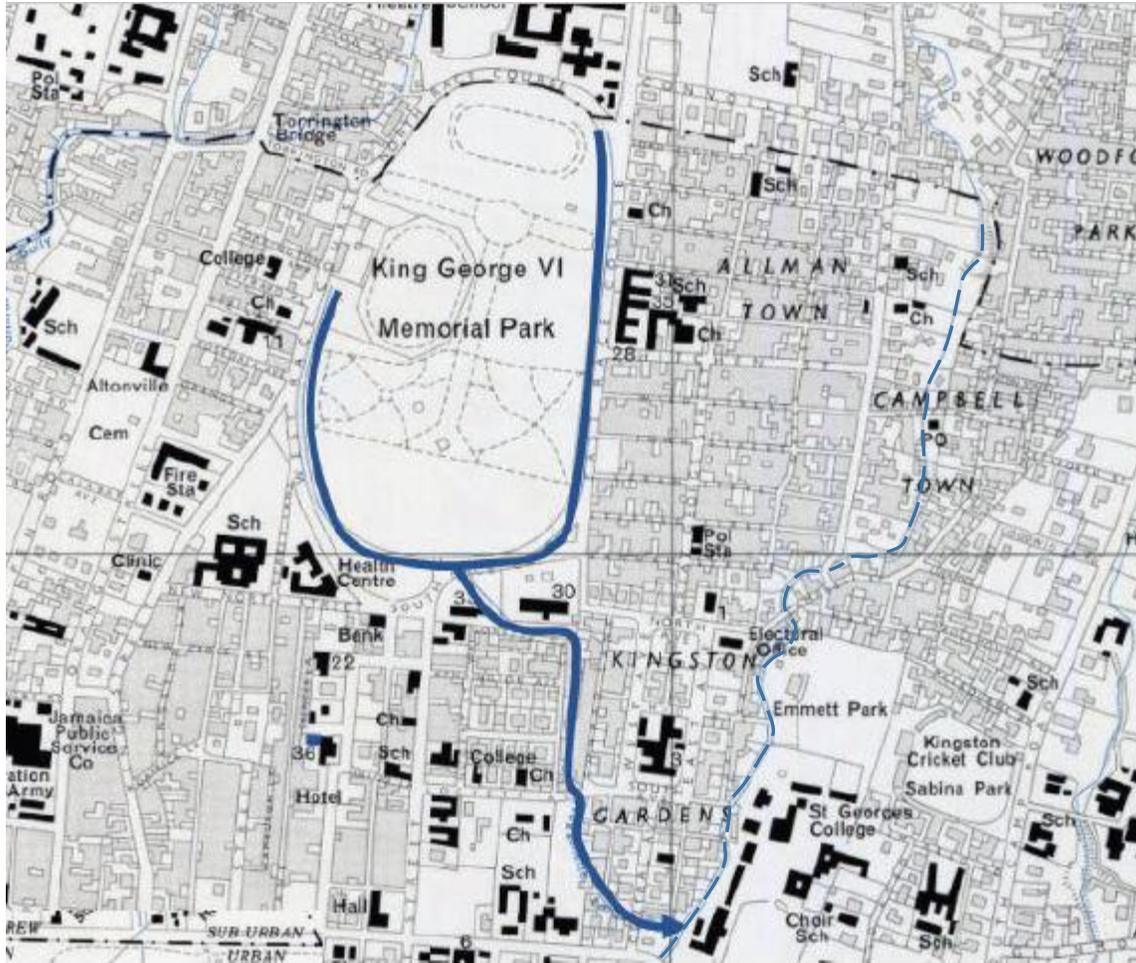


Figure 5-5: Location of the drainage path from project area to Barnes Gully

5.1.3.1 Predevelopment Assessment

The HechMMS model schematic for the project area is shown in Figure 5-6. For each sub-basin, the model utilized the parameters, CN and impervious percent given in Table 3-1, to simulate the infiltration losses and the UH lag time in Table 3-2 to transform the effective rainfall into the flow rate and volumes. These were then combined at the outlet.

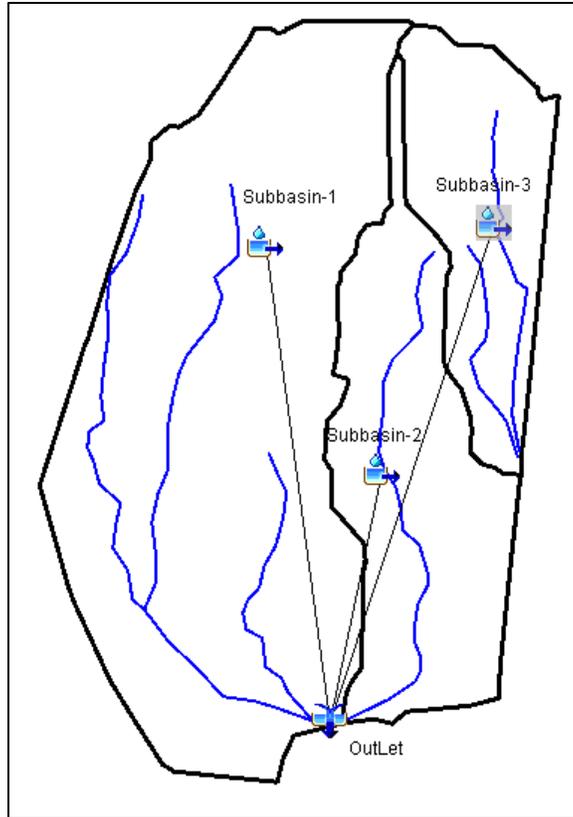


Figure 5-6: HechMS model schematic of the project area

The model was run using the DDF data for Cavaliers in Table 4.6, for each of the return periods: 10-, 25-, 50- and 100-year. The simulated peak lows and runoff volumes for each sub-basin and at the outlet are summarized in Table 5-2. This shows that currently a peak flow of 3.22 cubic meters per second (cumecs) at the outlet has a 10 percent chance of being equalled or exceeded in any given year. A peak flow of 12.27 cumecs has an exceedance probability of 0.01 in any given year. The corresponding runoff volumes for these peak flows are 15,950 cubic meters and 80,950 cubic meters respectively. The bulk of the flow at the outlet is generated by Subbasin-1.

Table 5-2: Predevelopment peak flows and runoff volumes

Return Period	Units	Subbasin-1	Subbasin-2	Subbasin-3	Outlet
10	PeakQ (m3/s)	1.62	0.64	1.09	3.22
25	PeakQ (m3/s)	4.48	1.75	1.88	7.91
50	PeakQ (m3/s)	5.87	2.29	2.22	10.16
100	PeakQ (m3/s)	7.18	2.79	2.53	12.27
10	Vol (1000m3)	8.53	3.16	4.26	15.95
25	Vol (1000m3)	25.97	9.61	9.36	44.94

Return Period	Units	Subbasin-1	Subbasin-2	Subbasin-3	Outlet
50	Vol (1000m3)	36.3	13.43	12.1	61.84
100	Vol (1000m3)	48.04	17.78	15.12	80.95

5.1.4 Climate

The climate of the National Heroes Park is consistent with that experienced by the rest of the Kingston and St. Andrew (KSA) area. Generally, Jamaica experiences a tropical maritime climate with a bimodal rainfall season occurring in May and October.

5.1.4.1 Temperature

The annual average temperature in the KSA area is 28.3°C. August and July usually experience the highest average temperature of 29.5°C, while January experiences the lowest mean temperature of 25.6°C. The annual highest maximum mean temperature is 31.9°C. July usually records the highest maximum mean temperature, while February has the lowest maximum mean temperature. Further, the highest average minimum temperature is experienced in August and the lowest average minimum temperature in February. August is the warmest month of the year.

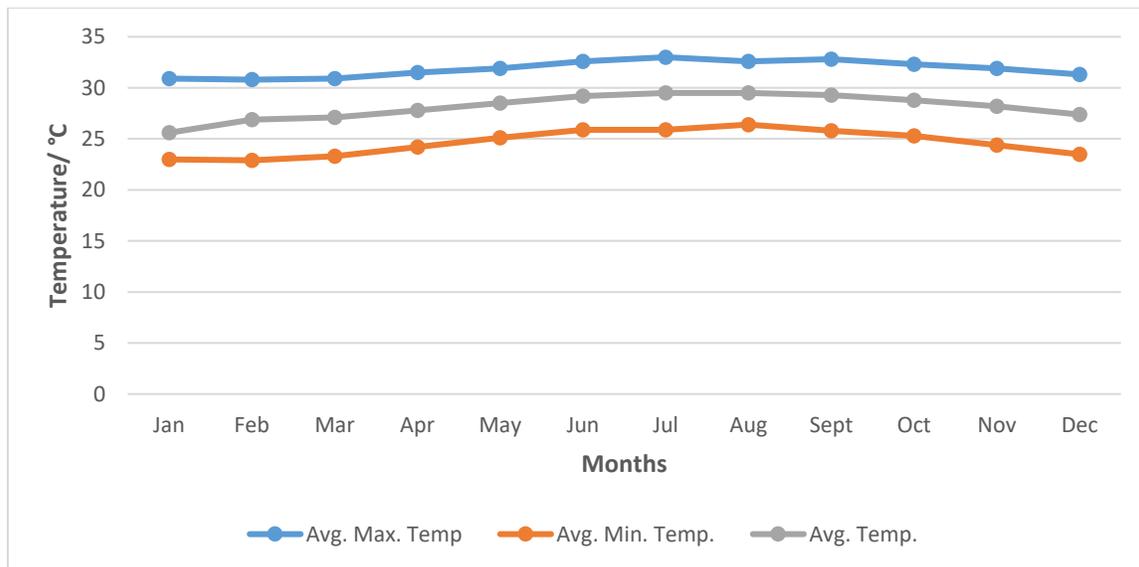


Figure 5-7: Average temperature – KSA. (Source: Meteorological Office of Jamaica, 20 year mean temperatures 1996-2015)

5.1.4.2 Rainfall

Most of the KSA’s rainfall is recorded during the rainy season which occurs from June to November/December. The average rainfall for the KSA is 1447mm, however, there is seasonal variation. October usually has the highest rainfall (241mm), while July records the lowest rainfall (65mm). The difference between the highest and the lowest months is 176mm.

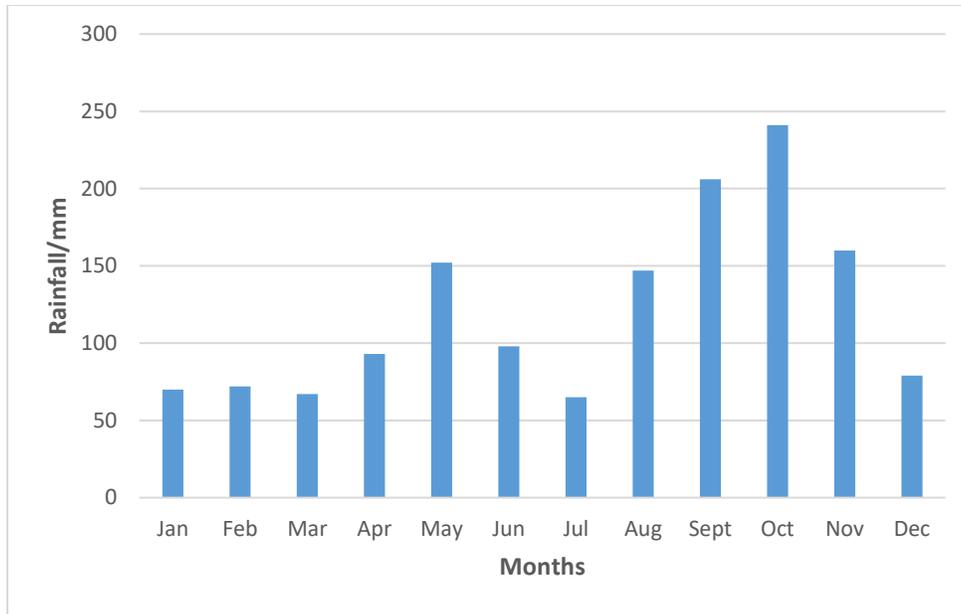


Figure 5-8: Average rainfall – KSA (Source: Meteorological Office of Jamaica, 30 year period between 1971 and 2000).

5.1.4.3 Climate Change

Like the rest of Jamaica, the study area and its environs are susceptible to the effects of climate change. Specifically, climate data indicates that the country has experienced an overall warming trend between 1950–2014 for minimum, mean and maximum temperatures. Of the three, minimum temperatures have increased at a faster rate ($\sim 0.27^{\circ}\text{C}/\text{decade}$) than both mean ($\sim 0.16^{\circ}\text{C}/\text{decade}$) and maximum ($\sim 0.06^{\circ}\text{C}/\text{decade}$) temperatures. Additionally, there has been an increase in the daily temperature range, the number of warm nights and the coolest minimum temperature. These increases are expected to continue until the end of the century (PIOJ, 2018).

With respect to rainfall, it has become less predictable and there has been a large increase in the number consecutive dry days in the southern sections of the island which indicates increased drought conditions. This drying trend is expected to continue to the end of the century. In addition, rainfall has become less predictable and the intensity and occurrence of extreme rainfall events have increased from 1940–2010.

The Intergovernmental Panel on Climate Change (IPCC) has indicated that extreme weather events, such as droughts, hurricanes and storms, will occur more frequently and be of greater intensity. Evidence of this has been the increase in the number of Category 5 hurricanes which have traversed the region over the past ten years.

Sea level rise will have a significant impact on Jamaica and particularly its southern coastline which is in close proximity to the study area. Climate scenarios have suggested that a rise of 0.18m will result in the loss of 101.9km² of land, while a rise of 10m will result in 416.4km² being loss. The areas that would be most affected by this are Palisadoes, Portmore, Old Harbour Bay, Black River, Rocky Point/Portland Cottage/Savanna-La-Mar and Negril (Richards, 2008). Sea level rise also has implications for water

resources as a result of saltwater intrusion. It will also exacerbate the impact that storm surges from now stronger hurricanes will have on areas which are currently further inland.

5.1.5 Natural Hazards

5.1.5.1 Tropical Cyclones

Jamaica is vulnerable to tropical cyclones due to its location within the Atlantic hurricane belt. Over the past 75 years, the island has been impacted by over 20 tropical depressions, storms and hurricanes (CSGM, 2017) and many more passing within 100km of the island. Many of the direct hit storms have approached the island from the south, thereby making the southern parishes, including Kingston and St. Andrew, especially vulnerable to the impacts of tropical cyclone hazards (Figure 5-9).

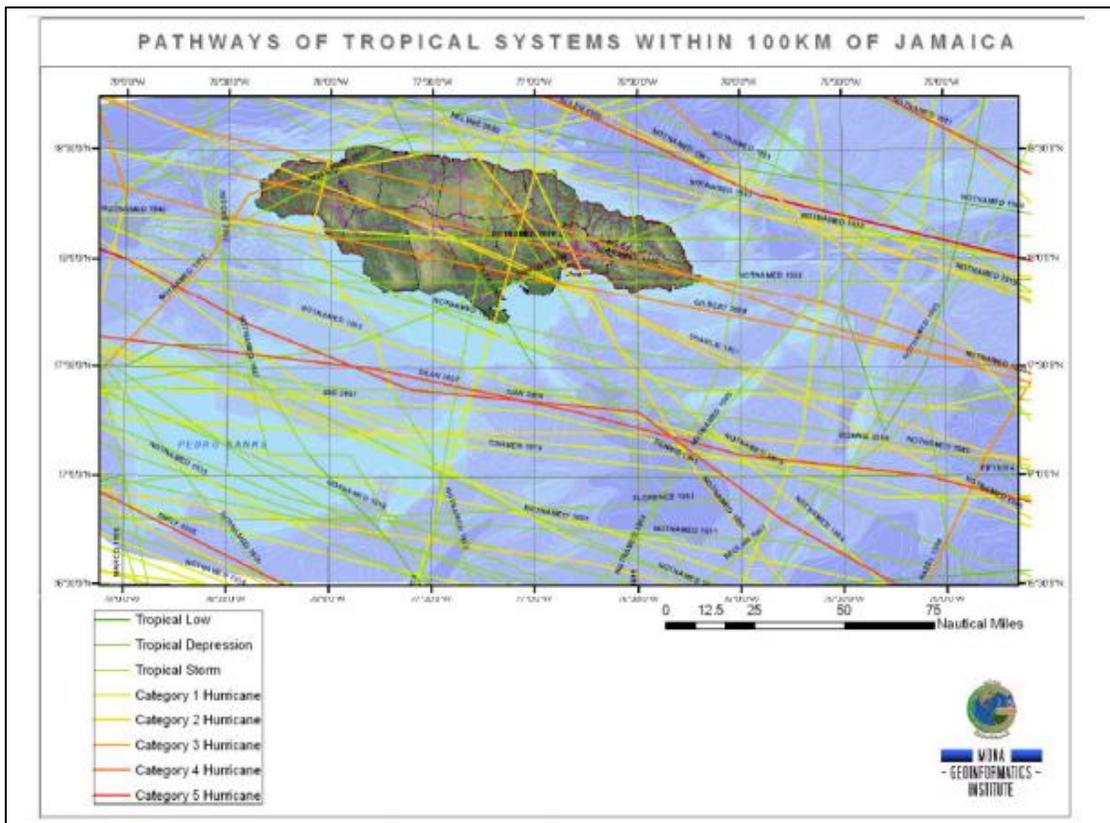


Figure 5-9: Historic storms passing within 100km of Jamaica (n.d.) (Source: Mona Geoinformatics Institute)

Storms of varying strengths affecting Jamaica over the past twenty years, whether by direct hit or not, have caused loss of lives as well as significant property damage. This has resulted in millions of dollars in losses to the country's economy (Table 5-3).

Table 5-3: Impacts of selected storm events on Jamaica

EVENT	YEAR	CATEGORY	COST/\$JMD BILLIONS	IMPACT (% OF GDP)	DEATHS
Hurricane Gilbert	1988	5	552.1	65	45
Hurricane Michelle	2001	4	2.52	0.8	5
Hurricane Charley	2004	4	0.44	0.02	1
Hurricane Ivan	2004	3	36.9	8.0	17
Hurricanes Dennis and Emily	2005	4	5.98	1.2	7
Hurricane Wilma	2005	5	3.6	0.7	1
Hurricane Dean	2007	4	23.8	3.4	6
Tropical Storm Gustav	2008	-	15.5	2.0	20
Tropical Storm Nicole	2010	-	20.6	1.9	16
Hurricane Sandy	2012	1	9.7	0.8	1

Source: ODPEM, 2014

It is assumed that storms and hurricanes that have affected Kingston would also have affected the project area and surrounding communities. Anecdotal information has indicated that when there is heavy rainfall, a large amount of solid waste is transported into the drains causing them to backup and overflow into sections of the communities and roadways. Trees are also likely to fall and damage electrical wires. Hurricane Gilbert resulted in the most significant damage to the general area.

5.1.5.2 Drought

Jamaica has been affected by droughts. The years 2009–2010 and 2014–2015 showed a decrease in daily rainfall from the yearly totals recorded at all the stations. This corresponded with the years of El Niño in the Atlantic which resulted in below normal rainfall, resulting in drought for the island with maximum impact in KSA, south St. Elizabeth, and Clarendon. The decline in rainfall was much more pronounced for the year 2015 where rainfall as low as 875mm was recorded in the station at Irish Town as compared to 1102mm of 2014. Newcastle recorded a decline from 1372mm in 2014 to 895mm in the year 2015. Additionally, the stations located at Palisadoes (NMIA) recorded a yearly total of 307mm in 2015. The Meteorological Service of Jamaica classified the KSA as experiencing extreme drought at this time.

Every year in the dry periods, NWC reports that there is an average shortfall of 20 million gallons per day. This affects the businesses, schools and organizations in the surrounding communities. This means that the project will have to consider alternative sources of water particularly during the dry period to mitigate against this potential risk.

5.1.5.3 Seismic Activity

Jamaica, due to its location on the Caribbean Plate margin, is susceptible to seismic activity. Seismicity mapping has indicated that there is a concentration of seismic activities in the country’s eastern parishes of St. Thomas, Portland, and Kingston and St. Andrew where the project is located (Figure 5-10).

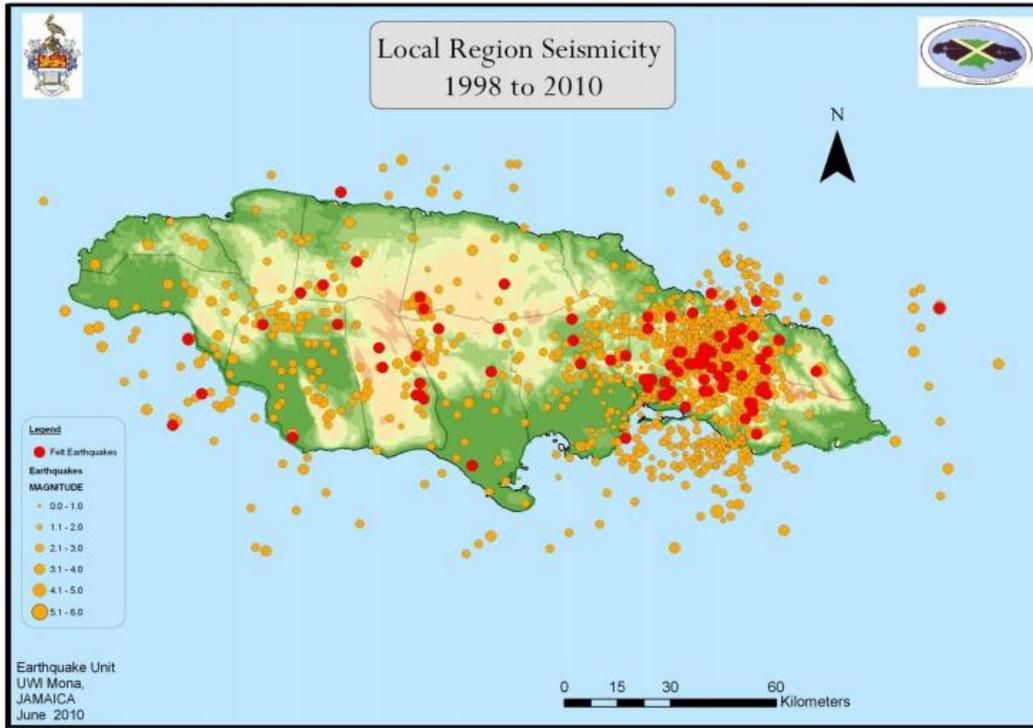


Figure 5-10: Jamaica seismic activity – 1998–2010

Source: Earthquake Unit, The UWI Mona

Specifically, the KMA, in which the project is located, has experienced a fairly active seismic history. In fact, Kingston and its environs have been affected by eight (8) of the thirteen (13) of Jamaica’s most damaging earthquakes. These include the catastrophic earthquakes of 1692 and 1907 (Table 5-4).

Table 5-4: Jamaica's most damaging earthquakes

Year	Date	Maximum Intensity (EMS) *	Places Affected	Observed Damage
1667	–	VIII	–	Landslide
1688	March 1	VII	Port Royal	Houses and ships damaged
1692	June 7	X	Port Royal, Kingston, Vere Plains Also felt strongly islandwide	3,000 dead; buildings collapsed; liquefaction, subsidence, landslides and water ejected
1771	September 3	VII	Port Royal, Kingston	Damage to structures, felt on boats in port
1812	November 11	VIII	Kingston	Several people killed; walls fell, buildings damaged

Year	Date	Maximum Intensity (EMS) *	Places Affected	Observed Damage
1824	April 10	VII	Kingston; Spanish Town, St. Catherine; Old Harbour, Clarendon	Loud noise accompanied shock; some houses fell
1839	November 5	VII	Montego Bay, St. James	Government buildings declared unsafe due to damage
1907	January 14	IX	Kingston, Port Royal	1,000 dead; fire over 56 acres; most buildings collapsed; water mains broken; landslides and slumps; localized tsunami; statues rotated; near total destruction of damage – est. 2 million pounds sterling in damage
1914	August 3	VII	Eastern Jamaica	Buildings cracked, doors and windows out of plumb; clocks stopped; stocks in drug stores broken
1943	July 15	VII	St. Elizabeth	Landslides; many homeless; breakages of merchandise in shops
1957	March 1	VIII	Montego Bay, St. James and felt islandwide	4 dead; landslides; bridges damaged; rotation of spires and monuments; springs increased flow and muddied; utility poles and lines broken; breakages of items off shelves
1993	January 13	VII	Kingston and St. Andrew Also felt islandwide	2 dead; items thrown off shelves and broke; most persons were frightened; heavy furniture shifted; water splashed out of containers and pools; much non-structural

Year	Date	Maximum Intensity (EMS) *	Places Affected	Observed Damage
				damage; few cases of structural damage
2005	June 12	VII	Central Jamaica – Felt strongest at Aenon Town and Top Alston in Clarendon; Silent Hill, Manchester; Wait-a-bit and Lemon Walk, Trelawny	Moderate to heavy structural damage on most vulnerable structures; some people had to be dug out of collapsed dwelling; minor injuries from falling objects

* European Macroseismic Scale

Source: Earthquake Unit, The UWI, Mona

Typically, the KMA is affected by earthquakes of low intensity (magnitude 4 or less) which are often-times not felt (Figure 5-10) and which are unlikely to cause much structural damage. In spite of this, it must be noted that the project location falls within an area which is near to fault lines that have the capacity of generate moderate strength earth movements with magnitudes of 6. Additionally, studies have indicated that motions in the KMA, particularly in areas of hard rock, have a 10% probability of exceedance in 50-year ground acceleration (shaking) values (Figure 5-11).

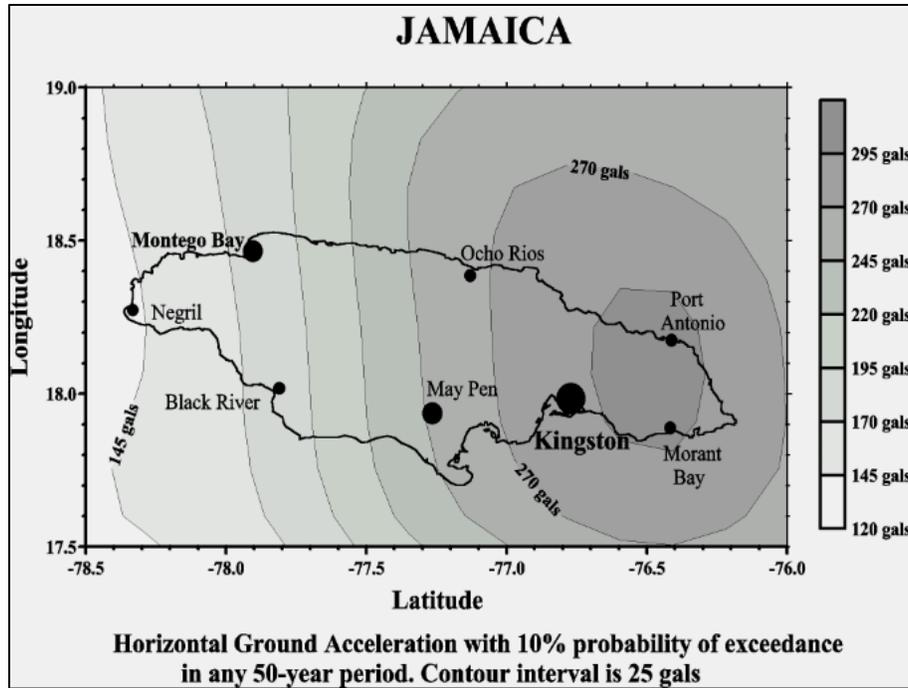


Figure 5-11: Jamaica – Probability of exceedance of 50-year acceleration values (Source: Organization of American States)

5.1.6 Water Quality, Air Quality and Noise

5.1.6.1 Water Quality Assessment

Only the January 29, 2020 results have been interpreted due to uncertainty with the November sample. The results were compared to the National Interim Irrigation Standards. Residual Chlorine was not included in this assessment. The results of the analysis indicate that faecal coliform levels were higher than the Irrigation Standards which indicate that the water is affected by untreated effluent from surrounding areas. This is also confirmed by the high nitrate levels in the sample. As such it is suggested that this water only used for irrigation purposes however treatment may be required due to the high faecal coliform values. At the time of preparing this report the results from the metal testing was not yet available for analysis. See Appendix 2 for further details.

Table 5-5: Well water results compared to the NRCA Irrigation Standards (January results)

Parameter	Irrigation Standard Limit	Hero's Park Sample January 2020
Fats, Oil and Grease (FOG)	10 mg/L	3.5 ± 0.39 mg/L
Total Suspended Solids (TSS)	15 mg/L	36 ± 0.20 mg/L
Residual Chlorine (RC)	0.5 mg/L	--
Biochemical Oxygen Demand (BOD)	15 mg/L D.O.	2.6 mg/L D.O.
Chemical Oxygen Demand (COD)	<100mg/L	<3 mg/L
Faecal Coliform (FC)	12 MPN/100ml	>1600 MPN/100ml

(Source: ETAS)

5.1.6.2 Air Quality Assessment

Sources of respirable particulates generally include a combination of natural and anthropogenic sources such as pollen, roadside dust, vehicular exhaust and used unpaved road, and so on. As it relates to the sites assessed at National Heroes Park, these sources were primarily vehicular exhaust and dust.

The results of the air quality sampling exercise conducted at eight (8) locations in September 2019 are presented in Table 5-6. The data obtained is useful for providing an indication of pre-construction PM₁₀ levels which should be maintained during construction and the operational phase of the proposed development.

Table 5-6: Particulate matter and noise results for monitoring sites within the project sphere of the Houses of Parliament Project, September 2019

SAMPLE SITE	PARTICULATE MATTER CONCENTRATION (μGM^{-3}) FOR 24-HOUR PERIOD	NRCA PARTICULATE MATTER CONCENTRATION (μGM^{-3}) FOR 24-HOUR PERIOD	AVERAGE NOISE (DBA)/15 MINS	AVERAGE NOISE ON OPPOSITE (WESTERN) SIDE OF ROAD (DBA)/15 MINS	NEPA NOISE GUIDELINE (DBA)
AQ1 (Ministry of Finance and The Public Service)	8.2	150	71.3	69.1	65
AQ2 (Ministry of Labour and Social Security)	8.1		68.1	65.1	

SAMPLE SITE	PARTICULATE MATTER CONCENTRATION (μGM^{-3}) FOR 24-HOUR PERIOD	NRCA PARTICULATE MATTER CONCENTRATION (μGM^{-3}) FOR 24-HOUR PERIOD	AVERAGE NOISE (DBA)/15 MINS	AVERAGE NOISE ON OPPOSITE (WESTERN) SIDE OF ROAD (DBA)/15 MINS	NEPA NOISE GUIDELINE (DBA)
AQ3 (Ministry of Education, Youth and Information)	5.3		59.5	72.7	
AQ4 (Plant Nursery; South Entrance)	1.7		52.9	–	
AQ5 (Voluntary Organization for Uplifting Children)	10.3		52.9	74.2	
AQ6 (Seventh Day Adventist Church)	1.3		71.1	68.0	
AQ7 (Northern Boundary of Site)	32.4		57.6	–	
AQ8 (Inside Heroes Park)	38.4		62.0	–	

Sampling stations were established at sensitive receptors upwind and downwind to the proposed Houses of Parliament Project site and included both commercial and business properties which may be most likely impacted during the construction phase of the project due to prevailing meteorological conditions. All the sampling stations had PM_{10} concentrations $<150\mu\text{gm}^{-3}$ with the highest value being $38.4\mu\text{gm}^{-3}$. The site with the highest PM_{10} value (AQ8) was located inside the Park. This site is characterized as having unpaved grounds with little grass and few large trees as well. During the dry periods, it is expected that dust from the Park will be transported to receptors based on the prevailing wind directions. This is evidenced by the PM_{10} value for AQ7 being $32.4\mu\text{gm}^{-3}$; this site is downwind of AQ8 and in the path of the prevailing winds noted during the assessment.

5.1.6.3 Noise Assessment

Noise levels exceeded the NEPA Standard of 65dBA for Commercial Areas at all sites except AQ3 – AQ5 and AQ7 (Figure 3-5). These sampling locations were influenced primarily by vehicular traffic which is a source of noise. Additionally, given the prevailing NW winds that were characteristic of the site on the day of sampling, it is expected that the noise readings on the western side of the road would be high as well. It is expected that noise levels near to these sources will exceed the cited standard especially when conditions change during heavy traffic flows. Further, it follows that the receptors on the western side of the project site would be most impacted given the prevailing winds and other meteorological conditions. Added to this, there is expected to be an increase in noise during the construction period which may

impact residents in nearby communities as well as workers operating in the office space surrounding the project site.

5.2 Ecological Environment

5.2.1 Situational Context

Although the project site is not considered to be in an ecologically significant/sensitive area, this assessment considered the surrounding flora and fauna and how what exists may be impacted by the proposed development. The ecology of the proposed project can be characterized as being severely disturbed since historically, it has been subjected to significant vegetation clearance and landscaping for use as a park and monument. In addition, adjacent lands have become heavily developed and urbanized. Figure 5-12 and Table 5-7 give an approximate definition of the habitat classes (land use) at the study area relative to its size (<20 hectares).



Figure 5-12: Habitat map of study area (Source: Google Earth, 2019)

Table 5-7: Habitat classes defined for the study area

Habitat classification	Relative area (% of total)
Grassland with low tree density (less than 2 trees per ha.)	85%
Wasteland (unvegetated/arid patches)	26%
Urban Infrastructure (incl. monuments)	9%
Trails (paved, paths)	4.5%

5.2.2 Flora

As a result of the current land usage of the study area, the terrestrial ecology is very disturbed and dominated by landscaped or opportunistic species, as well as trees and ornamentals purposely planted for beautification/landscaping. Grasslands dominate the study area, accounting for over 90% vegetation coverage, followed by trees and shrubs. Those found on site are typical of urban landscapes and can be described as grassland with low tree density (Figure 5-13). Of the 13 species recorded, there were none of special conservation status (endemic, threatened or protected) observed in the area. A full species list of flora observed can be found in Appendix 3.



Figure 5-13: Examples of flora observed at study area (September 5, 2019)

5.2.3 Fauna

Terrestrial fauna observed on site was limited to a few birds, butterflies and feral dogs, none of which are considered sensitive. The observed fauna are common and widespread species that typically occur in disturbed forests or landscapes. Further, none of the rare endemics (that are dependent on natural forests) were observed in the area. A full species list of fauna observed can be found in Appendix 3.

All the bird species which were observed in the study area were rated of “Least Concern” on the International Union for Conservation of Nature (IUCN) status list, meaning that these species have been evaluated and found to be so common that at present, no conservation concern is projected in the future. Solid waste and man-made paths were also evident at the project site, indicating considerable use by persons traversing the area.

5.2.4 Ecosystem Function and Services of the site

Ecosystems have the potential to supply a range of services that are of fundamental importance to human well-being, health, livelihoods, and survival (Millennium Ecosystem Assessment (MEA), 2005; TEEB Synthesis, 2010). Ecosystem services (ES) can be defined as contributions of ecosystem structure and function (in combination with other inputs) to human well-being (Burkhard et al., 2012). The ecosystem functions can be understood as the characteristics or behaviours of the ecosystem that underpins its

capacity to deliver an ecosystem service (e.g. ability of the woodland or grassland to generate a standing stock of biomass).

There are over 24 identified ecosystem services that are placed in four categories (MEA 2009, Figure 5-14):



Figure 5-14: Four categories of ecosystem services

The project site is heavily disturbed however it still provides some ecosystem services, primarily supporting (nutrient cycling, habitat provision, pollination) and cultural (recreation and historical values). These are not expected to be adversely impacted with the construction and operation of the project but will be positively enhanced.

5.3 Archaeology/ Heritage

5.3.1 General History of Study Area

This section provides a historical timeline of the site. The space now known as the National Heroes Park, or National Heroes Park, has a long and varied history as a space for entertainment and sports in the city. It currently houses the resting places for some of the country’s National Heroes, along with other notable national figures. Additionally, a number of monuments have been erected in the park to honour these persons.

5.3.1.1 Historical Timeline

Table 5-8 presents the historical timeline of evolution of the National Heroes Park from the 1700s. Photos of historical events are included in Appendix 4.

Table 5-8: Timeline of events of historical significance at the National Heroes Park

YEAR	HISTORICAL EVENTS
1754	The site was located on a property called Montgomery Pen in St. Andrew, not Kingston, which was a 160-acre lot owned by Jen Venhorn.
1784	George Liele, the first Black American preacher, preached at the area which became known as the Kingston Race Course before establishing a church in 1793 on the corner of Elletson Avenue and Victoria Road, the first Baptist church for blacks in Jamaica (Murphy, Melton and Ward, 2013).
1804	Montgomery Pen bought by Capt. Nathaniel Foy and Lt. Col. Spencer Perry and marks the launch of the Kingston Race Course
1808	42 acres of Montgomery Pen in the parish of St. Andrew bought by the City Council of Kingston as a racetrack
1809	The Jamaica House of Assembly passed an Act making the Kingston Race Course property a part of the parish of Kingston thereby regularizing the purchase of the property which now fell within the Kingston parish boundary.
	The Act regularizing the purchase also stated, <i>“Provided always, That the said piece or parcel of land, called the Race-Course, shall be at all times open from five of the clock in the morning until eight of the clock at night, for the use and recreation of the public: and that the said piece or parcel of land shall not be built upon by any person or persons whomsoever”</i> (DeCordova and McDougal, 1865:368); (Espeut, n.d.)
	The Jamaica House of Assembly passed an Act stating that a division of the militia of St. Andrew would muster here.
1816	Notwithstanding the Act disallowing the construction on the property, a one-mile oval track was built, along with a grandstand, bar rooms, weighing rooms, offices and a railed enclosure (Ward, 1893).
	The first horse race with these new facilities was run over the distance of 1.6 km (1 mile).
1833	At this time, the races drew large crowds. There were also ‘Military Races’ in which officers rode their own horses (Foulks,1830:3).
1838	Emancipation festivities took place at the Kingston Race Course. Thousands of newly freed persons went to the Race Course to enjoy entertainment (Barringer and Modest, 2018:2).
1850s	Cholera victims buried at the Kingston Race Course
1887	Queen Victoria’s Golden Jubilee celebrated at the Kingston Race Course
1891	The Jamaica International Exhibition was held on the Quebec Lands, north of Kingston Race Course, on the site which now houses the Wolmer’s Boys’ School and the Wolmer’s Girls’ School (Lumsden, 1991).
1897	Queen Victoria’s Diamond Jubilee was celebrated at the Kingston Race Course.

YEAR	HISTORICAL EVENTS
1907	After the 1907 earthquake, the wide open spaces of the park became a refugee camp for the homeless, initially under the tent of the <i>Shipe & Feltus Circus</i> which happened to be visiting at the time. This refugee camp, referred to as “Shack Town” lasted until all were able to find alternative accommodation. In the weeks following the earthquake, about a quarter of the 80,000 inhabitants of Kingston remained in Kingston. They stayed at the Race Course and other open spaces (American Geographical Society, 1907:102).
1933	A well was sunk at the Kingston Race Course which delivered 800,000 gallons of water/day to the Cavaliers plant.
1938	Alexander Bustamante held a public address at the Race Course to a crowd of 2,000 people about the fight for independence (Howard, 2005:168).
1939–1945	Horse races discontinued during World War II and resumed after the war
1942	Alexander Bustamante announced his intention to launch the Jamaica Labour Party at a public meeting at the racecourse. The party was launched a year later on July 8, 1943 at the Ward Theatre. http://old.jamaica-gleaner.com/gleaner/20030708/cleisure/cleisure3.html
1948	World-famous baritone and civil rights activist, Paul LeRoy Bustill Robeson (1898–1976), performed in a free concert here attended by 50,000 people (including agents of the Federal Bureau of Investigation (FBI) who were tracking him).
1952	A statue of Cuban hero Antonio Maceo, 2nd-in-command of the Cuban Army of Independence, was erected here at the Kingston Race Course. It was given to the people of Jamaica by the people of Cuba in gratitude for the refuge and hospitality afforded General Maceo in Jamaica during the Cuban struggle for Independence from Spain. Another gift from Cuba to mark this hospitality was that of a school in Clarendon opened in 1980- The Garvey Maceo High School.
1953	Horse racing relocated to Knutsford Park
	The Kingston Race Course track was subsequently used for cycle racing and became known as Town Moor.
	Kingston Race Course renamed George VI Memorial Park in honour of King George VI who died in 1952
	The Cenotaph to the war heroes of World War I (1914-1919) was moved to the Kingston Race Course (now renamed George VI Memorial Park) for the visit of Queen Elizabeth II. The Cenotaph was built in 1922 and was originally located in Cenotaph Square on Church Street.
1955	Norman Manley addressed the crowd at the recently renamed George VI Memorial Park on election night following the victory of his party, the People's National Party. (Howard 2005:163).
1964	Marcus Garvey buried at the George VI Memorial Park (Mordecai et al., 2001:23)
1965	Martin Luther King, Jr. laid wreath at the George VI Memorial Park
	A memorial for heroes of the Morant Bay Rebellion built at the George VI Memorial Park
1966	On 22 Apr 1966, Haile Selassie I (1892–1975), Emperor of Ethiopia (1930–1974), Power of the Holy Trinity, 225 th Emperor of the Solomonic Dynasty, Elect of God, Lord of Lords, King of Kings, Conquering Lion of the Tribe of Judah, laid a wreath at the Cenotaph.
1967	The name was changed from George VI Memorial Park to National Heroes Park, and memorials to Jamaican heroes and outstanding Jamaicans were erected there. Over the years, various

YEAR	HISTORICAL EVENTS
	circuses and evangelists have set up there at the George VI Memorial Park because of the convenient large open space (Senior 1983:115, 116).
1976	Bob Marley’s free <i>Smile Jamaica</i> concert held at the National Heroes Park
1978	On July 7, the Venezuelan choir performed at the recently erected Simon Bolivar statue at the National Heroes Park to mark Venezuela’s National Day.
2015	US President Barack Obama participated in a wreath laying ceremony at the National Heroes Park during an official visit to Jamaica.

5.3.2 Artefacts with Potential Historical/Heritage Significance

Most of the observations made on site were of objects that were more contemporary in nature, however, a few historical items were still visible within the study area. In the north-western quadrant of the property, the old gate is still preserved. The gate bears a “1953” marking which likely identifies the property as the George VI Memorial Park. Additionally, historic ceramics were observed to the west of the southernmost guarded car park. The limited area exhibited an artefact cluster with ceramics (circa 1800s) and green glass of about the same period (Figure 5-15). No building was associated with the artefacts.



Figure 5-15: Location of old gate and historic ceramics

Further west, parallel concrete parapets, that may have been part of a gutter bed were observed. The gutter was about three feet wide. Here, a fragment of a historic iron pot was observed. Even further west appeared what seemed to be a building foundation. This was close to the perimeter wall.

Further south, on the west of the perimeter wall were mortared lanes, perhaps part of the early race track, but more likely marked out by nearby schools for sports day activities. This was seen in the vicinity

of a huge banyan tree. Three lanes were observed (Figure 5-16). In association with this track feature were historical materials including historical brown wine bottle glass.



Figure 5-16: Track that could be part of the original race track, but more likely prepared for recent track meets

On the south western border, near to the fence line, a rectangular feature resembling a grave was present, however, no tombstone nor any other type of marking identifying it as such was evident. In the southern section of the Park are the National Heroes' monuments and shrines including the bust of Antonio Maceo, the Eventide Fire memorials, as well as the burials sites and memorials of Jamaica's national heroes and other prominent citizens.

Despite the study area's prominence in many significant historical events, there was no specific evidence of Shack Town 1907, the cholera graves of the 1850s, horse racing paraphernalia from 1804 to 1953, dancehall (party) paraphernalia from the 1950s, the militia presence in 1809 and cycle racing.

5.4 Socio-Economic Environment

National Heroes Park is located at the northern border of the Kingston and St. Andrew parishes and is surrounded by five communities: Cross Roads to the north; Greater Allman Town to the east; Fletchers Land to the south; Hannah Town to the south-west; and Jones Town in the west. This section describes the existing socio-economic environment of these five communities.

5.4.1 General

The communities around the ring of National Heroes Park have their origins in the outward expansion of Kingston away from its northern boundary of North Street during the city's early developmental phase. Coming into the late 19th century, these communities were all heavily populated, though continuous outward expansion. Twentieth century electoral boundary changes have since helped create their present community identities. In the pre- and early post-independence years, persistent rural to urban migration

exasperated increasing densities and the onset of declining physical and social infrastructure across all communities. Migrations of better endowed social classes towards the hills, and the merchant class towards the increasingly popular industrial zones, led to an infilling of these areas with migrants feeding the new and nascent, but rapidly growing commercial needs for inexpensive, low-level skills that downtown ‘trading’ Kingston had become. Concurrently, an outward, but lateral expansion of the traditional West Kingston communities was pushing the urbanization of districts and communities around the Park. Since then, urban renewal initiatives have struggled with an increasingly persistent tendency to urban decay and areas of extensive if contained, sprawl.

These lower income areas tend to be characterized by minimal educational opportunities, high unemployment and crime rates, broken families, and inadequate housing. In such communities, there tends to be a commonality of demographic characteristics, occupational profiles and the need for housing upkeep and physical infrastructure. These were all confirmed by the Consultants’ observations, in the rim communities.

Large business operations are not present despite sources of cheap labour with some of these labourers being skill equipped; this is so because it is feared that extortion and crime are not only a threat but also the cause of the down time experienced when businesses must be closed because of intermittent violence. Poverty indices are generally higher than those in the surrounding metropole, though this has not been verified in this report.

5.4.2 Existing Uses of the Site

The site is currently used for parking by some of the nearby government business and for recreational purposes. Members from the surrounding communities use the site to play sports and socialise. Some nearby schools also use the site for sports day events.

5.4.3 Land-use Patterns

There are multiple land-use types in the areas surrounding the National Heroes Park with residential land use being most dominant in all five rim communities except for Cross Roads, where commercial land use dominates. Other types of land usage include government buildings, schools and social amenities such as health centres and police stations. The single family dwellings in the nearby communities tend to be single floor but there are the occasional 2 to three floor dwellings. The nearby government ministries are often as high as four storeys.

5.4.4 Existing and Projected Population for the Surrounding Communities

Table 5-9 illustrates the best estimates of population in year 2020 and projected to 2030. The figures in the table shows that population growth has been experiencing very limited growth.

Table 5-9: Community Estimated Populations 2020 and Projections for 2030.

	Baseline Year	COMMUNITY	POPULATION IN BASELINE YEAR	ESTIMATED POPULATION 2020	% Change 2011 to 2020	PROJECTIONS 2030	% Change 2020 to 2030
1	2008	Greater Allman Town	10,915	11,068	1.4%	11,758	6.23%
2	2010	Cross Roads	3,552	3,602		3,826	
3	2011	Fletchers Land	5,000	5,070		5,386	
4	2012	Hannah Town	2,240	2,272		2,414	
5	2011	Jones Town	10,840	10,992		11,679	
	TOTALS		32,547	33,004		35,063	

*Consultants estimates based on : STATIN's Total population and growth rate, Jamaica (2002-2016) and Projections for 2030.

The following table attempts to identify the population within a 1km radius of the project. These communities are the closest to the project and could be directly impacted by the project.

Table 5-10: Estimated Population In each community falling within the 1km Project Radius (2020)

	COMMUNITY	ESTIMATED POPULATION 2020	ESTIMATED PERCENT OF POPULATION WITHIN 1KM PERIMETER	IMPACTED POPULATION
1	Greater Allman Town	11,068	60%	6,641
2	Fletchers Land	5,070	100%	5,070
3	Jones Town	10,992	40%	4,397
4	Hannah Town	2,272	50%	1,139
5	Cross Roads	3,602	50%	1,081
		33,004		18,328

*Based on Consultants best estimate

The Consultants initially ratioed the percent of impacted STATIN EDs to the total ED's in each community. However, because a significant number of the ED's were dissected to varying degrees by the 1km circle, reliance was placed on the estimates provided by the Presidents of the Community Development Committees or Community Leaders. These individuals are considered very knowledgeable about their communities, and each was directly engaged in supervising the execution of the community surveys within the respective impact zones.

The resulting figures suggest that the population within the project zone defined by the 1km radius is slightly over half of the total population of the communities. However, this population is not evenly

distributed across communities as can be seen from the table above. Topographically, the 1km perimeter encloses the entire Fletchers Land Community.

5.4.5 Employment and livelihoods of surrounding communities

The source of the socio demographic information in this section is taken from SDC’s Summary Community Profiles for the respective communities. Appendix 6 presents the summary socio-economic profiles for each community.

All five of the communities surrounding the project site are characterized by high unemployment rates. The proportion of the labour force that was unemployed ranges from 31.9% in Cross Roads to as high as 64% in Jones Town (Figure 5-17).

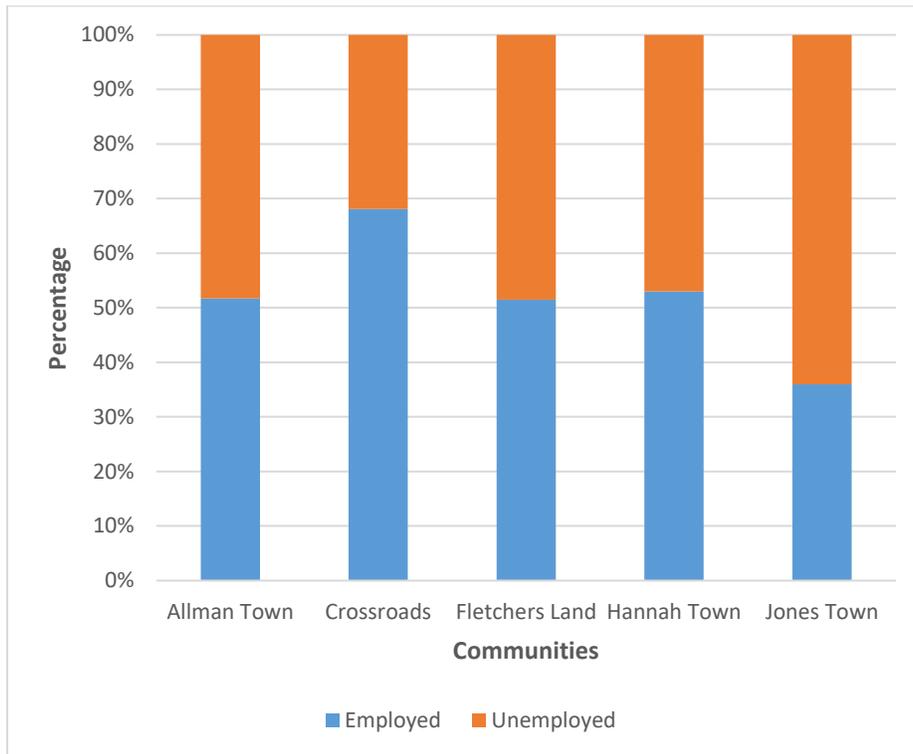


Figure 5-17: Employment versus unemployment (Source: SDC, 2011)

With respect to the employed, most are self-employed or employed as service workers in shops/market or in elementary occupations, with earnings generally less than JMD \$30,000 per month. Most residents supplemented their income mainly through government assistance such as the Programme of Advancement Through Health and Education (PATH) or by remittances. Only in the Cross Roads community did the majority of persons supplement their income through financial investments. Of interest is the fact that there are more males employed than females in Cross Roads, Jones Town and Hannah Town.

With respect to unemployment, females are more likely to be unemployed than males and there is high youth (14–24) unemployment. The latter was also stated during focus group discussions. Additionally, reasons given for unemployment include inability to find employment, lack of training/skills and waiting on a job which was promised.

5.4.6 Existing Social and Community Infrastructure

5.4.6.1 Housing

Housing Material and Quality

Although concrete and blocks are the most dominant materials used to construct housing units in the communities surrounding National Heroes Park, there was some variation in proportion, ranging from 73% of houses in Hannah Town to 57% in Fletchers Land. Houses made of board are the second most popular type of housing.

There was also variation in terms of the quality of the housing stock among communities. In Cross Roads, the majority (43%) of the houses are in good condition while 12% are in poor condition. Conversely, in Hannah Town, most (39%) of the houses are in poor condition and only 10% are reported as being in good condition. For both Fletchers Land and Allman Town, the largest proportion of houses is in fair condition (44% and 45.7% respectively). It is interesting to note that although Hannah Town had the highest percentage of concrete and block dwellings, it also had the lowest structure quality. No data on either housing material or quality of houses was available for Jones Town. However, from observation the Consultants are of the view that the housing stock in the project zone of influence is mainly of good construction.

Land Tenure

With respect to land tenure, ownership is dominant in all five communities. The proportion of household heads who own the land upon which their houses are built ranges from 51.6% in Hannah Town to 23.9% Jones Town. Renting was the second most popular land tenure type in Allman Town (32.3%), Cross Roads (36.5%), Jones Town (20.5%) and Fletchers Land (7.4%). Residing on captured land was the second highest land tenure type in Hannah Town. The captured land tenure category was also relatively high in Jones Town (13.9%), Cross Roads (5.2%) and Allman Town (4.7%). This category was relatively low in Fletchers Land (2.1%) (SDC, 2011).

5.4.6.2 Roads

A consequence arising from the pre automobile settlement patterns established in the Rim Communities has been that their roads are narrow, mostly incapable of carrying two-way traffic, and do not function as an efficient system of carriageway for their members. The networks have been built based on the traditional grid pattern, of interconnected roadways. In most communities these would be better described as lanes.

In all communities they are generally oriented north south and east west. The roads are maintained by the Kingston and St Andrew Municipality. In very recent times, road maintenance has been undertaken in sections of Jones Town Hannah Town and Fletchers Land, and some sections of Cross Roads. Greater Allman Town is has not yet benefitted from this road improvement program.

The nature and pattern of the roadways is indicative of the urban decay that is a persistent threat to the living conditions in these communities. Zoning is absent and signed boundary demarcations between settlements within the Communities is absent. There are no parking zones which appear to be dictated by the narrowness of the streets and roads, and bear little relationship to convenience of access by motorists, to places of business, schools, churches or homes. Consideration should perhaps be given to pedestrianizing some roads in the interest of commuter safety but also if visitors are to be encouraged to

participate in the Community’s hope that the Project could allow exposure to their various cultural offerings. There is particularly this need for safer commuting access in most of Greater Allman Town, Jones Town and Fletchers Land.

It is noteworthy that although public transportation is available within moderate walking distances and by taxis, no minibuses, much less Government operated buses, route through major parts of these communities.

5.4.6.3 Utilities and Services

Water Supply

All the five rim communities were served by public water supply. Most of the households in Cross Roads (45.8%), Fletchers Land (52.1%), Hannah Town (46.9%) and Jones Town (80.1%) have public water piped to their yard. On the other hand, the majority of households in Greater Allman Town (44.5%) have public water piped into their dwelling. Other types of water supply present include public standpipe and private catchments such as drums or wells.

Toilets

The majority of households in the communities which surround the National Heroes Park use indoor plumbing. Most utilize water closets which are linked to the main sewer system, while a smaller proportion utilize water closets which are not linked to the main sewer system. Water closets linked to a sewer system are highest in in Hannah Town and lowest in Cross Roads (Table 5-11).

Table 5-11: Proportion of toilets linked to sewer system

COMMUNITY	PERCENTAGE OF WATER CLOSETS LINKED TO MAIN SEWER SYSTEM
Allman Town	79.6%
Cross Roads	44.0%
Fletchers Land	89.4%
Hannah Town	91.8%
Jones Town	79.8%

Source: SDC, 2011

A relatively small proportion of households use pit latrines or other more informal type of toilets and there are some households that report having no access to toilet facilities. The Cross Roads community is the only one in which there were no households without toilet access. Additionally, a significant proportion of households from all five communities share their toilet facilities with other households. Sharing is highest in Jones Town and lowest in Cross Roads (

Table 5-12). The numbers of households with whom toilets are shared ranges from 1– 56.

Table 5-12: Proportion of households that share toilet facilities

COMMUNITY	PERCENTAGE OF HOUSEHOLDS THAT SHARE TOILET FACILITIES
Allman Town	31.0%
Cross Roads	18.0%
Fletchers Land	27.7%
Hannah Town	41.0%
Jones Town	63.0%

Source: SDC, 2011

Electricity

Electricity use is very high in all the rim communities. Usage ranges from 97.6% in Jones Town to 100% in Cross Roads. Other sources of light include kerosene lamp, bottle torch and candles.

Communications

The majority of the households in all of the five communities have access to telephones. Cellular phone usage alone is highest, followed by households that have both cellular and landline usage. Households with only landline access are in the minority. Conversely, access to the Internet is fairly low in these communities ranging from 10% in Jones Town to 36% in Cross Roads.

5.4.6.4 Solid Waste Management

According to SDC data, most households have their garbage picked up by truck (Allman Town – 98.4%; Cross Roads – 86.0%; Fletchers Land – 97.9%; Hannah Town – 60.1%; Jones Town – 93.1%). Focus group data, however, uncovered that garbage collection by truck is generally unreliable and only takes place once every two weeks or once a month in some instances. Consequently, residents dispose of their garbage in a multitude of other ways including dumping on site, burning, placing in community receptacles and dumping in gullies and other water ways.

5.4.6.5 Community Services

Community amenities which are available in the areas surrounding National Heroes Park include schools (over 50 at all levels), churches, parks, police stations, health centres, and so on. Hannah Town and Cross Roads have the presence of hospitals – Kingston Public and Victoria Jubilee, and Nuttall respectively. In Cross Roads the public library is also present. Access to public transportation is also relatively easy. In addition, several government ministries and agencies are located the project’s vicinity, including, but not limited to, the Ministry of Finance and The Public Service, the Ministry of Education, Youth and Information, and the Banana Industry Board. Furthermore, Sabina Park is also located within the surrounding communities.

5.4.7 Community Challenges

As with many areas in downtown Kingston, the five rim communities are not without their challenges. Specifically, these areas are characterized by sporadic outbursts of gang violence and warfare. Other challenges within the communities include high youth unemployment rates, inadequate street lighting, the presence of derelict buildings, poor roads, illegal dumping of garbage and overgrown lots amongst others.

As with many areas in downtown Kingston, the five rim communities are not without their challenges. Within all communities these include high youth unemployment rates, inadequate street lighting, the presence of derelict buildings, inadequate roads, illegal dumping of garbage and overgrown lots amongst others. In Section 6 Public Participation, the communities themselves speak to these problems.

5.4.7.1 Crime

Specifically, as it relates to crime, there are a number of features that may be broadly categorized as ‘the crime problem’ in these communities. These have been briefly summarized below:

1. Informed opinions who wish anonymity would rank these communities as being most prone to criminal activity. In order of first priority – 1. Jones Town, 2. Fletchers Land, 3. Hannah Town, 4. Cross Roads, 5. Allman Town.
2. The types of crimes committed are common to all communities and, most seriously and typically involve gang warfare, extortion, simple larceny, domestic violence, sexual harassment, all leading to a high incidence of homicides. Cross Roads represents an anomaly within the 5 communities in that it has a much higher incidence of extortion (which in turn tends to fuel gang rivalry). This is said to be centred on the vendors market which none of the other communities have.
3. The sources of criminality are said to be home grown, national, international and transnational as in scamming. Criminals are no longer politically controlled, nor do they coalesce around ideologies. In many instances ‘Community Dons’ work together where it suits them to.

Paradoxically many community members while citing crime as a major problem, absolve their communities from harbouring criminals. They prefer to concede that there are a few ‘bad boys’ in other parts of the community. Social workers and community development specialists are well aware of this phenomenon and its fear-based roots.



PUBLIC PARTICIPATION

6 PUBLIC PARTICIPATION

6.1 Community Questionnaires

6.1.1 Socio-Economic Survey

As stated in section 4.5, the community questionnaires targeted two sets of respondents: community members captured mainly within a dwelling or street setting; and community members who were operating a business. Overall, there were 362 of the former respondents and 94 of the latter, for a total of 456. Both HOP questionnaires are attached as Appendix 5. Probing covered the following topics although for purposes of reporting the results, the Consultants have selected those deemed of most relevance to the project. Excluding administrative data, the following issues were covered in a total of 30 questions (Table 6-1).

Table 6-1: Issues probed in the socio-economic survey

ISSUES PROBED	% OF TOTAL QUESTIONS
Acceptance of Project Concept and Views on Project Design	17
Business Impact and Concerns	20
Environmental Concerns	7
Approval of Project	10
Socio-demographic Profile of the Communities	47
TOTAL	100

6.1.1.1 Socio-Economic Survey – Community Members

Across all communities, there was a high participation rate among respondents, with nearly all 362 respondents answering a large percentage of the questions, although not all respondents offered an opinion to the questions asked.

The results selected below reflect a generally positive attitude to the project with 62.2% approving it and 22.1% not approving it, while 20.1% either expressed no opinion or did not respond to the question. Of the respondents, 57.2% felt that the project was a necessary one, while 27.6% felt it was not necessary. When asked how their communities would decide, 19.61% of respondents thought that their community would accept the project proceeding whereas 15.47% would prefer it not to. Of persons responding, 50.28% accepted that the project should proceed, while 24.86% felt it should not.

When asked to think of better uses for the land space available, the three most popular answers (> 10% of respondents) selected of the responses were for green space, like an Emancipation Park, a technical vocational centre and housing solutions (Table 6-2).

Table 6-2: Community members' most frequently selected alternative land use for Emancipation Park

SUGGESTED ALTERNATIVE LAND USE	PROPORTION OF RESPONDENTS/ %
Green Space as per Emancipation Park	18.8
Technical Vocational Centre	11.6
Housing Solutions	10.5

Of interest are the alternative suggested land uses, but which received less than 10% of all responses. These included the following: Sports Centre; Entertainment Complex; Bus Park; Military Camp; Police Command Centre; Shopping Mall; Space for vendors; Coronation-style Market; Amusement Park; Fire Services Complex.

Environmental concerns identified included traffic congestion, limiting traditional use of land space, making the space less inclusive of everyone, reduced water supply (14.36%) and a negative change in historical character. A small proportion of respondents had no environmental concerns (Figure 6-1).

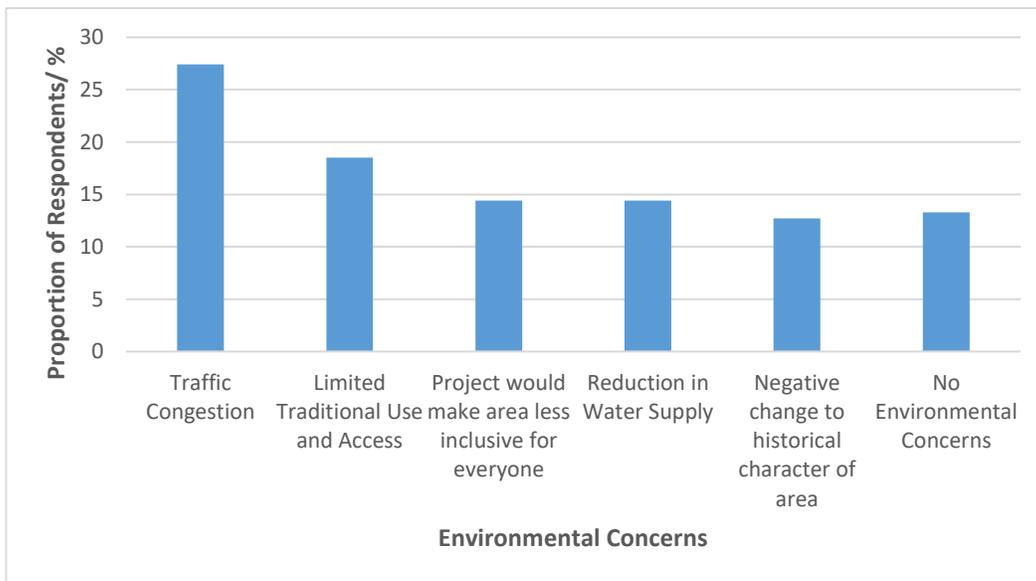


Figure 6-1: Community members' environmental concerns

Interestingly, the more traditional negative physical impacts, including air and noise pollution, risk of flooding or ponding, and negative impacts on plants or animals were not given. Table 6-3 summarizes the responses given by community members.

Table6-3: Summary – Community members' responses (D.K. – Doesn't Know; N. R. – No Response)

QUESTIONS	RESPONSES/PERCENT					PARTICIPATION
Do you accept project concept?	Accept 62.15	Do Not Accept 22.1	No Opinion 4.97	D. K. 9.12	N. R. 6	362 out of 362
How do you think your community views this project?	Accept 30.39	Do Not Accept 21.82	No Opinion 6.35	D.K 38.4	N.R 3.04	362 out of 362
In your opinion, do you think this project is necessary?	Necessary 57.18	Not Necessary 27.62	No Opinion 3.87	D.K 9.39	N.R 1.93	362 out of 362
Can you think of a better use of this space?	Green Space as in Emancipation Park 18.78	11.6	20.17	10.22	0	362 out of 362
	Technical Vocational Centre 10.5					
	Housing 7.73					
	Business Centre					
Do you have environmental concerns for the community in relation to the project?	Increased Traffic Congestion 18.51	27.35				359 out of 362
	Limiting traditional use 14.36					
	Make area less inclusive for everyone 13.26					
	No concern 14.36					
	Reduced water supply 12.71					
	Negative change in historical character					

QUESTIONS	RESPONSES/PERCENT					PARTICIPATION
Based on your preference should the project proceed as designed?	Yes 50.28	No 24.6		D.K 17.96	N R 6.91	359 out of 362
How would your community decide?	Yes approve	No do not approve		D.K 58.84	N.R. 6.08	

6.1.1.2 Socio-economic Survey – Business Operators

Across all communities, there was a high participation rate among business respondents for the questions answered (86 out of 94 or 91%), although not all respondents offered an opinion to the questions asked.

The results reflect a generally favourable disposition to the project on a personal level (64%), but a less favourable response to the perceived acceptance of other business operators. Just over half (57.2%) of the respondents felt that the project was a necessary one, while 27.6% believed it was not necessary. This general uncertainty applied also to the respondents’ sense of the project being acceptable by their communities with only about a third thinking that it would be accepted (Figure 6-2).

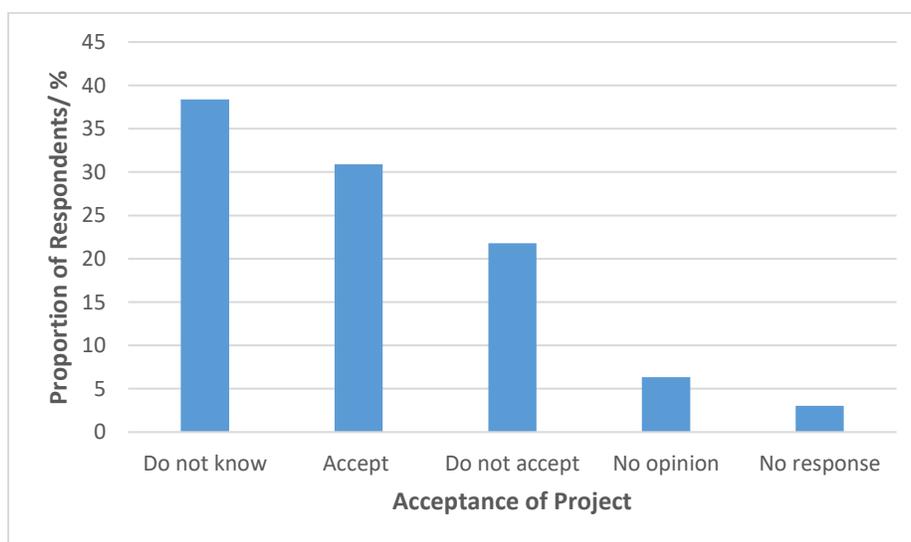


Figure 6-2: Business owners' perception of acceptance of project by community members

This somewhat muted ‘middle of the road’ response to the project across business respondents can likely be explained by the widespread lack of informed knowledge about the project, which was highlighted in all the surveys, even though respondents had heard of the project. Similarly, only a relatively modest percentage (27.7%) saw the project having a positive impact on their businesses (Figure 6-3).

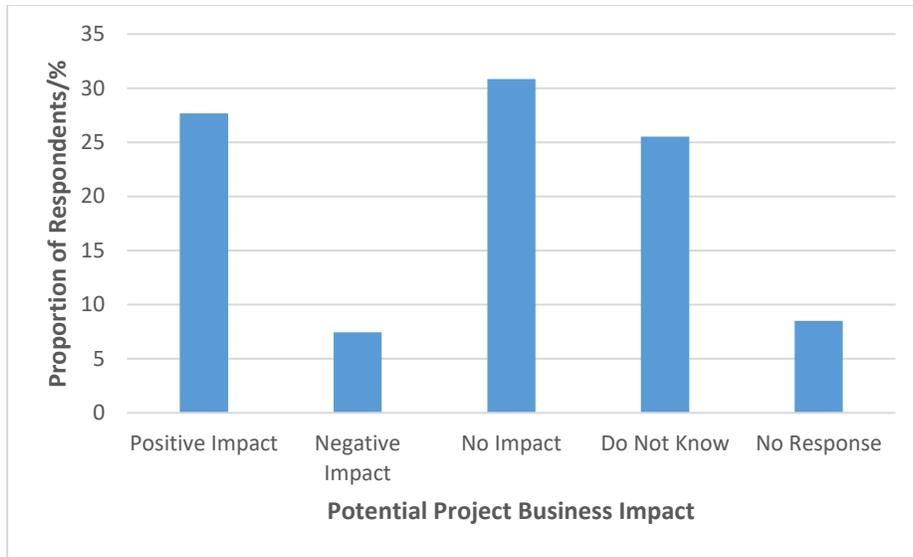


Figure 6-3: Business owners' perceived potential impact of project on business

Environmental issues were mainly confined to a concern for traffic flows and congestion (30.9%). Interestingly, there was a clear sense of the pending loss of an iconic space with accustomed land use and historical memories. The Consultants would not consider this a commonly expressed sentiment in their project experience. As a general comment, the tenure of the business operator's responses were also reflective of community members collectively. Detailed inspection of individual community responses shows variation (Figure 6-4).

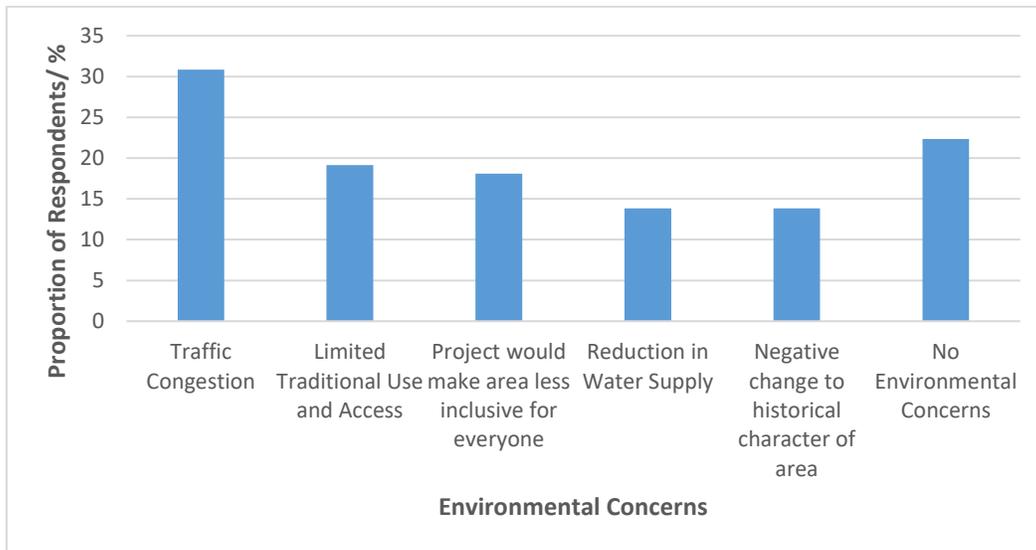


Figure 6-4: Business owners' environmental concerns

All of the other options received less than a 10% frequency. Nearly all respondents felt these impacts applied to both the construction phase and post-construction phase of the project.

In terms of alternative land use, a range of options (13) was put to the respondents who were asked to choose one. The following received the highest support (Table 6-4).

Table 6-4: Business owners' suggested alternative land use for National Heroes Park

SUGGESTED ALTERNATIVE LAND USE	PROPORTION OF RESPONDENTS/ %
Sports Complex	21.3
Green Space as per Emancipation Park	18.1
Fire Station Complex	15.9
Technical Vocational Centre	13.83

All of the other options received less than a 10% frequency. When asked if based on all considerations taken into account, their preference was for the project to proceed as designed or otherwise, half of the respondents stated yes. Table 6-5 summarizes the responses given by business owners.

Table 6-5: Summary – Business owners' responses

QUESTIONS	RESPONSES/PERCENT					PARTICIPATION OF RESPONDENTS
Do you accept project concept?	Accept	Do Not Accept	No Opinion	D.K	N.R	86 out of 94
	62.15	22.1	4.97	9.12	1.66	
How do you think your community views this project?	Accept	Do Not Accept	No Opinion	D.K	N.R	86 out of 94
	30.9	21.82	6.34	38.4	3.04	
In your opinion, do you think this project is necessary?	Necessary	Not Necessary	No Opinion	D.K	N.R	86 out of 94
	57.18	27.62	3.87	9.39	1.93	
Can you think of a better use of this space?	Sports Complex	21.28		15.96		86 out of 94
	Green Space as in Emancipation Park	18.09				
	Fire Service	15.96				
	Technical Vocational Centre	13.83				
In your opinion what impact do you think the project will have on your business?	Positive Impact	Negative Impact	No Impact	D.K	NR	86 out of 94
	27.66	7.45	30.85	25.53		
Do you think that this concept (design)	Yes	No	No opinion	D.K	N.R	86 out of 94

QUESTIONS	RESPONSES/PERCENT					PARTICIPATION OF RESPONDENTS
would meet the acceptance of the other businesses in your community?	19	8	3	49	7	
In your opinion, how do you think the local business community views this project?	Necessary 25.53	Not Necessary 15.96	No Opinion 6.39	D.K 40.43	N.R 3.19	86 out of 94
Do you have environmental concerns for the community in relation to the project?	Increased Traffic Congestion	30.85				86 out of 94
	No concern	22.34				
	Limiting traditional use	19.15				
	Make area less inclusive for everyone	18.09				
	Reduced water supply	13.83				
	Negative change in historical character	13.83				
Based on your preference should the project proceed as designed?	Yes 50	No 14.89		D.K 19.15	N R 7.45	86 out of 94

6.2 Key Stakeholder Interviews

Stakeholder interviews by open-ended questionnaire were conducted with three Community Development Committee (CDC) Presidents and one Community Leader. These were regarded as supplemental to the main opinion gathering surveys and are reported on, in this section. To date two have responded with completed questionnaires.

Hannah Town CDC Interview – Mr. Nicholas Campbell, President

The President felt that the project concept, as known to date, would meet the approval of the community. He also was of the view that the community would view the project as necessary. His opinion was that the community would not prefer an alternative land use for the project site.

Short-term employment was a main benefit seen for the community arising from the project. He thought the community would benefit from participating in the decision-making process about possible complimentary land use.

Main environmental concerns expressed were related to dust control. Other reservations were that local skilled and unskilled workers would be overlooked as the project rolls out.

He felt that the community could offer to become involved in all aspects of the project, not only in terms of the planning process, but also in other areas of project needs.

He confirmed that the community-based organizations (CBOs) and community were involved in the public consultation process that accompanied the project and the main source of information has been the mass media.

Fletchers Land CDC Interview - Mr. David Allen, President

The President felt that the project concept, as known to date, would meet the approval of the community. He was of the opinion that the community would view the project as not very necessary, as they were more appreciative of evidence-based benefits. He was of the opinion that the community would not be very clear on how the project would offer immediate benefits, but stated that community members were anxious to receive benefits. His opinion was that the community would not prefer an alternative land use for the project site.

Improved security within the 1km radius was a main benefit seen for the community arising from the project. He thought the community would benefit from increased social programmes and also economic benefits. By the same token, the community would also benefit from improved housing provisions, environmental aid and increased pro-cultural activities.

The main environmental concerns expressed were related to waste management arising from the project. Other reservations were that people were not being integrated in a long-term sustainable way.

He felt strongly that the community could offer human capital towards ensuring the social and environmental development of the project in a sustainable way.

He confirmed that the CBO and the community had been involved in public consultations, and that the main source of information about the project for the community has been the radio and word of mouth.

The Greater Allman Town CDC Interview – Miss Tamara Reynolds, President

She felt that the community would not highly approve the HOP concept or project. Many of the residents seem to oppose it for the following stated reasons: firstly, the fear that they may have to relocate; and

secondly, the belief that the truth is not being told about the project and how it will affect people in the community. They need the truth so that they can reposition themselves in relation to the proposed development.

She has reason to believe that the Project, as currently proposed, is deemed to be unnecessary by the community. She explains that millions of dollars have been spent already on other redevelopment programmes on the Park. However, to date no benefits have come about to the community in relation to accessing the Park for recreational activities and facilities. In addition, some of the promised redevelopments remain incomplete.

The community would be accepting of extended the green space in keeping with the idea of an Emancipation Park-type development. The main benefit that the community would see the Park bringing to the community was simply the fact that this would be a form of development. In addition, employment benefits would be expected.

The main environmental concern that the community would have would be traffic congestion arising from the project. Other fears are that the residents may be restricted from access to the space. In addition, the community members have not been consulted enough on the project and do not fully understand it.

The community has a pool of both skilled and unskilled labour to offer the project. It can also offer higher skill sets, on completion. This would be right up the chain of managerial occupations. Community-based organizations such as the CDC exist to offer the project help.

The community has participated in a consultation about the project with UDC. However, the main source of information regarding the project remains the media.

The Cross Roads Community Leader Interview – Miss Stephanie Russell, Community Leader

She felt that the community would approve of the project concept and project. She was of the opinion that they would view the project as necessary. She also felt that there were no other land use options that the community would necessarily want.

The main benefits flowing to the community from the project would be increased business activity within the community. The main environmental concern that the community would have in regard to the project would be traffic congestion.

It was not felt that the community would have any other important fears regarding the implementation of the project. The most important thing that the community can offer the project would be its support in whatever way this was needed.

The community leader was uncertain as to whether the community has participated in a consultation about the project. However, the main source of information on the project remains the media.

6.3 Public Feedback

6.3.1 Community Focus Groups

A total of five focus groups, one in each of the rim communities, were conducted. A total of 106 community members attended disaggregated as follows:

Table 6-6: Focus group participants by community

	COMMUNITIES	NO OF ATTENDEES
1	Greater Allman Town	21
2	Fletchers Land	20
3	Hannah Town	12
4	Jones Town	33
5	Cross Roads	20
	TOTAL	106

The community focus groups were intended to be informal discussions in a round table format. This was largely achieved. Themed “Let’s Talk about Your Community”, the Moderator invited discussion around the following issues of interest for the EIA. Thirty questions framed the discussions. The moderator’s question guide is attached as Appendix 6. The discussion covered the following topics (Table 6-7).

Table 6-7: Issues discussed in each focus group

ISSUES PROBED	% of Total Questions
Demographic attributes/ issues both negative and positive	29
The economy, social conditions and vulnerabilities	29
The project and the environment	29
Project acceptance and approval	13
TOTAL	100

As with the socio-economic survey, for purposes of reporting the results, the Consultants have selected those deemed most representative of the concerns of the attendees and of interest to the Client and EIA. Results of the focus groups shall be summarized in a tabular format.

A notable feature of all communities is their feeling of alienation from being accepted by the wider society. This is reflected in many still having to disguise their community names when job hunting. The perception of a violent people is strongly repudiated. Jobs are lifelines. Positive achievements in whatever fields bring out community pride. Sporting activities are strong bonders. People are genuinely poor (Table 6-8).

Table 6-8: Focus group results – Socio-demographic issues

	Is the community pulling together for the common upliftment?	What are the main issues holding your community back?	What are the positive things about your community that you can build on?
Greater Allman Town	-Most of the community -Examples given -Including collective push-back against crime	-Unemployment and lack of Job opportunities -Lack of community pride -Poor garbage collection	-Can showcase National Heroes & Simon Bolivar -Institutions that give status to the community
Fletchers Land	-Yes, but not as together as in the past -Community bonds around sports -Envy and troublemakers push it apart	-Incorrect perception of community being violent and this is not true -Lack of leadership -Lack of job opportunities	-When people get an opportunity to work together, they do. -Positive and active community centre -Community feels safe. People move freely. -Police station big support against crime
Hannah Town	-A work in progress -Not there yet	-Crime and violence -Lack of social amenities -No police station -Need more streetlights -Lack of job opportunities -Lack of pride	-Rapport in community positive - Allows things to happen -Health amenities close by -Local Government structure supportive -Good communications -Community engaged in many consultations
Jones Town	-Depends on issues - Could be better	-All issues listed apply. -Lack of jobs -Lack of proper housing	-Values held by senior citizens can be relied upon -Police station. & schools in community
Cross Roads	-Yes. Neighbours live well together -Little crime	-Lack of jobs -Lack of skills training & education	-Neighbours 'live good' with each other -No crime

Economic hardship is a conditioned expectation in inner city communities. Not only are incomes uncertain and often bordering on subsistence levels, but the dependency ratio is high. These communities face an income deficit situation exacerbated by high levels of underemployment in addition to unemployment. Making ends meet appears to be a ceaseless preoccupation of a significant proportion of the adult population. Added to the social anxiety and anger are the gender issues that women speak to or silently

agree with, when this topic is probed. This preoccupation with fundamental issues of getting by, with no clear path a struggle-free future helps to explain the marked antipathy to the HOP Project. It is not central to their hopes of anything changing (Table6-9).

Table6-9: Focus group results – The economy and social conditions

	How would you describe unemployment in your community? Is it voluntary or involuntary?	Are there vulnerable groups in your community? Describe the problems they face. Are females at a social, living, or working disadvantage in your community?
Greater Allman Town	<ul style="list-style-type: none"> -Very high -Need to disguise address to get a job -There are a lot of unemployable persons. -A mixture of both voluntary and involuntary employment 	<p>The vulnerable persons are mainly:</p> <ul style="list-style-type: none"> -Mentally challenged -Elderly (a large population) -Children without proper parental care -Women dealing with absent fathers -Gender-based violence decreasing, but not spoken about -Women will accept lower wages. -Women have to think about families. -Not disadvantaged at the work place -Perception of subservience changing
Fletchers Land	<ul style="list-style-type: none"> -Very High -About half and half voluntary and involuntary -People don't have qualifications and are afraid to apply for jobs -People want long-term jobs, but can only find short-term employment 	<ul style="list-style-type: none"> -Yes: The mentally challenged -The elderly -Women and girls open to peer pressure -Men not pulling weight in community -Women are at a disadvantage. -Men not playing their part -Women must engage in activities they do not want to because men are not playing their role. -Women face unwanted sexual harassment and are taken advantage of.
Hannah Town	<ul style="list-style-type: none"> -High unemployment -About 50% /50% between voluntary and involuntary unemployment 	<p>The vulnerable are mainly:</p> <ul style="list-style-type: none"> -Young people who are unemployed and unattached, but also: -The elderly -The sick -The disabled -Domestic violence exists -Females earn more incomes than males. This creates problems. -Women shoulder more responsibilities and this increases their vulnerability. -Unfairness in the arrangements between males and females. -Females find it difficult to get jobs in male-dominated work environment.
Jones Town	<ul style="list-style-type: none"> -High unemployment -Mainly involuntary 	<ul style="list-style-type: none"> -Yes. The disabled, uneducated youth, women, the elderly and children

	How would you describe unemployment in your community? Is it voluntary or involuntary?	Are there vulnerable groups in your community? Describe the problems they face. Are females at a social, living, or working disadvantage in your community?
		-Women are at a disadvantage generally because they receive less money for any given work done.
Cross Roads	-Perception of unemployment not captured However, a high majority felt it was involuntary.	-Yes: children and the elderly, the disabled and women identified -Women are vulnerable because they make less money for work done.

There is a general push-back against the use of the National Heroes Park for the project that appears to the Consultants to have its roots in several firmly held perspectives. Briefly these seem to be as follows:

1. No demonstrable benefit to the economic and social needs of the rim communities;
2. A long history underlying an important ‘our park, our space’ sentiment, that expresses itself in a fear that access to the space will evaporate over time;
3. No demonstrable appreciation of the importance of sport facilities in enabling social intercourse and a possible path to peace among often warring districts within communities;
4. No demonstrable appreciation of the economic landscape that attends the daily lives of a large number of community persons and their frustration, hopelessness, and anger when large projects in their communal space offer no clear path to economic advancement.

There is, however, a general acceptance that the project cannot be reversed. There is also a gender-oriented appreciation for the concept of an Emancipation Park vision. It appears to the Consultants to hold some appeal to females, in particular, who can relate to the escapism it offers for children and softer activities (Table 6-10).

Table 6-10: Focus group results – The project, the environment and project acceptance

	From all you have learnt or heard, what do you think about the general design concept of the HOP? Do you think better use could be made of the land space?	Do you fear any negative environmental impacts for your community or generally if the project is implemented?	Based on all you have heard and discussed what is the consensus on the project? Would you support it?
Greater Allman Town	-Meetings have been held, but persons attending felt that they were mainly to explain what others had decided upon. -The high majority of respondents did not have an opinion about the design concept of the HOP. -Fears related to the project are lack of free access to the park.	-None were articulated.	-There was a strong sense that the project was not geared to benefiting the people in the rim communities. -By a show of hands, they would not support the project.

	From all you have learnt or heard, what do you think about the general design concept of the HOP? Do you think better use could be made of the land space?	Do you fear any negative environmental impacts for your community or generally if the project is implemented?	Based on all you have heard and discussed what is the consensus on the project? Would you support it?
	<p>-Facilities, if developed, won't be free.</p> <p>-Games like football will be restricted, with no alternatives provided.</p> <p>-The majority felt that better use could be made of the land space.</p> <p>-But the ideas were not clearly defined or unanimous.</p> <p>-A strong sentiment was that people are telling the community what to accept.</p> <p>-Not listening to what they want</p> <p>-An unexpressed sentiment appears to be that community members can see nothing specific in the project of benefit to them or their community.</p>		
Fletchers Land	<p>A meeting about HOP had been held but most Focus Group attendees knew very little about the project.</p> <p>The design concept of the building was good. The idea of creating a larger park was also good, Acceptance that there may be some movement restrictions, also sceptical about plans to make the park available to public access. Sporting facilities must be included but not necessarily football. Some 11 suggestions for land use alternatives or inclusion are in the appended notes. The most aligned to the present land use thinking would be: An exercise track. A children's play area. An area to host events. An area to have sporting events. Least aligned would be: A food mall. A vocational centre. A learning resource centre. A swimming pool.</p>	<p>In both the pre- and post- construction phases:</p> <ul style="list-style-type: none"> -Dust -Noise -Traffic congestion -Security of wells supplying water -Unnecessary cutting down of trees -Dislocation of persons currently using the park, or later downstream, when urban renewal and a later phase requires land 	<p>-The attendees wished to know more about the project.</p> <p>-The intended final land use</p> <p>-They require more information before feeling comfortable to give support to the project at this point.</p> <p>-They want to ensure that the community can be integrated into the project in a long-term sustainable role.</p>

	From all you have learnt or heard, what do you think about the general design concept of the HOP? Do you think better use could be made of the land space?	Do you fear any negative environmental impacts for your community or generally if the project is implemented?	Based on all you have heard and discussed what is the consensus on the project? Would you support it?
Hannah Town	<ul style="list-style-type: none"> -Meeting invitations have been extended, but in Allman Town. -The focus group was the first meeting on HOP that attendees had been to. -Reservations raised about access to the area once Parliament was built -Several ideas were tabled - <ul style="list-style-type: none"> -Amusement Park for children -A community gym -A good mix of hard and soft surface sport facilities -A football field could be accommodated with proper maintenance -A factory to bring jobs 	<ul style="list-style-type: none"> -Shortage of water during the construction phase -Water supply particularly pressure being less for persons nearer the project -Air pollution -Traffic congestion 	<ul style="list-style-type: none"> -All focus group attendees would support the project.
Jones Town	<ul style="list-style-type: none"> -The majority of persons did not have an opinion about the design concept of the Parliament building. -Many present were not in agreement with the project being executed. -Alternatives land uses suggested were: <ul style="list-style-type: none"> -Shopping centre -Amusement Park -Sports complex -A minority admitted that they liked the Emancipation Park thinking. 	<ul style="list-style-type: none"> -Traffic congestion was the dominant concern. -Air quality and noise pollution were also raised. -Especially as all of the above related to schools in the project area 	<ul style="list-style-type: none"> -The majority of attendees were neutral about the project. -However, most in the minority did not support the HOP Project being in that location. -A viewpoint held by a few was that Government should spend the money on making communities better through upgraded housing for example.
Cross Roads	<ul style="list-style-type: none"> -No attendee had been invited to an HOP meeting -Attendees were generally disengaged about the building design concept. -The vast majority felt that an Emancipation Park replication was of very little interest to them. 	<ul style="list-style-type: none"> -Traffic congestion -There was no concern for air pollution or noise. -Neither was water supply a concern. 	<ul style="list-style-type: none"> -By a show of hands, the vast majority accepted the project rather than no project. -They were clear, however, that support was conditional on more favourable land use options for the remaining acreage.

	From all you have learnt or heard, what do you think about the general design concept of the HOP? Do you think better use could be made of the land space?	Do you fear any negative environmental impacts for your community or generally if the project is implemented?	Based on all you have heard and discussed what is the consensus on the project? Would you support it?
	<p>-Overall, the project held little meaning or interest to them -They stated that that type of land use offered little by way of functionality or upliftment and wellbeing for them.</p> <p>Alternative suggestions included: -Area for sports including football volleyball, and basketball. Even if outside the park, space could be found or made in a nearby community. -A skills training centre -Play area for children -Other recreational facilities</p>		<p>-The need to accede to the wishes of the community</p>

A noticeable feature of the focus groups was that while they were mainly attended by females, who were vocal, males, particularly voluble ones and those accepted as being knowledgeable, often swayed the consensus in their favour.

It would be short-sighted not to re-engage the communities in a well prepared and managed series of consultations. Community leadership must be convinced to buy into the vision or clarify their thinking as to why it needs to be opposed.

The Consultants have witnessed a clash of cultures. The communities are disadvantaged by a planning failure to mobilize involvement and participation in the decision-making process.

If a major and historic landmark that has accompanied the lifespan of every rim community can be planned for, in a manner that seems arbitrary and high-handed to these communities, then the resistance which is present, will only harden and further support the underlying assumption that nobody really cares about inner city people.

6.4 Public Consultation

The project and its associated impacts and mitigation measures will be presented to the public once approval has been granted by the National Environment and Planning Agency. The Draft EIA will be posted on the NEPA and ESL website and will be available in the nearby libraries for public viewing. Feedback received will be incorporated as best as possible in the Final EIA. The UDC will be encouraged to create a grievance mechanism that will allow the public and employees to indicate their grievances.



PERSPECTIVE - PLAZA VIEW
Government of Jamaica New Houses of Parliament Project

IMPACTS IDENTIFICATION AND ANALYSIS

7 IMPACTS IDENTIFICATION AND ANALYSIS

The construction and operation phase activities have been analysed for potential impacts, and these were evaluated based on their direction, magnitude, duration and type of impact. The detailed impact assessment criteria are defined in Table 7-1 to Table 7-3. Assessment of the potential impacts of various activities entails consideration of short duration reversible impacts, long-term permanent impacts and those with medium-term significance. Impacts may be positive, negative or benign. It is important to note that the project may have impacts on the natural as well as built environments, and importantly the project can be affected by environmental processes.

Table 7-1: Impact assessment criteria for quantitative analysis

IMPACT CHARACTERISTIC	
Direction of Impact	
Rank	Definition
Positive	Impacts of project on the environment and vice versa are likely to be good
Negative	Impacts of project on the environment and vice versa are likely to be bad
Magnitude of Impact	
Rank	Definition – one/the combination of
Low	<ul style="list-style-type: none"> • Little or negligible action and/or control are useful, but not required in the short term, review in the future is useful • Exceeding of threshold value in case of operating problems (abnormal conditions) and low effect and low probability of occurrence and/or high probability of detection • Minimal effect • Limited probability of occurrence • “Aspect” controlled under normal conditions • High knowledge of “Aspect”
Moderate	<ul style="list-style-type: none"> • Action and/or control are required in the near future • Exceeding of threshold values in case of operating problems (abnormal conditions) and above • Average high probability of occurrence and/or low probability of detection • Financial threat • Effect likely to increase under planned activities • Rising concern of shareholders • Emergency situation would cause a large environmental impact • Complaint likely to be received • “Aspect” not fully controlled under normal conditions
High	<ul style="list-style-type: none"> • Immediate Action and/or • Control is mandatory. • Aspect” is currently not controlled under normal operations. • Could break legal or policy documents • In breach of legislation

IMPACT CHARACTERISTIC	
Direction of Impact	
Rank	Definition
	<ul style="list-style-type: none"> • Sensitive environment (groundwater proximity, conservation area, residential area) • Repeated complaints

Table 7-2: Definition of impact durations

DURATION	DESCRIPTION
Short term	Occurring infrequently or during one project phase
Medium term	Occurring frequently during a few project phases
Long term	Occurring frequently during most or all project phases
Persistent	Occurring for a significant period after completion of construction and demobilization or on a permanent basis due to operation of revetment structures

Table 7-3: Type of impact

RANK	DESCRIPTION OF ACTION
Reversible	Effects which are reversible and diminish when activities cease or over time.
Irreversible	Effects which are not reversible and do not diminish even if the activity ceases to occur, and do not diminish with time.

7.1 Construction Phase

7.1.1 Physical

7.1.1.1 Hydrology and Drainage

The likely main water quality issues to arise from activities of the construction phase include:

- *Increased sediment runoff* – resulting from land clearing and improper storage of fine earth material near to drains and or stream. Runoff of other construction spoils or spilt waste during construction can occur if material is not bermed and spills not cleaned immediately;
- *Disruption of surface water and changes in hydrologic regime* – due to improper storage of construction material or refuse as well as the removal of exiting natural drains without appropriate alternatives. It has the potential to increase runoff which may result in flooding downstream.

7.1.1.2 Air Quality

It is likely that construction activities will increase the sources of air emissions in and around the project site, thereby increasing the concentration of respirable particulates in the atmosphere. Increased emissions may be caused by a combination of the following anticipated activities:

- Transportation of construction material
- Clearing and excavation of the land
- Improper storage and transportation of cleared/excavated earth material
- Increase in construction vehicles in the area
- Increase traffic in the area
- Improperly maintained vehicles
- Fugitive dust from dry roadways
- Use of diesel generators.

Increased emissions have the potential to have an adverse impact on the health of not only onsite workers, but also other receptors including residents, pedestrians, schools, and businesses in the area. This is especially true for those located downwind of the project. The direction of the prevailing wind will determine the severity of the impact on the receptors.

7.1.1.3 Noise Levels

Baseline noise levels exceeded the NEPA guidelines of 65dBA at 37.5% of the sampling locations. The elevated noise levels were linked to identified sources of noise in the environment. The project is located in a commercial zone and the major roadway that extends around the project site and serves as an access route for neighbouring communities and as a transit route for other vehicles moving in and out of the area. This thoroughfare will also be used as the access point for the project site. Therefore, during construction it is expected that noise levels may be exceeded in the study area and further exceeded at places in close proximity to the 37.5% of sampling locations where NEPA's noise level guidelines are already surpassed. Anticipated activities that will cause this impact include:

- Clearing and excavation of land
- Construction activities
- Increased vehicular traffic
- Movement and operation of heavy equipment
- Equipment not fitted with noise suppressors
- Use of diesel generators.

Elevated noise levels may impact onsite workers, residents, pedestrians, schools, businesses and other operations in the area. This is especially true for those located downwind of the project. The direction of the prevailing wind will determine the severity of the impact on the receptors.

7.1.1.4 Water Quality

Water will be needed during construction. There is a well on site which can only be used for irrigation purposes. However, treatment is suggested due to the high levels of faecal coliform. If the water is to be used for construction purposes, care must be taken so that workers do not consume the water.

7.1.2 Ecological

Most of the species identified are common and are able to thrive in a semi-disturbed habitat. Much of the secondary vegetation in the study area (though there are only a few trees) will be removed during construction works. Consequently, some of the existing flora and attendant fauna will be temporarily displaced. Given that significant replanting is expected to occur as a part of project works, fauna are expected to only be temporarily displaced and will persist as long as an adequate habitat is replicated.

Therefore, the impacts from the project on the ecology, as characterized in this assessment, are expected to be minor if the appropriate monitoring and mitigation measures are implemented.

7.1.3 Archaeology/ Heritage Impacts

With respect to archaeology, the impact on the tangible heritage is inevitable, and it is likely that during excavation different layers reflecting the Park's multiple uses over the centuries will be uncovered. Therefore, there will be need for a Watching Brief. However, it must be noted that the land use of the site has always changed over the years, therefore, the construction of a new parliament building simply reflects another chapter in the changing land use.

7.1.4 Socio-Economic

7.1.4.1 Employment

Positive economic benefits are identified and acknowledged through community consultations as being construction employment generation. The main concern expressed is for this benefit be available to the surrounding communities. Vending activities are expected to also benefit, as also other entertainment activities that take place within the rim communities. Community leadership is actively giving consideration as to how their members can contribute to or participate in the project to the mutual benefit of all. Many are hoping that security services, site traffic control operations, site catering, and landscaping establishment can provide opportunities. At the national level, a construction project of this scale impacts the economy through the many sectoral linkages that the construction industry permits.

Negative economic impacts are expected to be minimal and transitory. This is mainly because little economic activity is currently centred on the project site.

7.1.4.2 Traffic

It is likely that there will be an increase in traffic, particularly construction vehicles. There are no traffic signals currently to control the movement on and off the property. Also, due to these heavy vehicles, there is a potential for road accidents.

Travel time cost can be expected to increase in relation to the dislocation experienced by commuters. Alternative travel routes that circumvent the National Heroes Park, are already congested or take wide detours. Making way through the communities themselves is not considered a feasible option.

If trucks transporting material are overloaded they are likely to cause damage to the existing road surfaces.

7.1.4.3 Crime

If not properly secured, the project construction phase could be affected by theft. Though the nearby communities are affected by criminal elements it cannot be anticipated that this in turn will affect the construction phase of the project.

7.1.4.4 Solid Waste

There is the potential for solid waste to be generated during construction. The disposal of this waste must be managed and disposed of according to the guidelines and requirements of the NSWMA.

7.1.4.5 Other

Health issues relating to air quality and noise have the potential for causing mainly localized negative impacts. However, construction mitigation measures, described elsewhere, will be mandated. This also applies to on site waste management.

Social negative impacts can be reasoned to if not measured. The project is not highly favoured by the rim communities and therefore can be expected to weight negatively on their sense of wellbeing. This will likely transcend over into the post-construction phase.

The construction phase should not unduly disrupt internal community civil or commercial activities. Church, schools and other state activities, though experiencing some inconvenience, are not in danger of being dislocated.

The nearby crab and corn vendors may benefit from additional business during and possibly after construction.

7.2 Operation Phase

7.2.1 Physical

7.2.1.1 Hydrology and Drainage

Table 7-4 shows that the 10-year return period increase in peak flow at the outlet will be at least 0.80 cubic meters per second (cumecs) and the increase in runoff volume for the same return period at least 3,530 cubic meters. Similarly, the 100-year return period increase in peak flow at the outlet will be at least 0.86 cumecs and the increase in runoff volume for the same return period at 6,750 cubic meters. This means that there is a 10% chance that in any given year, the proposed development will increase flows to the Barnes Gully by at least 0.8 cumecs with a 1% chance that the increase will be 0.86.

Table 7-4: Differences in pre- and post-development peak flows and runoff volumes

RETURN PERIOD	UNITS	POST-DEV OUTLET	PRE-DEV OUTLET	DIFFERENCE	PERCENT DIFFERENCE
10	PeakQ (m3/s)	4.02	3.22	0.8	25%
25	PeakQ (m3/s)	8.8	7.91	0.89	11%
50	PeakQ (m3/s)	11.05	10.16	0.89	9%
100	PeakQ (m3/s)	13.13	12.27	0.86	7%
10	Vol (1000m3)	19.48	15.95	3.53	22%
25	Vol (1000m3)	50.39	44.94	5.45	12%

RETURN PERIOD	UNITS	POST-DEV OUTLET	PRE-DEV OUTLET	DIFFERENCE	PERCENT DIFFERENCE
50	Vol (1000m3)	67.98	61.84	6.14	10%
100	Vol (1000m3)	87.7	80.95	6.75	8%

For the post-development assessment, the major parameters affecting the runoff would be the percentage of the area that would become impervious as a result of the development. The proposed areas affecting the imperviousness of the area include the roadways, parking areas, the buildings and water basin.

The drainage plan (Figure 7-1) illustrates the proposed drainage for the site. The internal roadways would have permeable paving. Compaction over time may result in these roadways eventually becoming impermeable. However, these roadway areas are relatively small compared to the areas to be covered by the Parliament building and their effect on the imperviousness of the sub-basins would be relatively small.

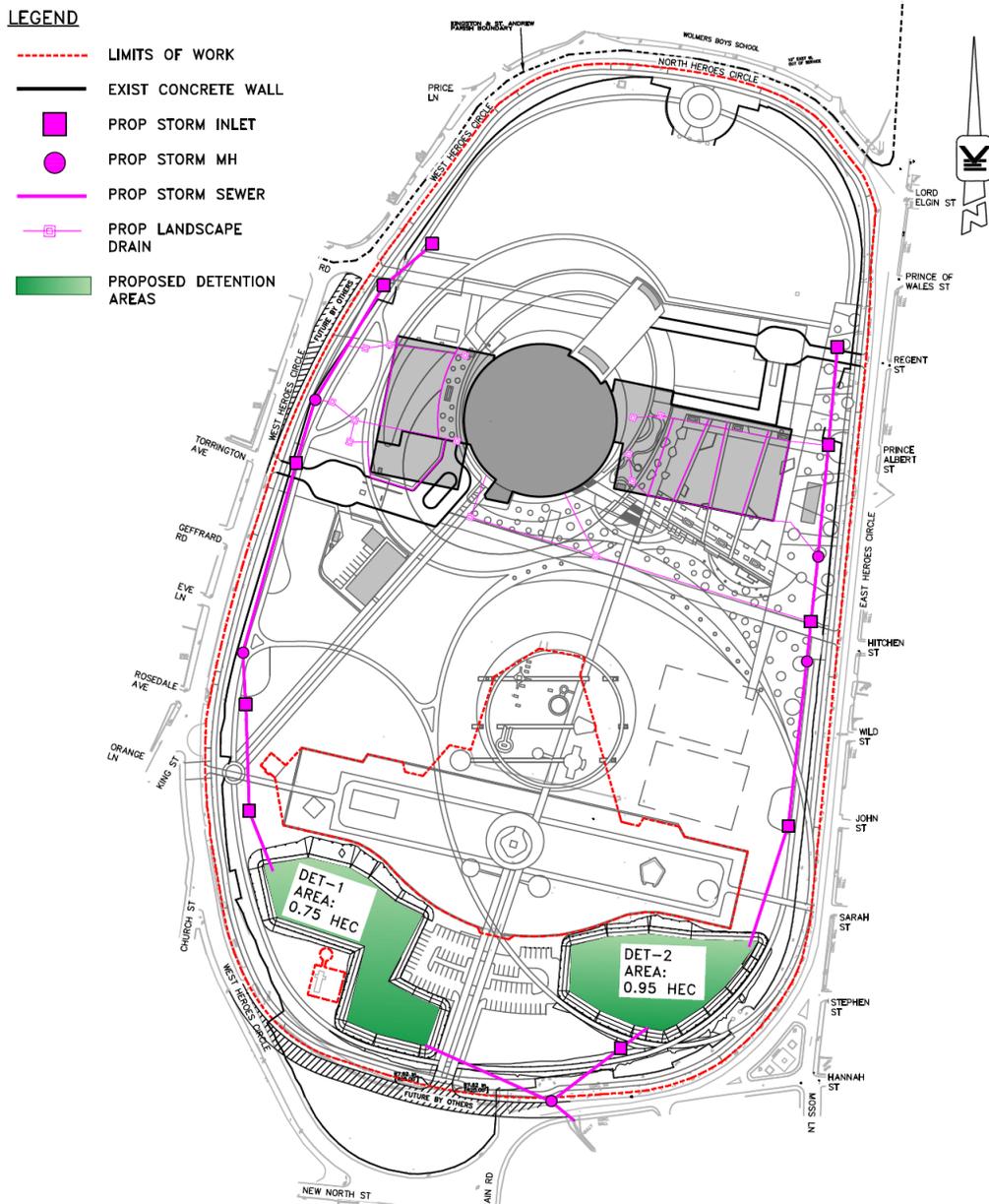


Figure 7-1: Water detention areas and storm sewer plan

The impervious areas are illustrated in Figure 7-2. The percentage of these impervious areas in each sub-basin was determined and are shown in Table 7-5.



Figure 7-2: Proposed development's impervious areas

Table 7-5: Sub-basins' imperviousness

SUB-BASIN	CN	% IMPERVIOUS
1	44	9
2	40	3
3	53	24

When comparing pre- and post-development, the impervious percentage post development in sub-basin 1 increases by 7% and that of sub-basin 2 by 1%. No change was applied to sub-basin 3 as the same parking area would apparently be utilized.

The model was re-run for each of the return periods; 10-, 25-, 50- and 100-year. The simulated peak flows and runoff volumes for each sub-basin and at the outlet are summarized in Table 7-6.

Table 7-6: Post-development peak flows and runoff volumes

RETURN PERIOD	UNITS	SUB-BASIN-1	SUB-BASIN-2	SUB-BASIN-3	OUTLET
10	PeakQ (m3/s)	2.4	0.66	1.09	4.02
25	PeakQ (m3/s)	5.35	1.77	1.88	8.8
50	PeakQ (m3/s)	6.74	2.3	2.22	11.05

RETURN PERIOD	UNITS	SUB-BASIN-1	SUB-BASIN-2	SUB-BASIN-3	OUTLET
100	PeakQ (m3/s)	8.03	2.81	2.53	13.13
10	Vol (1000m3)	11.97	3.25	4.26	19.48
25	Vol (1000m3)	31.29	9.74	9.36	50.39
50	Vol (1000m3)	42.3	13.57	12.1	67.98
100	Vol (1000m3)	55.65	17.93	15.12	87.7

7.2.1.2 Air Quality and Noise

During operations, particularly when Parliament is in session, the area will now experience an increase in traffic. This will have adverse impacts on air quality and noise. However, when parliament is in session the area will be regarded as a silent zone and as such, will benefit the neighbouring areas (businesses, schools and communities) as it relates to reduced noise levels from traffic.

7.2.1.3 Water

As indicated in previous sections, the area already is affected by water shortages particularly during the dry season. This project is expected to require a significant amount of water for the operations of the building, the water fountain as well as irrigation needs. There is a well on the property but water quality tests have shown a high level of contamination with faecal coliform. As such this water cannot be used for potable or irrigation purposes without adequate treatment.

7.2.1.4 Natural Hazards and Climate Change

Climate change is expected to result in more intense periods of short duration rainfall, more intense hurricanes and longer dry periods. These impacts are likely to affect the site in the following ways:

- Short duration intense periods of rainfall can result in increased run-off and possibly flooding of the site and surrounding areas;
- More intense hurricanes are likely to put greater stress on the physical infrastructure, the plant nursery and tall trees to be planted;
- Longer dry periods mean that there is likely to be greater strain on water resources during dry season. There is already a shortfall of water in Kingston during dry periods and therefore, with the projected impacts of climate change, it is anticipated that this will only get worse.

The site may be affected by earthquakes based on its location, however, it is likely to be affected by liquefaction due to properties of the soils.

7.2.2 Ecological

The revegetation and landscaping of the area will likely increase the coverage of green area within the project location when compared to the baseline data covered in this report. If undertaken appropriately, this may create ecological corridors and habitat for local fauna, for example, birds, butterflies, and other wildlife, which are able to survive in urban, semi-disturbed landscapes.

The project as conceptualized may have some positive impacts via the provision of ecosystem services, for example, carbon sequestration (which should increase as tree density increases); potential for seed dispersal as pollinators forage in the area; and increased habitat quality and foraging grounds, depending on the flora selected for replanting.

7.2.3 Archaeology/ Heritage Impacts

The presence of the HOP on the project site is likely to encourage more visitors to the Park resulting in greater visibility of the heritage features and national monuments. This increase in visitors could also result in physical damage to the features and monuments if not properly monitored.

7.2.4 Socio-Economic

The following considerations apply:

- Changes in resource use will result, but not in any demonstrably environmentally negative way;
- Public access will be modified through greater regulation of movement in relation to the HOP space, but not prohibited. Similarly, existing permitted access to other areas will be modified in relation to uncontrolled access and use, but not prohibited to the public;
- With respect to prescriptive rights, there is no indication that this issue will arise in the instance, since access through and within the space may be regulated, but not prohibited, to the extent of creating an unreasonable inconvenience;
- Existing recreational use will benefit in relation to any properly planned recreational facilities designed for the larger park area. However, in the building footprints, there will be a change in recreational use in the form of design features that will have a recreational purpose;
- Impacts on existing and potential economic activities will be positive in relation to any increased recreational use of the space. This is based on the assumption that both enhanced park design and management features will allow adequate provision for controlled commercialization that will benefit local micro-entrepreneurship;
- Public perception, as sampled by the Consultants in the rim communities, is mixed and not strongly favouring the intended land use. Mitigation of this present, if not completely measurable, dissatisfaction must lie in a combination of selling the HOP Project benefits, but also creatively incorporating into the future land use planning, elements sensitive to what the rim communities are asking for. Simply put, and as reflected by the consultations conducted for this EIA, elements that create clearer and more direct economic or social betterment for these communities;
- There is the potential for the National Heroes space to become catalytic in the development in both the economic and psychic landscape of a future Kingston. Public administrative spaces in every major metropole worldwide are engines of economic growth and deep national pride. Examples abound. Our own history has bequeathed Spanish Town Square to the benefit and pride of Jamaicans. The nearest proximate example is in neighbouring Havana, where the El Capitolio, or the National Capitol Building, is one of the most visited sites in Havana, and probably Cuba. It is the communication of this potential reality and vision that needs to be currently much more pro-actively engaged.

Currently, and understandably, some members in these communities are sensing that the project is a prelude to a major longer-term urban renewal movement that will make incursions into their communities, particularly in relation to increasing displacement with or without resettlement. This is a

fear that needs to be addressed directly and specifically. In the long run, everyone benefits from urban renewal. Currently, not everyone understands its full implications. This is part of the communication challenge that the promoters of the HOP Project must overcome.

If successfully implemented in accordance with the recommendations of the EIA, there should be no long-term negative economic or social impacts whether one-off or cumulative arising from the project.

7.2.4.1 Traffic

The presence of the HOP and the wider vision for the area to become the Government Oval will likely see an increase in traffic. Without any mitigation measures implemented there will also likely be negative impacts of the traffic entering and exiting the property. There is also likely to be an increase in visitor traffic to the Park which may also add to traffic congestion.

7.2.4.2 Crime

The likely challenges for the Project that these community problems pose are as follows:

1. Inner city criminality is incompatible with the symbolic significance of Houses of Parliament as being the seat of legislation, the protection of rights and the protector of the nation's security.
2. Any redevelopment of the site into a visitor attraction, including locals and tourists, will be threatened by predatory criminal elements.
3. Any sporting or recreational use designed within the park, will be faced with ensuring an adequate security presence. An adequate policing presence must also be placed within each community.

7.3 Cumulative Impacts

The Urban Development Corporation recently commissioned the development of a Master Plan concept for the area surrounding the National Heroes Circle, to be called the Government Oval. It has been suggested that the wider area can be developed over 2 main phases (Figure 7-3) and that it incorporates mixed uses and not only government uses (Figure 7-4). Parking will also be provided as part of the development of the area.



Figure 7-3: Master Plan Study Areas to be developed over 2 phases (Source: One People..One Place, National Heroes District Master Plan)

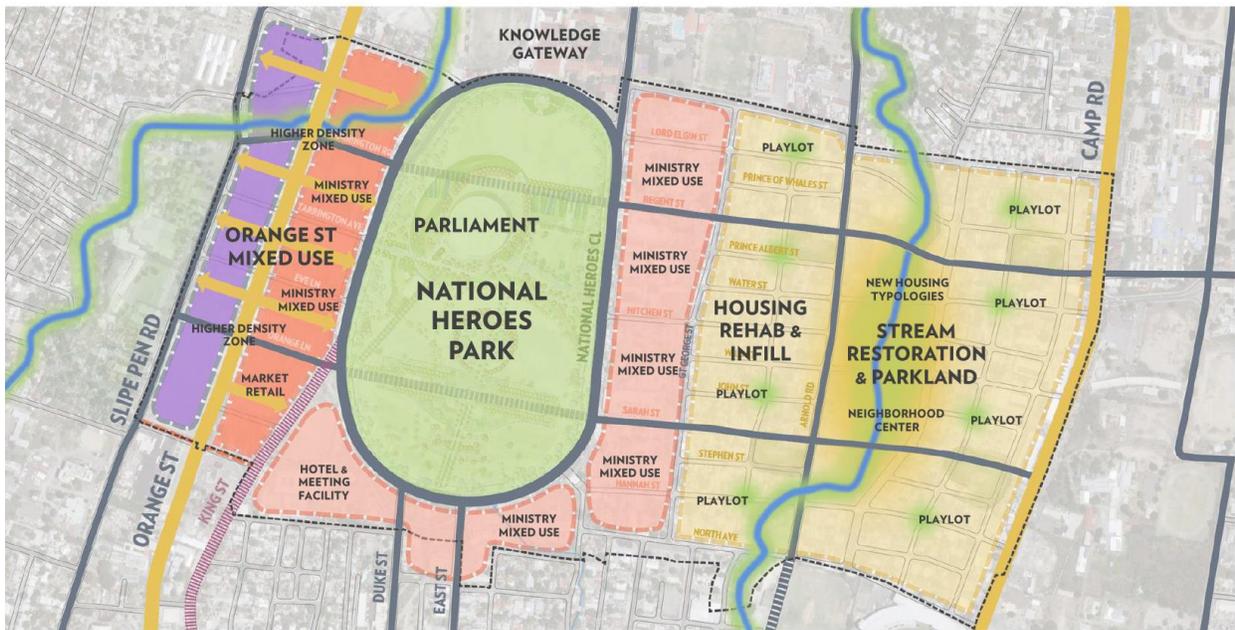


Figure 7-4: Mixed use framework (Source: One People...One Place, National Heroes District Master Plan)

For the area immediately surrounding the park, three options have been presented to the Government (Figure 7-5). Concept A involves perimeter buildings around central courtyards; Concept B includes terraced buildings with small courtyards; Concept C includes buildings with park-front courtyards. Concept

B has been approved as the way forward, though elements of Concept C may be integrated where appropriate.

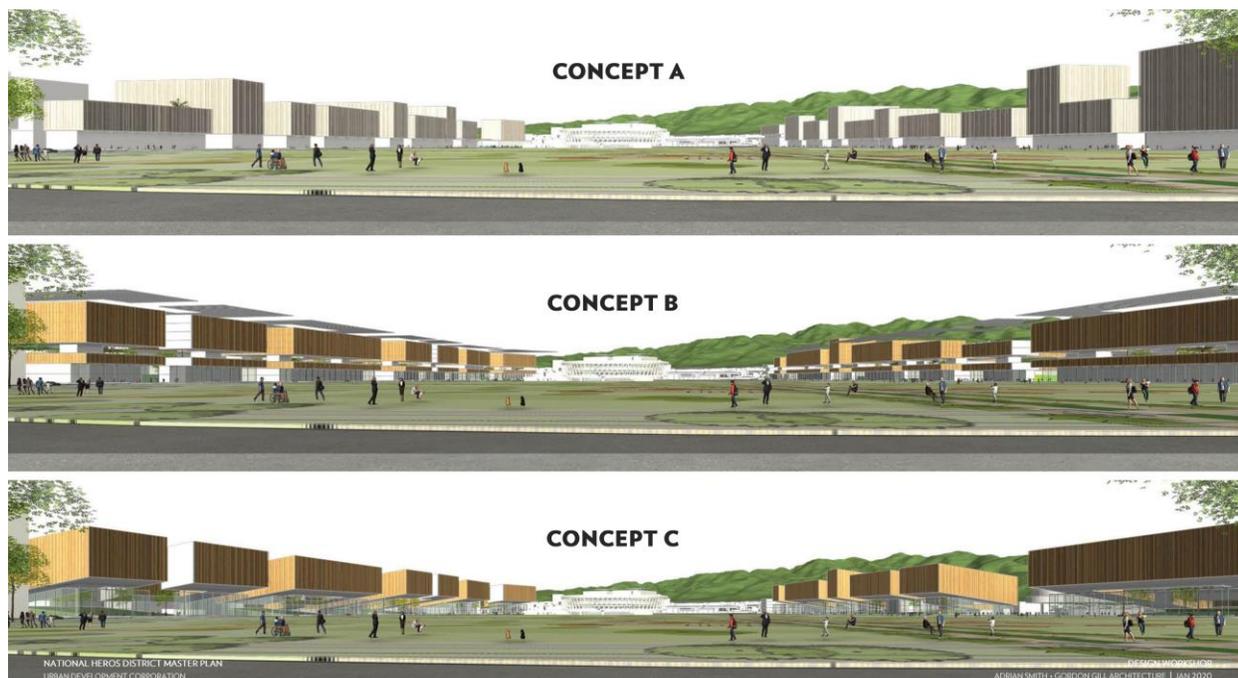


Figure 7-5: Three Concepts for the buildings surrounding Government Oval.

This will see the increase in the number of government buildings in the area and will therefore result in the overall increase in the following:

- Traffic – More cars and traffic will be on the roads. Combined with the use of space for social events, the area will also be more likely trafficked on weekends;
- Water demand and usage – More buildings and persons will result in a greater demand for water. There is already a shortfall in Kingston during the dry season in particular and this will only be exacerbated if alternative sources of water are not found for the area;
- Parking needs – With an increase in staffing, there will be an increasing need for more parking which is already a challenge in the area;
- Sewage production and solid waste – There will be an increased production of sewage and solid waste due to the increase in the number people in the area;
- Noise – The increase in traffic is likely going to result in an increase in noise both on weekdays and weekends;
- Impermeable spaces – The increase in buildings in the area will result in the increase in impermeable surfaces which is likely to increase run-off into the nearby gullies. The design specifications of the gullies are likely to be exceeded, especially with climate change which has resulted in more variable rainfall and an increase in short and intense periods of rain.

It will also likely result in the reduction of air quality due to the increase in traffic. Additionally, the ecology of the area will continue to fragment. Additionally, there is possibility for the decrease or disappearance of local species due to increasing urbanization. Replanting and revegetation should be completed and

managed in a strategic, systematic manner (e.g., selection of trees to increase habitat quality, carbon sequestration value, etc.), to sustain and boost the provision of ecosystem services.



POSITIVE ENHANCEMENTS AND MITIGATION MEASURES

8 POSITIVE ENHANCEMENTS AND MITIGATION MEASURES

8.1 Construction Phase

8.1.1 Physical

8.1.1.1 Total Integrated Water Management

There are four identified sources of water to the site or for use on the site:

1. NWC- for potable water
2. Well water- for irrigation, fire storage and water wall feature
3. Rainwater- for fire storage and irrigation
4. Cooling Systems Condensate- for irrigation in the nursery

It is therefore imperative that an integrated approach be utilized to manage water use on the site and maximize the non-utility supplied sources to the maximum practicable.

Storage will also be required for fire-fighting and that should be sourced from rainwater harvesting or from the well, but should not be from the NWC. The fire system should be able to be supplied directly from the well to ensure a continuous supply in an emergency.

8.1.1.2 Water Supply and General Water Management

There is an active well in the National Heroes Park, however, it is abstracting water from the alluvial aquifer which is contaminated and would require treatment to be used for any potable purposes. The aquifer is polluted primarily from infiltration from onsite sewage systems to the north and north east of the Park as well as from leaking sewer mains. This has resulted in unacceptably high levels of nitrates and coliform in the water.

“The Kingston hydrologic basin of Jamaica covers an area of approximately 258km² of which 111 km² area is underlain by an alluvium aquifer, 34km² by a limestone aquifer, and the remainder underlain by low-permeability rocks with insignificant groundwater occurrence. Water quality study of the wells studied shows pH values ranging from near neutral to alkaline (7.1 – 8.6). High concentration of nitrate is one of the main causes of contamination with values as high as 45mg/L (NO₃–).” (Mandal, Haiduk, Alleyne and Nawal, 2011).

Basic filtration followed by chlorination or ultraviolet (UV) irradiation can eliminate the coliform and other pathogens, however, the removal or necessary reduction of the nitrates will require specialized and expensive treatment which is likely to be the use of membranes which is a high energy treatment system.

Potable water is best taken from the NWC with adequate storage being provided for periods of water restrictions or loss of supply for any of a variety of reasons: water restrictions; storm events; mains repairs; system upgrading; or any other disruption. This storage would be enhanced, though separate, by the use of rainwater harvesting.

8.1.1.3 Rainwater Harvesting

The use of rainwater harvesting at the Parliament building and general site has been suggested in the design and is recommended not only for the functional benefits, but also for the demonstration to the public and by extension, the promotion of the use of rainwater harvesting. During extended dry periods, rainwater harvesting would not be viable because there would not be any rain to collect, however, during

any brief or single rainfall event the benefits of having such a system becomes evident as storage is rapidly filled and water is thereafter available. During periods of rainfall, the use of the domestic supply from the NWC can be reduced by using the harvested rainwater for non-potable purposes.

Rain should be collected from all hard surfaces and directed to the preliminary treatment and storage area. Harvested water from roofs will contain particles of dust washed off the roof and droppings from birds and other small creatures. Therefore, the level of treatment is dependent upon the final use.

Dual plumbing is utilized in some situations and this involves having two sets of plumbing, either entering with water or leaving with sewage and grey water separate. If dual plumbing for water supply is utilized, then one of the pipeline networks would carry rainwater which can be utilized for toilets and washdown of the building and walkways. The other pipeline network would carry potable water which would be taken from the NWC. Each would be piped into the building separately and colour coding of the pipes should be employed to reduce the risk of cross connections. The NWC water would be piped to the faucets in the bathrooms and the kitchen areas, whereas the recycled/rainwater would be piped to toilets and external pipes for maintenance and landscaping purposes. All non-potable water outlets would be so labelled.

8.1.1.4 Condensate water

Condensate water should not be used in the water features as the design may allow persons to get wet or consumer the water. As such this water should be piped to the south of the property to be used by drip irrigation in the nursery.

8.1.1.5 Hydrology and Drainage

The storm water system has been designed per the NMIA rainfall gauge data and in accordance with the NWA manual and is also designed to manage (but not mitigate for) the 100-year storm event from the modified Cavaliers data. In addition to the design, it was noted that sections of the Barnes Gully are constricted and partially covered with vegetation. As such it will require maintenance so as not to overflow.

Additionally, the Wagonette Gully which starts at the south end of the Heroes Circle and connects to Barnes Gully in the vicinity of North Street has the capacity to discharge the 10-year flow. However, it is also important that the pavement of the gully be maintained so as not to cause restrictions.

8.1.1.6 Air quality

Recommended mitigation measures for possible air quality issues during construction are as follows:

- Ensuring that all fine earth material transported to the site is always properly covered and all material stored on the site is covered if not being immediately used;
- Ensuring that all unpaved surfaces are paved and/or grassed as soon possible;
- Wetting of the site to suppress fugitive dust;
- Placing dust screens around the site to reduce the migration of fugitive dust from the site;
- Developing a comprehensive traffic management plan to minimize the concentration of traffic within the study area as well as restricting the speed limit of vehicles operating within the project area to control the dissemination of fugitive dust.

8.1.1.7 Noise Levels

Due to the negative impacts the exposure to loud noises may cause, it is recommended that on site noise monitoring be executed to establish the areas and/or activities which produce noise that exceeds the US Occupational Safety and Health Administration (OSHA) standards. These areas should be properly labelled to ensure all employees wear the necessary personal protective equipment (PPE). A “*Hearing Conservation Programme*” should also be implemented to prevent initial occupational hearing loss, preserve and protect remaining hearing, and equip workers with the knowledge and personal protective gears necessary to protect them from hearing loss.

It is further recommended that a trained Occupational, Environmental, Safety and Health (OESH) practitioner be engaged by the project to assist with the drafting, implementing, monitoring and review of procedures geared towards eliminating and or reducing the hazards associated with the environment, occupational health and safety.

Given the fact that noise is expected to be generated from activities as well as the equipment used during the construction phase, the following are some recommended mitigation methods. Once implemented these will reduce the impact on the surrounding community.:

- Ensuring that all equipment is properly maintained;
- Selecting equipment with lower sound power levels;
- Ensuring equipment, such as compressors, is fitted with appropriate mufflers;
- Setting up acoustic or sound barriers without gaps around noisy equipment or activities. Barriers should be located as close to the source or to the receptor locations for them to be effective;
- Installing vibration isolation or dampers on mechanical equipment;
- Limiting the hours of operation for noisy equipment and/or activities;
- Relocating noise sources to areas that are less sensitive to take advantage of distance and shielding.
- Conduct work only during the permitted hours.

8.1.1.8 Other Occupational Health and Safety

As with any construction project, occupational health and safety risks or any hazards related the proposed activities have the potential to cause injury or ill health. As it relates to this HOP Project, these risks include injuries caused by equipment and vehicles; slips, trips or falls; noise-induced injuries; and ill health caused by dust and other emissions, to name a few. The following precautionary measures should be included among safety practices:

- The contractor must have a health and safety policy that is known and understood by all workers. It must also be visible to the workers on site;
- Construction areas should be clearly demarcated with safety signs and barriers to prevent possible incidents;
- Workers should be properly equipped with health and safety equipment and trained in the proper use of construction equipment;
- All workers must be trained in the proper use of all health and safety equipment;
- All workers must be trained in the proper handling and management/disposal of all types of waste;

- The contractor Environment, Health and Safety (EHS) Manager/ Officer shall maintain a register of all EHS-related incidents that have occurred as a result of the activities associated with the contract;
- EHS incidents that should be recorded include fires, accidents, spills of hazardous materials that contaminate soil or water resources, stop-order notices issued by NEPA, or any other relevant agency, non-compliance with this Environmental Management Plan (EMP);
- Each EHS-related incident will be investigated by the client's EHS officer and an incident report forwarded to the contractor. An incident report will be presented within five working days;
- EHS incident reports will include as a minimum, a description of the incident, actions taken to contain any damage to the environment, personnel or the public, and the corrective actions to repair/remediate any damage;
- All construction plant and equipment, tanks and machinery shall be maintained in a good state of repair throughout the construction period;
- Equipment maintenance will be carried out on an impermeable surface;
- Leakage from equipment will be prevented by regular inspection and repair;
- Areas under construction should be clearly demarcated;
- Emergency medical supplies must be available and easily accessible in the case of an incident;
- In the event that the onsite medical supplies are not adequate, the incident needs to be escalated to the hospital;
- In the event that a worker is exposed to hazardous material, they should immediately be taken for medical attention.

8.1.2 Ecological

While the study area is not characterized as ecologically sensitive and the ecosystem functions provided are already compromised, any modifications related to the project should minimize further loss of ecological functions that arise from the direct removal of habitats as well as indirect removal of pathways and linkages between other biological resources. Many of these ecological functions will benefit the future operations of the proposed development in addition to supporting the surrounding areas. Mitigation activities include compensation activities for areas lost, as well as activities to support healthy functioning habitats during operation.

Construction

During the construction phase, it is mandatory to adhere to the following guidelines and stipulations:

- Local workforce/contractors should receive an “ecology” orientation regarding endangered status of associated fauna and best practices when encountered (primarily birds and eggs, etc.);
- Where possible, vegetation clearance and construction activities should take place outside of the March to September breeding season for birds. In the event that these activities must occur within the restricted activity period, appropriate setback distances from active nest sites should be established and a qualified ecologist or NEPA consulted. If the status of the nest cannot be confirmed, or if a nest is found outside of the breeding season, an appropriate setback distance should be implemented until such time that the nest status can be confirmed;
- Works should be undertaken as much as possible in the dry season to reduce possible sedimentation;

- Wetting of the construction site and materials during construction or until roads are paved will minimize the fugitive dust impacts on the surrounding vegetation;
- Fencing the area will limit human impacts observed (solid waste, dumping);
- Logs should be kept which indicate when and for what reason work was halted;
- The project area for the Houses of Parliament should be marked out prior to construction so that there is no unnecessary clearing of vegetation;
- Any vegetation cleared should be done in a phased manner, to limit any effects of possible erosion;
- Cleared vegetation should be disposed of in a suitable manner, for example, woodchipper and recycled into soil, given to persons who make charcoal, or sent to a landfill, but it is not to be burnt;
- The development should consider irrigation water when determining water requirements and capacity. Efforts should be made to ensure that vegetation remains healthy.

8.1.3 Archaeology/Heritage

It is recommended that a watching brief be conducted during excavation works to observe and record any features or artefacts that may be uncovered. In addition, a small group (3–4) of archaeologists should be on standby to execute salvage archaeology in as expeditious a manner as possible so as not to disrupt the work schedule or at worst, impact it very slightly. Further, should the finds be overwhelming for such a small team, others should be brought on to achieve the same end of expediting with alacrity the recording of features and artefacts and collection of the latter. This should be done in coordination with the JNHT.

Additionally, prior to construction a record of the monuments and grave sites should be done prior to the start of construction to mitigate against any damage during construction.

8.1.4 Socio-Economic

The mitigation measures that accompany construction sites are defined in other sections. They will be sufficiently supportive of minimizing the negative environmental impacts on the rim communities.

Since inclusiveness of employment opportunities is such an important concern of the communities, the project should implement a robust oversight mechanism through the contractor to ensure that this objective is achieved. It must also be apparent that this mechanism is in place and is effective. Several of the hoped-for job opportunities have already been detailed in previous sections.

8.1.4.1 Traffic Impacts

The Traffic Impact Study that was commissioned for this project has recommended the following mitigation measures during construction:

- Trucks and equipment should be mobilized and demobilized from the site during off-peak hours only, during the hours of 9am to 1:30 pm.
- The recommended ingress is through a new slip lane on the North Western side of the site as shown in Figure 8-1 egress along the northern boundary of hero's circle).
- Egress is recommended on the South Western section of the circle in line with Torrington Ave. as shown in Figure 8-1 The only movement permitted is Southbound on Heroes Circle. Northbound movements can be achieved by completing a circle at the park.
- Deliveries should be scheduled for off peak hours of 9am to 1:30 pm.

- The Western Entrance obelisk will have to be removed to accommodate turning movement from trucks (Figure 8-1).
- It is also recommended that the guard booth be set back 25 meters from the existing entrance. This will give enough stacking distance internally for construction traffic credential to be verified prior to entering the site.

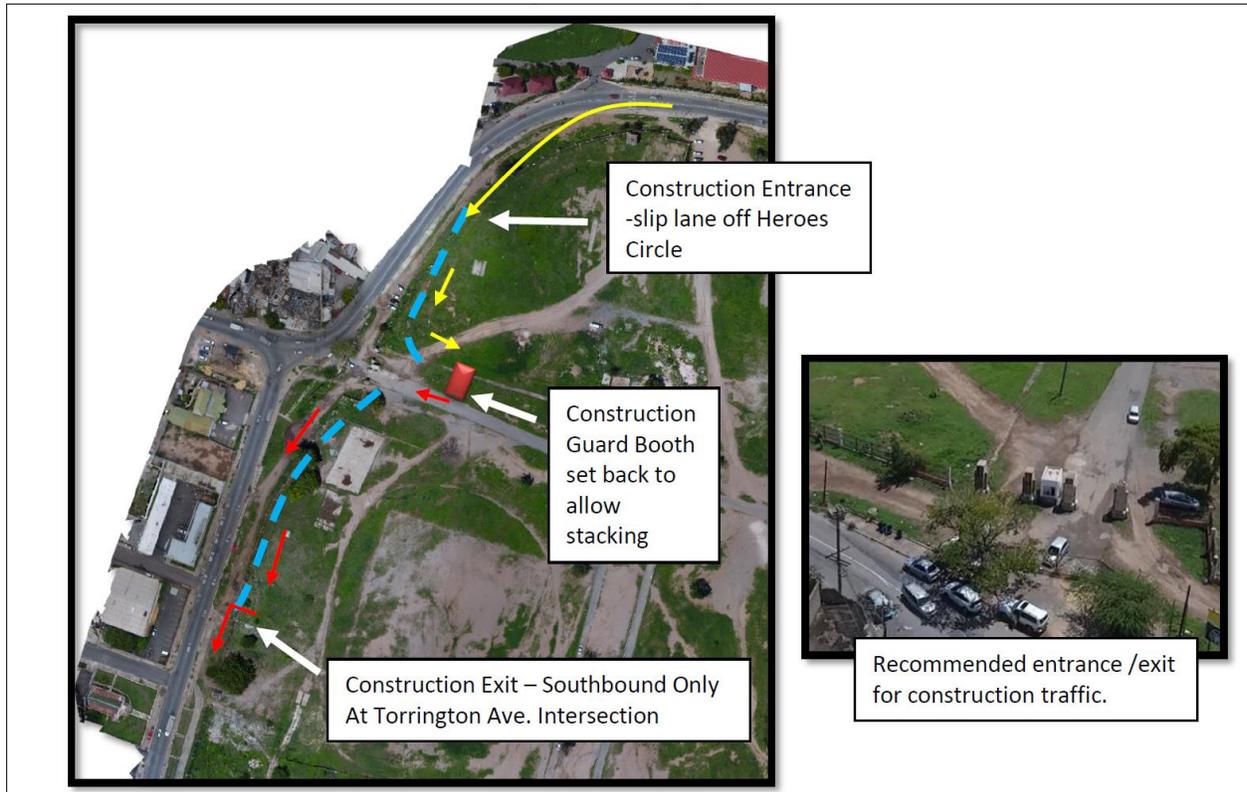


Figure 8-1: Construction Traffic Routing (Source: Traffic Impact Study, 2020)

8.1.4.2 Crime

The following mitigation measures are suggested to deal with the potential issues of crime:

1. Employ persons from within the community as best as possible.
2. Improve social amenities including the social security net in terms of available and affordable health care.
3. Provide a better equipped police force to be located in each community. Presently not all have a police station. Each is under resourced across manpower and equipment to better control crime.
4. Improve roads to the point where they more functionally assist crime prevention by giving quicker access.

Perhaps the single most important project that can push back against crime, is the re development of Central Kingston.

8.2 Operation Phase

8.2.1 Physical

8.2.1.1 Runoff

To mitigate the impact of the development on the predevelopment flows to Barnes Gully, the increased volumes of runoff must be managed. The proposal for managing the runoff is illustrated in Figure 7-1. Figure 8-2 is an overlay of the sub-basins and natural water ways on the “Water Story” diagram. This was done to show where the proposed structures were located in the sub-basins. Hence, the runoff volumes from the sub-basins are those for which the structures in that sub-basin should be designed.

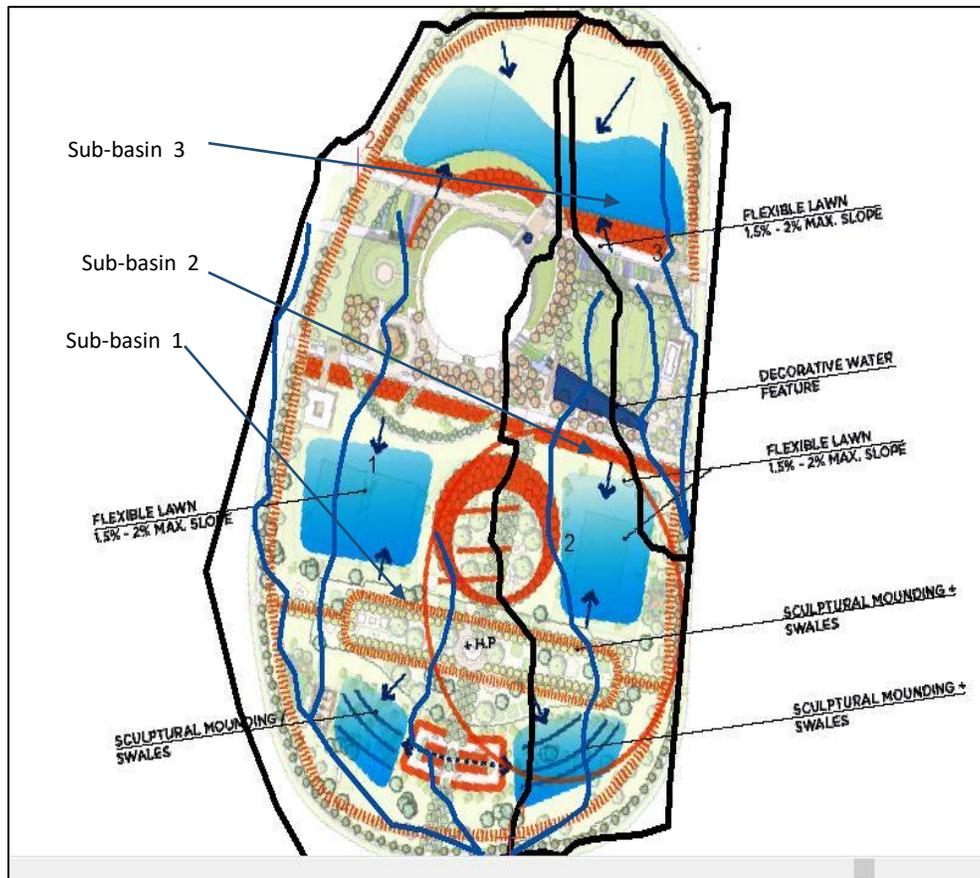


Figure 8-2: Overlay – Sub-basins and natural waterways over water story

As shown in the Figure, the proposed flexible lawns and sculptural mounding swales are in both sub-basins 1 and 2 and within proximity of the natural flow paths. Table 8-1 shows that for the 100-year event, 98% of the flow increase going to the outlet is generated from sub-basin 1 and therefore, the natural drainage will not be adequate to distribute the flows to both flexibility lawns. The drainage layout and design should take this into consideration.

Table 8-1: Differences in sub-basin pre- and post-development runoff volumes

	100-YEAR RUNOFF VOLUMES (1000M3)		
	SUB-BASIN 1	SUB-BASIN 2	SUB-BASIN 3
Post-dev Outlet	54.65	17.93	15.12
Pre-dev Outlet	48.04	17.78l	15.12
Difference	6.61	0.15	0.0

8.2.1.2 Water Supply

During the operations phase, efficient maintenance of the water systems is essential, but will require that a maintenance plan be developed and kept at the facility to ensure it is used. All work on the systems should be supervised and checked to ensure there are no cross connections.

8.2.1.2.1 NWC Water

NWC water will be received directly into the facility and into storage. There are no recommendations for this source.

8.2.1.2.2 Wells

There are well established protocols for operating and maintaining wells and well equipment. This source should be treated prior to use and therefore, maintenance of the treatment system is critical. As this is a non-potable source any pipe/faucet point that uses this water should be clearly labelled as non-potable water and the pipe colour coded to make it obvious.

8.2.1.2.3 Rainwater Harvesting and Recycling

The rainwater that is harvested should be subject to treatment before use and storage. Gutters need to be regularly cleaned and the design needs to ensure that there is access to the gutters for cleaning. A first flush diverter may be necessary, but not essential if there is some degree of treatment of the rainwater before being sent to storage. A first flush diverter is a simple mechanism to capture approximately the first 5 minutes of rainfall which would have washed off the particles and droppings. This water is usually sent to waste or can be diverted to irrigation.

For extended storage, the water should be recirculated to avoid it becoming stagnant and the storage should not be subject to sunlight which would promote algae growth.

8.2.1.2.4 Water Distribution

Adequate distribution systems are available, but the repair of these multiple pipe networks can cause the most significant disruptions to the availability of water and has a functional impact in the areas where repairs are being effected. It is critical that records of the location of pipes, in both hard and soft copies, be stored both at the project site as well as at the respective municipal entities.

Where pipes are located under hard surfaces that cannot be damaged, consideration should be given to placing the pipes in sleeves so that repairs can be effected without destructive means to the walkways or floors.

8.2.2 Ecological

The Consultants have recommended the following ecological project enhancements/mitigation measures:

- Where possible, new areas of landscape planting should incorporate native species, particularly when planting in proximity to existing, natural vegetation;
- Utilise the existing nursery to host and grow the plants needed for the project site. This should be done as soon as possible to allow for the plants to be at the required heights.
- Conduct before and after assessments of local fauna population counts. Of interest would be nesting birds.
- The developers should ensure that the vegetation type is selected to boost ecosystem services and not exclusively for beautification.

8.2.3 Archaeology/Heritage

Due to the likely increases in visitors to the Park there will be greater visibility of the heritage features and national monuments. As such it is recommended that Table 5-8 which presents a timeline of events of historical significance at the park be placed on signs to give persons a greater appreciation of the history of the site.

8.2.4 Socio-Economic

Potential positive enhancement measures have been identified through the community consultation process. The design concept is a given, hence, within the practical framework for consideration of community ideas, the following are those that seem most aligned to the concept:

1. A play zone for children;
2. Elements of an amusement park that will have broad appeal to users;
3. A running and exercise track;
4. Facilities that will cater to the recreational needs of park goers, such as access to refreshments;
5. Incorporation into the Parliament Building of cultural offerings originating in the communities, inclusive of their fine arts, music, drama, culinary offerings or fashion displays;
6. A space where events can be held;
7. A space for soft sporting activities;
8. Outreach that is sensitive to the heritage elements that most communities have, whether in the built environment, as in several exquisite architectural buildings, or in existing monuments, or in the several places of significant historical interest;
9. Outreach and sensitivity to the cultural offerings that communities can mount inside of their communities to be available to users and visitors of the Park;

10. A visioning that asks that facilities that may not easily be accommodated within the existing concept, be considered for implementation in spaces perhaps contingent to National Heroes Park. Hard surface sporting facilities and a gym are examples cited.

Now that the communities have been sensitized to the imminence of the project, it is likely that the public consultation, that will follow, will be a source of other ideas.

8.2.4.1 Traffic

The traffic study carried out for specifically for this project has suggested the following mitigation measures to improve the road network. They are several options for consideration:

- Turn Heroes Circle into one-way operation and realign the Southern Circle
- Introduce an Uncontrolled Tee at Torrington Road/Heroes Circle
- Widen the section of roadway in front of Wolmer’s Boys and Wolmer’s Girls School
- Introduce an uncontrolled Tee at Heroes Circle/ Marescaux Road
- Introduce a median starting at Heroes Circle Marescaux Road and continuing northward past Connolley Ave. and Wolmer’s Girls Upper and lower Schools.
- Dualizing Marescaux Road with a median strip to separate opposing lanes of traffic. A signalized intersection is also recommended for Mico University, with the entrance to the National Water Commission realigned to Mico to create a 4-way intersection.
- Include signals at strategic points:
 - At the main entrance and exit for parliamentarians and security personnel. A signal operating full time is recommended here.
 - At the entrance and exit for staff and visitor. A signal operating full time is recommended here.
 - At the 2 emergency exits for the complex. A flashing signal is recommended here that will be activated in emergencies.
 - At the entrance and exit to Mico university and the proposed realigned National Water Commission. A signal operating full time is recommended here.

The Traffic Impact Study was only prepared for the HOP project and the mitigation measures suggested did not consider the Master Plan for the Government Circle which has not yet been completed.

8.3 Summary of Impacts and Mitigation Measures

Table 8-2: Summary of impacts and mitigation measures

MAIN ISSUES	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	MAGNITUDE	DURATION	DIRECTION	PERMANENCE	PROPOSED MITIGATION MEASURES
CONSTRUCTION PHASE							
Increased sediment runoff	High	The increase in sediment could infill drainage channels and gullies resulting in a reduced capacity for water and potential flooding.	Moderate	Short-term	Negative	Reversible	<ul style="list-style-type: none"> • Silt traps and screens • Cover stored material • Stored material should be bermed
Increase in runoff during site clearance and preparation	High	Can potentially result in increased flooding	Moderate	Short-term	Negative	Reversible	<ul style="list-style-type: none"> • Clear the site in stages • Contour the site during clearance to allow for infiltration prior to replanting of vegetation
Increase in air pollutants and dust	Medium	Can potentially result in adverse impacts on the health of construction workers, surrounding communities,	Significant	Short- to long-term	Negative	Potentially irreversible	<ul style="list-style-type: none"> • Vehicles on the construction site should be properly maintained to ensure they are always working optimally.

MAIN ISSUES	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	MAGNITUDE	DURATION	DIRECTION	PERMANENCE	PROPOSED MITIGATION MEASURES
		businesses and institutions Deterioration of air quality					<ul style="list-style-type: none"> • Speed limits in the project area should be set and enforced to reduce fugitive dust generation especially on unpaved surfaces. • Frequent wetting on the site should be done to reduce the levels of fugitive emissions. • Dust screens should be used especially for activities which generate a lot of fugitive dust and do not have an existing buffer zone, for example, those created by mature trees. • Periodic monitoring should be done to ensure compliance with the regulatory requirements and

MAIN ISSUES	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	MAGNITUDE	DURATION	DIRECTION	PERMANENCE	PROPOSED MITIGATION MEASURES
							environmental best practice levels. <ul style="list-style-type: none"> • All fine earth material transported to the site should be properly covered. • Avoid storage of fine earth material for extended period of time on the site.
Elevated noise levels	High	Adverse health impact on contractors, employees, residents, and animals	Medium	Short- to long-term	Negative	Potentially irreversible	<ul style="list-style-type: none"> • All equipment and vehicles should be properly maintained. • Noise assessment should be conducted during start up to identify areas where there may be elevated noise levels. If mitigative measures, such as the use of noise reduction dampers, cannot be implemented, persons should wear the appropriate personal protective gears.

MAIN ISSUES	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	MAGNITUDE	DURATION	DIRECTION	PERMANENCE	PROPOSED MITIGATION MEASURES
							<ul style="list-style-type: none"> • The use of mobile acoustic /noise barriers without gaps around activities which generate high noise levels and are close to sensitive areas particularly schools and health care facilities, etc. • Schedule noisy activities to reduce the magnitude of their impacts to people, businesses and the environment.
Flora and fauna could be displaced/removed during construction works.	High	Loss of flora and fauna during construction Habitat fragmentation	Low	Short-term	Negative	Reversible; Cumulative	<ul style="list-style-type: none"> • Use equipment outside of peak bird activity (daybreak and sunset). • Nests of birds identified during clearance should be gently relocated to a section of the property that will not be clear cut (if applicable).

MAIN ISSUES	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	MAGNITUDE	DURATION	DIRECTION	PERMANENCE	PROPOSED MITIGATION MEASURES
							<ul style="list-style-type: none"> • All construction sites should be clearly demarcated. • Areas where priority plant species are growing must be demarcated as no-go zones (if applicable). • No clearing of vegetation, storage of materials or other construction-related activities shall be permitted outside the demarcated construction area. • Works should be undertaken as much as possible in the dry season.
Potential to boost ecosystem services through the provision of urban green space	Moderate	Increase in habitat quality, carbon sequestration value, seed dispersal potential	Moderate	Long-term	Positive	Reversible, Cumulative	<ul style="list-style-type: none"> • Ensure that replanting is done with native/local species. • Develop a landscape or urban greening management plan.

MAIN ISSUES	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	MAGNITUDE	DURATION	DIRECTION	PERMANENCE	PROPOSED MITIGATION MEASURES
Traffic congestion	High	Loss of travel time Compromise to road user safety Danger to pedestrians, particularly children	High	Both short-term and long-term	Negative	Reversible	<ul style="list-style-type: none"> • Executing a comprehensive traffic plan to cover both internal and the external traffic environment
Increased social apprehension and tensions, including anxiety and anger	Moderate	Mainly psychological	Low	Short-term	Negative	Reversible	<ul style="list-style-type: none"> • Consultation and inclusiveness in explain the project and allaying misgivings • Grievance Mechanism
Employment and economic activity	Moderate to High	Persons from within the community could be employed during construction. Businesses surrounding the Park are likely to see an increase in business during construction when workers buy snacks, lunch, etc. from them.	Moderate	Short-term	Positive	Reversible	<ul style="list-style-type: none"> • The possibility of employing persons from within the communities should be announced as early as possible to reduce anxiety and concerns. • Give those interested persons the opportunity to learn a skill by setting up a special construction-related HEART programme in these communities (months prior to the start of the

MAIN ISSUES	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	MAGNITUDE	DURATION	DIRECTION	PERMANENCE	PROPOSED MITIGATION MEASURES
							project) so that those to be employed will go and seek employment having gained a skill.
Crime	Moderate	Disruption to construction work progress	Low	Short-Term	Negative	Reversible	<ul style="list-style-type: none"> Adequate security measures in place at all times.
Potential to uncover items of significant cultural heritage value	Moderate	Enhanced knowledge of cultural heritage and history of Jamaica	Moderate	Long-term	Positive	Irreversible	<ul style="list-style-type: none"> Implement watching brief to ensure any items discovered are properly identified and catalogued
Potential for damage to items of significant cultural heritage value	Moderate	Damage or loss of heritage features	High	Short-term	Negative	Irreversible	<p>A watching brief should be prepared prior to the start of construction.</p> <p>A team of archaeologists and the JNHT should be on standby particularly during excavation and land clearance.</p> <p>Prior to construction a record of the monuments and grave sites should be done prior to the start of construction to mitigate</p>

MAIN ISSUES	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	MAGNITUDE	DURATION	DIRECTION	PERMANENCE	PROPOSED MITIGATION MEASURES
							against any damage during construction.
OPERATION PHASE							
Increase in runoff due to increase in impermeable surfaces	Moderate	Can result in possible flooding in downstream areas	Moderate	Short-term	Negative	Reversible	Implement the proposed designs to capture and reduce run-off on the site to allow for RWH and infiltration.
Increase in green area(s) within the project area	High	Has the potential to create ecological corridors and habitat for local fauna, e.g., birds (such as hummingbirds), butterflies, etc., which are able to survive in urban, semi-disturbed landscapes	High	Long-term	Positive	Reversible	A landscaping plan should be prepared. Local species should be used as much as possible.
Increase in the volume of cars in the area	High	Increase in traffic and drive time for commuters passing through the area	High	Long-term	Negative	Irreversible	The use of traffic signals as much as possible to control the flow of traffic

MAIN ISSUES	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	MAGNITUDE	DURATION	DIRECTION	PERMANENCE	PROPOSED MITIGATION MEASURES
Increase in visitors to the park to view the heritage features	High	Heritage features will be more visible	High	Long-term	Positive	Reversible	Signs and story boards should be utilized as much as possible to educate persons as to the history of the site.
Exclusion of community members from the use of the space	Moderate	Loss of common space to be used by the surrounding communities for sports and other social events	Moderate	Long-term	Negative	Irreversible	<p>Suggestions were provided by the communities during consultation:</p> <ol style="list-style-type: none"> 1. A play zone for children; 2. Elements of an amusement park that will have broad appeal to users; 3. A running and exercise track; 4. Facilities that will cater to the recreational needs of park goers, such as access to refreshments; 5. Incorporation into the Parliament Building of cultural offerings originating in communities, inclusive of their fine arts, music, drama, culinary offerings or fashion displays;

MAIN ISSUES	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	MAGNITUDE	DURATION	DIRECTION	PERMANENCE	PROPOSED MITIGATION MEASURES
							5.A space where events can be held; 6.A space for soft sporting activities; 7.Outreach that is sensitive to the heritage elements that most communities have; 8.Outreach and sensitivity to the cultural offerings that communities can mount inside of their communities to be available to users and visitors of the Park; 9. Hard surface sporting facilities and a gym are examples cited.
Crime	High	Disincentive to full community or general public participation in any planned social or cultural activities associated with the project.	High	Long Term	Negative	Reversible	1. Providing alternatives to unemployed youths, who often used by community gangs in their criminal activities. 2.Improve social amenities including the social security net in terms of available and affordable health care. 3. Improve roads to the point where they more functionally assist crime

MAIN ISSUES	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	MAGNITUDE	DURATION	DIRECTION	PERMANENCE	PROPOSED MITIGATION MEASURES
							<p>prevention by giving quicker access.</p> <p>4. Provide a better equipped police force to be located in each community. Presently not all have a police station. Each is under resourced across manpower and equipment to better control crime.</p> <p>5. Improve general directional signs within the communities. Currently traffic flow within communities is very congested.</p> <p>6. Perhaps the single most important project that can push back against crime, is the re development of Central Kingston.</p>



PROJECT ALTERNATIVES

9 PROJECT ALTERNATIVES

The King George VI Memorial Park Act, 1956 outlines suggested uses of the Park. These include:

- Public garden, pleasure park, and recreation area for the benefit of the inhabitants of the Corporate Area or,
- Use for the construction of Parliament buildings and such administrative and other buildings, along with the burial of the remains of distinguished persons, and is subject to approval by the Minister of Local Government.

As such the only alternatives to the HOP are the no-action alternative or a public park, garden or pleasure park.

9.1 The No-Action Alternative

For this alternative, the proposed project site would remain as is without any development. There are many implications of this no-active alternative option. Not having the project will eliminate the added value and upliftment it would bring to the surrounding communities, both in terms of aesthetics as a properly maintained green space for community usage in the Downtown area as well as the potential it has to raise the values of the properties within its sphere of influence. Most areas in the Park will continue to be poorly maintained. Additionally, not proceeding with the project would lead to no additional job creation, both as it relates to construction work and then later during the operations phase of the project. Since it is possible that excavation activities related to construction would uncover items of significance to Jamaica's cultural heritage, not implementing the project would cause these artefacts to remain buried.

Most importantly, the no-action alternative would mean that the Houses of Parliament would remain at Gordon House on Duke Street where space would continue to remain a problem. As this project has been 50 years in the making, the no-action alternative cannot be considered.

9.2 Public garden, pleasure park, and recreation area

The National Heroes Park Development Proposal was initiated under the Environmental Foundation of Jamaica Special Projects Programme between the period January to December 2000, alongside 14 other potential projects. The National Heroes Park Development Project was shortlisted and further developed in January 2001 then later activated in February 2001 with five other projects under a Five-Year Plan. As a part of this programme, a Master Plan was developed for the National Heroes Park and designs were created for the various water supply systems and for the landscaping of the park (Figure 9-1).

The Master Plan included drawings that were produced and allowed for the planned and structured development of the National Heroes Park. The Master Plan was developed in conjunction with, the community, the Ministry of Local Government and Community Development, and the Kingston and St. Andrew Corporation.

Designs for the landscaping and upgrading of the park, the irrigation system, the water supply system and the new well for the park were also completed along with the drainage designs. The electrical system for the park was also designed, including the electrical connection for the well and the lighting and power for the park in general. By July 2003, the designs for the various elements were submitted for tender and the construction of the well began.

A new pipeline was constructed to convey water from the National Water Commission supply to the eastern section of the park. This pipeline facilitated the upgrading of the park for the visit of the Queen Elizabeth II. An irrigation system inclusive of a pump house, pump, and storage tanks, was installed in the Shrine Area of the park. A new JPS electrical supply was installed to provide adequate power to the irrigation pump. The landscaping in the Shrine Area of the park was upgraded and several hundred new plants were planted including various shrubs, flowering plants and palms. The pipeline and hard landscaping began in August and September 2003 respectively. The project had a total budget of JA \$35,672,754.00

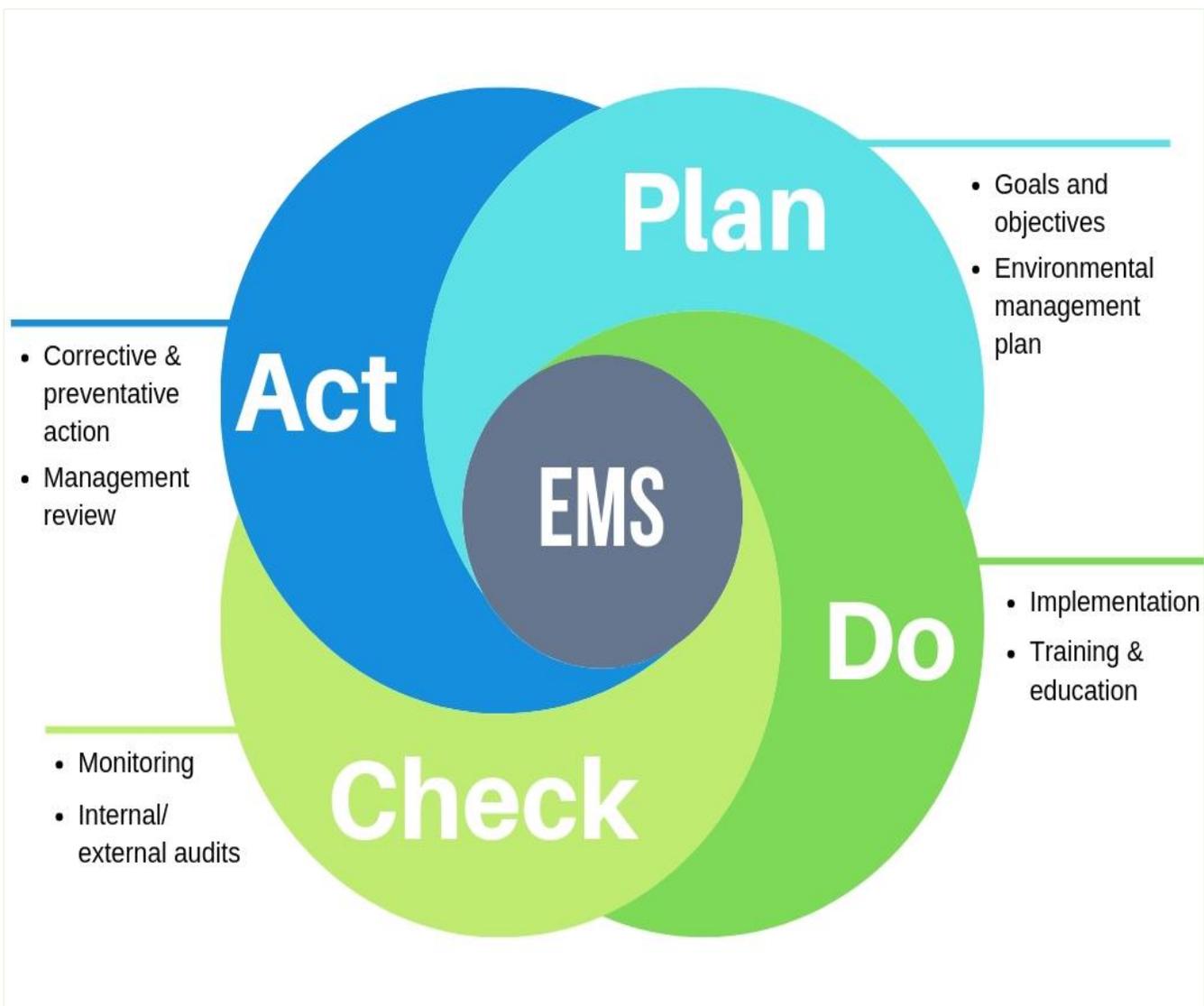
Details of works and projects under this plan

- Upgrading of historical garden
 - o Development of the historical garden – development of a formal garden area
- Investigation of water source
 - o Irrigation to the distinguished persons area – development of recreational area to encourage use by families
 - o 6” water main – provision of irrigation water
 - o Purchase of maintenance equipment – equipment to ensure the continued maintenance of the park
- Development of source
- Construction of well
 - o Drilling, construction and connection of the well/well equipment – provision of a dedicated source of water to irrigate the park and improve the aesthetics and use by the public and eliminate dust nuisance
- Installation of well pump
- Installation of water distribution system
- Installation of irrigation system
- Landscaping
- Design
- Equipment

Future work was to include putting in a stream and forest. In 2003-2004, additional landscaping work, along with the installation of a gazebo and benches were done in the Memorial Gardens area of the park by Cornerstone Ministries (separate project).



Figure 9-1: National Heroes Park Development Past Proposal



ENVIRONMENTAL MANAGEMENT AND MONITORING

10 ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

Once the permit is granted for the construction of the proposed Houses of Parliament Project and before any site mobilization, site preparation and construction activities begin, a monitoring programme should be prepared and submitted to NEPA for approval.

The purpose of the monitoring programme (during construction and operation) is to ensure the following:

1. Compliance with relevant guidelines and legislation;
2. Conformance with both all general and specific conditions outlined in the permit;
3. Proper implementation of mitigation measures;
4. Long-term minimization of negative environmental impacts.

This plan is intended to complement the Environmental Impact Assessment (EIA) and is tailored to the hazards and risks established for developments of this nature. It specifically defines what actions must be taken and the person or entity responsible for reducing adverse operational impacts.

This Plan can be revised once the permit from NEPA has been received with the specific conditions. These conditions should be included in the contract for the Contractor to be selected for construction and operation. The table below outlines the phases of the project that monitoring and management should take place for each of the risks identified.

Table 10-1: Identified risks and the relevant sections of the management plan

Identified Risks	Project Phase
Air Quality	Construction
Noise	Construction
Waste Management	Construction and Operation
Health and Safety Management	Construction and Operation
Water Quality	Construction and Operation
Emergency Response	Construction and Operation
Flora and Fauna	Construction
Chance Find Programme/ Watching Brief	Construction
Traffic Management	Construction and Operation (a separate plan has been submitted in the Annex).

10.1 Air Quality

The generation of dust will largely be an issue during the construction. Therefore, monitoring is only recommended during the Construction Phase of the project. Through monitoring of the ambient air quality, the Contractor and ultimately the UDC will ensure that his/her team complies with all emission limits in the NEPA standards.

10.1.1 Monitoring Standards

NEPA has a 24-hour standard for Particulate Matter (PM₁₀) (<10 µm) which is 150 µg/m³. Other parameters include SO₂, NO_x, O₃. and NEPA will state in their Environmental Permit, the specific parameters that will need to be monitored.

Table 10-2: Air quality monitoring standards and timing

Description		Standard			
		Average Timing	NRCA (NEPA) (Max Concentration in µgm ⁻³)	Average Timing	IFC (µgm ⁻³)
Ambient Air Quality	PM _{2.5}	-	-	1-year	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) 10 (guideline)
				24-hour	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline)
	PM ₁₀	Annual 24 hours	50 150	1-year	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20 (guideline)
				24-hour	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline)
	Sulphur Dioxide		80 Primary; 60 Secondary (c), 365 Primary; 280 Secondary, 700	24-hour 10 minutes	125 (Interim target-1) 50 (Interim target-2) 20 (guideline) 500 (guideline)
	Nitrogen Dioxide	Annual	100	1-year 1-hour	40 (guideline) 200 (guideline)
	Ozone	1 hour	235	8-hour daily maximum	160 (Interim target-1) 100 (guideline)

10.1.2 Monitoring Equipment and Stations

Particulate Matter

Samples for particulate matter should be collected using calibrated pumps. The pumps should be placed at the approximate respiratory height of the individual(s) for a 24-hour period. The data obtained from

the analyses of the filter should be expressed as the exposure levels of particulate matter (PM₁₀) using a Time Weighted Average (TWA). The results at the end of the sampling period will be compared to the NEPA standards.

Stations

The monitoring stations used in the EIA will be kept during construction monitoring. However, additional stations may be needed based on the location of the works and any sensitive nearby receptors. The monitoring stations established will be based on the prevailing winds and most sensitive human receptors.

10.1.3 Monitoring Frequency

Prior to the construction, a monitoring baseline will be established for both particulate matter and noise. This will involve continuous monitoring for these parameters over a 48-hour period along the length of the proposed site.

During construction, monitoring will be carried out randomly twice per month or as stipulated by NEPA only along the sections that are under construction at the time. This particularly relates to both components. Thereafter, the monitoring can be reduced to once per month or as required by NEPA.

10.1.4 Management and Mitigation Measures

In addition to the monitoring procedures, the Contractor will ensure that these measures are followed:

- All equipment to be utilized during construction must be properly serviced so as to reduce the potential for harmful emissions;
- All stakeholders that may be affected directly along the route should be given written notice of the works to be carried out and the timeframe for the potential disruption;
- The contractor should ensure that work that is likely to generate significant amounts of dust does not take place during windy conditions;
- Trucks transporting sand or other fine construction material shall be covered to avoid dust emissions;
- Monitoring will be necessary. The parameters to be monitored during construction include PM₁₀ and PM_{2.5}, NO₂, SO₂, CO and O₃ (to be finalized after receipt of NEPA permit);
- Frequent wetting and other methods of dust suppression is recommended where excavation is taking place;
- Roads that are used for transportation of materials should be watered to avoid dust emissions;
- All workers must be supplied with the required personal protective gear.
- COVID-19 protocols must be adhered to during construction, this includes wearing of masks, logging of temperatures, frequent sanitization and physical distancing.

10.1.5 Key Performance Indicators

The following key performance indicators (KPIs) have been selected in order to evaluate the effectiveness of the air quality monitoring system.

Table 10-3: Key Performance Indicators

No.	Key Performance Indicators	Monitoring and Measuring Methods	Responsibility
1	Equipment maintenance log and schedule	Review and inspection of documentation	Contractor Results to be presented to the Implementing Agency
2	Notices to stakeholders	Review and inspection of documentation	Contractor Results to be presented to the Implementing Agency
3	Air quality parameters within NEPA standards	Results certificates	Contractor Results to be presented to the Implementing Agency
4	Log of wetting frequency	Review and inspection of documentation	Contractor Results to be presented to the Implementing Agency
5	Use of personal equipment gear	Review and inspection of documentation	Contractor Results to be presented to the Implementing Agency
6	COVID-19 Protocols and Log Bok	Review and inspection of documentation	Contractor Results to be presented to the Implementing Agency

10.1.6 Roles and Responsibilities

It is the responsibility of the Contractor to ensure that all mitigation measures are carried out and that monitoring reports are prepared. The Contractor should ensure that an EHS Manager is employed to oversee the specific requirements of this plan.

The Implementing Agency (UDC) is responsible for monitoring the Contractor to ensure that monitoring is being undertaken and mitigation measures are being enforced.

10.1.7 Data Analysis and Reporting

The sampled data will be compared to NEPA’s standard for air quality and included in the environmental monitoring report prepared and submitted to NEPA. If there are any exceedances, this will be reported immediately to the EHS Manager to allow for the implementation of corrective measures or adjustment in management strategies based on the results and where practicable to the operations.

10.2 Noise

During construction, noise may be an issue. Therefore, it is important for monitoring to be carried out during this phase.

10.2.1 Monitoring Standards

The NRCA Standards are presented in Table 10.3. The NEPA permit will stipulate the frequency with which monitoring should take place. Noise level readings, wind direction and any unusual local noise sources will be recorded. Measurements will be taken using approved and calibrated sound level meters. The frequency spectrum of the noise will be measured.

The results at the end of the sampling period will be compared with NEPA standards.

Table 10-4: Noise standards

Description	Standard	
	Average Timing	NRCA (NEPA)
Noise	Between the hours of 7a.m. and 10p.m. for a residential area	55 dBA
	And 10p.m. to 7a.m.	50dBA
	Between the hours of 7a.m. and 10p.m. for a commercial area	65dBA
	And 10p.m. to 7a.m.	60dBA

10.2.2 Monitoring Equipment and Stations

Ambient noise measurements will be conducted simultaneously, at the same stations sampled for air quality during construction. A calibrated sound level meter will be used to measure noise. The model of the equipment will be clearly stated, and the meter will be calibrated before each survey.

Monitors will be located approximately 1.5m above the ground and no closer than 3m to any reflecting surface (e.g., wall). In general, the noise level limit is represented by the background or ambient noise levels that would be present in the absence of the facility or noise source(s) under investigation. In addition, before and after the survey, the instrument will be checked with a calibrator, which is factory calibrated.

10.2.3 Monitoring Frequency

The noise level readings will be taken over a period of 2–3 minutes and the average (geometric mean) noise level recorded in decibels (dBA). These readings will be taken at the same time as the air samples. These readings will be taken at the same time as the air samples which is twice per month.

10.2.4 Management and Mitigation Measures

In addition to the monitoring procedures, the Contractor will ensure the following noise reduction options are implemented where necessary;

- Protect workers properly from noise above 90dBA using the appropriate protective gear (according to US OSHA Permissible Noise Exposure Limits). The National Institute for Occupational Safety (NIOSH) recommended exposure limit for occupational noise exposure is 85dBA for an 8 Hour shift;
- Do not exceed 65dBA noise levels designated for commercial areas;
- Fit all pneumatic tools to be used in close proximity to residential properties with an air exhaust silencer;
- Utilize noise mitigation measures (including the construction of bunds, metal sheet walls) in order to limit noise levels at sensitive receptors;
- Ensure that equipment to be used meets industry best standard in relation to noise attenuation;
- Ensure that construction works are only undertaken in defined working hours (weekdays 8h00 – 17h00 and weekends 8h00 – 13h00). In the event that noisy activities are undertaken outside of the specified working hours, all noise receptors will be informed of such activities in advance;
- Assess and manage all noise complaints;
- Undertake noise monitoring at locations with persistent noise complaints;
- Limit vehicle speeds to 20km/h on unpaved surfaces.

10.2.5 Key Performance Indicators

The following KPIs have been selected in order to evaluate the effectiveness of the noise monitoring system.

Table 10-5: Key performance indicators

No.	Key Performance Indicators	Monitoring and Measuring Methods	Responsibility
1	Equipment maintenance log and schedule	Review and inspection of documentation	Contractor Results to be presented to the Implementing Agency
2	Notices to stakeholders	Review and inspection of documentation	Contractor Results to be presented to the Implementing Agency
3	Noise parameters within NEPA standards	Results certificates	Contractor Results to be presented to the Implementing Agency
4	Log of complaints	Review and inspection of documentation	Contractor Results to be presented to the Implementing Agency
5	Use of personal equipment gear	Review and inspection of documentation	Contractor Results to be presented to the Implementing Agency

10.2.6 Roles and Responsibilities

It is the responsibility of the Contractor to ensure that all mitigation measures are carried out and that monitoring reports are prepared. The Contractor should ensure that an EHS Manager is employed to oversee the specific requirements of this plan.

The Implementing Agency (UDC) is responsible for monitoring the Contractor to ensure that monitoring is being undertaken and mitigation measures are being enforced.

10.2.7 Data Analysis and Reporting

The results from the sampling exercise will be compared to NEPA noise pollution standards and included in the environmental monitoring report prepared and submitted to NEPA. If there are any exceedances, this will be reported immediately to the EHS Manager to allow for management strategies to be changed according to the results.

10.3 Waste Management

The administration and oversight of solid waste management is primarily to be carried out by the Contractor. Below is the definition used in the management of solid waste.

Solid (Non-Hazardous) Waste

The International Finance Corporation (IFC) General Environment, Health and Safety (EHS) Guidelines define solid (non-hazardous) waste as generally any garbage refuse including domestic trash, inert construction/demolition materials, refuse such as scrap metal and empty containers. Solid waste that is likely to be generated in this project will primarily be construction waste (piping material, dirt, old pavement, etc.).

Hazardous Material/Waste

The International Finance Corporation (IFC) General Environment, Health and Safety (EHS) Guidelines define hazardous waste as substances that possess at least one of four characteristics: ignitability, corrosivity, reactivity, or toxicity – or appear on special lists.

The International Finance Corporation (IFC) General Environment, Health and Safety (EHS) Guidelines define hazardous material as materials that represent a risk to human health, property, or the environment due to their physical or chemical characteristics. They can be classified according to the hazard as explosives; compressed gases, including toxic or flammable gases; flammable liquids; flammable solids; oxidizing substances; toxic materials; radioactive material; and corrosive substances.

10.3.1 Monitoring Frequency

Monitoring of waste should be done twice per month or as per the frequency with which material is being removed and transported from the site to ensure that all measures are being implemented and followed. During operation this can be done monthly.

10.3.2 Management and Mitigation Measures

The Contractor will ensure that the following mitigation measures are following during construction so as to reduce the possible negative impacts of improper waste disposal and management. During the Operation Phase of the project it becomes the responsibility of the PEU to ensure proper waste management:

Hazardous Waste

- Potential hazardous material should be identified prior to the start of construction;
- All wastewater that is contaminated with hazardous substances shall be collected in a container, allowed to evaporate and the sludge disposed of as hazardous waste;
- All personnel shall be trained and educated during induction on the safe handling of hazardous substances on site;
- Any hazardous material, such as waste oil and tyres, asbestos containing material and contaminated soil, should be disposed of via approved contractors in locations approved by NEPA. A special permit for removal and transportation is a requirement of NEPA;
- In the event of leaks/spills, they should be cleaned up immediately, NEPA/ODPEM consulted, and the waste disposed of at an approved dump site;
- Hazardous material should not be stored on site, near the gully or near residential areas. This should be done offsite;
- Hazardous materials shall be stored in properly bunded areas to contain any leaks and drip trays shall be in place under all fuel bowsers;
- Workers handling hazardous waste should be properly equipped with PPE (masks, gloves, hard hat, hard boots, etc.);
- Appropriate spill kits must be available in areas of proximity to watercourses and drains;
- Burning or burying of any kind of waste is prohibited;

Non- Hazardous Waste

- All non-hazardous waste generated should be disposed of using approved methods. Waste should only be dumped at an approved landfill, the closest is Riverton Disposal Site. It must be transported by either NSWMA or by an approved contractor;
- Material that can be recycled, such as scrap metal, should be separated and carried to approved collection points;
- Burning or burying of any kind of waste is prohibited;
- Sufficient weather and scavenger-proof bins (with lids to prevent the escape of litter) shall be provided and be accessible at all points where waste is generated;
- The project area should be kept clean and free of litter and no litter from the site shall be allowed to be dispersed to surrounding areas;
- All personnel shall be instructed to dispose of all waste in a proper manner;
- All construction materials should be suitably stored and protected so that they do not become damaged and unusable.
- Portable toilets, if used, must only be transported by approved contractors. NEPA permits may be required;

- A schedule for collection of waste must be developed and waste must never be stored in or near to waterways or along roadways;

10.3.3 Key Performance Indicators

The following KPIs have been selected in order to evaluate the effectiveness of the solid waste management system:

Table 10-6: Key performance indicators

No.	Key Performance Indicators	Monitoring and Measuring Methods	Responsibility
1	No construction waste deposited in the active roadway, gully and pedestrian walkway	Location of a temporary storage site away from road, gully and walkway for construction waste	Contractor Results to be presented to the Implementing Agency
2	No leakages or spills	Monitor possible spills Inspection of the site by the Contractor	Contractor Results to be presented to the Implementing Agency
3	Limited sediment laden runoff during heavy rain	Monitor runoff of the construction period during rainfall events. Monitor areas immediately downstream for significant sediment deposits after rainfall event.	Contractor Results to be presented to the Implementing Agency
4	Reuse of construction waste where possible	Less construction waste being delivered to the dump	Contractor Results to be presented to the Implementing Agency
5	Approved Contractors	Inspection of licences and documentation	Contractor Results to be presented to the Implementing Agency
6	No burning of waste/ proper disposal of waste in approved locations.	Inspection and documentation	HOP

KPIs will be reviewed occasionally to determine areas for improvement.

10.3.4 Roles and Responsibilities

It is the responsibility of the Contractor to ensure that all mitigation measures are carried out and that monitoring reports are prepared. The Contractor should ensure that an EHS Manager is employed to oversee the specific requirements of this plan.

The Implementing Agency (UDC) is responsible for monitoring the Contractor to ensure that monitoring is being undertaken and mitigation measures are being enforced. During Operation, where waste is generated, the HOP is responsible for monitoring.

10.3.5 Data Analysis and Reporting

If there are any exceedances, these will be reported immediately to the EHS Manager to allow for management strategies to be changed according to the results.

10.4 Health and Safety Management

This section relates to both worker health and safety as well as to the health and safety concerns of the general surrounding communities.

10.4.1 Monitoring Frequency

Monitoring will be carried out by the Contractor daily to minimize possible incidents during Construction. Once in operation it becomes the responsibility of the management of HOP to create a schedule.

10.4.2 Management and Mitigation Measures

The Contractor will ensure that the following mitigation measures are followed during construction so as to reduce the potential negative impacts of workers and surrounding residential areas:

- The Contractor must have a health and safety policy that is known and understood by all workers. It must also be visible to the workers on site;
- Construction areas should be clearly demarcated with safety signs and barriers to prevent possible incidents;
- Workers should be properly equipped with health and safety equipment and trained in the proper use of construction equipment;
- All workers must be trained in the proper use of all health and safety equipment;
- All workers must be trained in the proper handling and management/disposal of all types of waste;
- The Contractor EHS Manager/Officer shall maintain a register of all EHS-related incidents that have occurred as a result of the activities associated with the contract. EHS incidents that should be recorded include fires, accidents, spills of hazardous materials that contaminate soil or water resources, stop-order notices issued by NEPA, KSAMC or any other relevant agency, non-compliance with this EMP;
- Each EHS-related incident will be investigated by the client's EHS officer and an incident report forwarded to the Contractor. An incident report will be presented within five working days;
- EHS incident reports will include as a minimum, a description of the incident, actions taken to contain any damage to the environment, personnel or the public, and the corrective actions to repair/remediate any damage;
- All construction plant and equipment, tanks and machinery shall be maintained in a good state of repair throughout the construction period;
- Equipment maintenance will be carried out on an impermeable surface;
- Leakage from equipment will be prevented by regular inspection and repair;
- Areas under construction should be clearly demarcated;
- Emergency medical supplies must be available and easily accessible in the case of an incident;

- In the event that the onsite medical supplies are not adequate, the incident needs to be escalated to the hospital;
- In the event that a worker is exposed to hazardous material, they should be taken immediately for medical attention;
- 'Work Ahead'/'Detour' signs should be used ahead of potential traffic disruptions;
- Avoid blocking entrances to businesses;
- Dirt/ debris should not be stored on sidewalks or roadways;
- Wherever works are taking place pedestrian and vehicular traffic must not be completely obstructed. The use of flag men will be required when heavy vehicles are moving on and off the site.

During Operation the following mitigation measures apply:

- HOP must have a health and safety policy that is known and understood by all workers. It must also be visible to the workers on site;
- Workers should be properly equipped with health and safety equipment and trained in the proper use of construction equipment;
- All workers must be trained in the proper use of all health and safety equipment;
- All workers must be trained in the proper handling and management/disposal of all types of waste;
- All EHS incident should be recorded and include as a minimum, a description of the incident, actions taken to contain any damage to the environment, personnel or the public, and the corrective actions to repair/remediate any damage; Each EHS-related incident will be investigated by the client's EHS officer and an incident report forwarded to the Contractor. An incident report will be presented within five working days;
- All construction plant and equipment, tanks and machinery shall be maintained in a good state of repair throughout the construction period;
- Equipment maintenance will be carried out on an impermeable surface;
- Leakage from equipment will be prevented by regular inspection and repair;
- Areas under construction should be clearly demarcated;
- Emergency medical supplies must be available and easily accessible in the case of an incident;
- In the event that the onsite medical supplies are not adequate, the incident needs to be escalated to the hospital;
- In the event that a worker is exposed to hazardous material, they should be taken immediately for medical attention;
- Dirt/ debris should not be stored on sidewalks or roadways;
- Signs should be indicated when any major repair/ construction works are taking place.

10.4.3 Key Performance Indicators

The following KPIs have been selected in order to evaluate the effectiveness of the health and safety management system.

Table 10-7: Key performance indicators

No.	Key Performance Indicators	Monitoring and Measuring Methods	Responsibility
1	Health and Safety Policy	Review and inspection of documentation	Contractor (During Construction) Results to be presented to the Implementing Agency HOP (During Operation)
2	Health and Safety Signs	Inspection of the site	Contractor (During Construction) Results to be presented to the Implementing Agency HOP (During Operation)
3	Training log and schedule	Review and inspection of documentation	Contractor (During Construction) Results to be presented to the Implementing Agency HOP (During Operation)
4	Register of all EHS-related incidents	Review and inspection of documentation	Contractor (During Construction) Results to be presented to the Implementing Agency HOP (During Operation)
5	Equipment maintenance log and schedule	Review and inspection of documentation	Contractor (During Construction) Results to be presented to the Implementing Agency HOP (During Operation)
6	Emergency Kit	Inspection of site office	Contractor (During Construction) Results to be presented to the Implementing Agency HOP (During Operation)
7	Detour signs	Inspection of the site	Contractor (During Construction) Results to be presented to the Implementing Agency HOP (During Operation)
8	Log of Complaints	Review and inspection of documentation	Contractor Results to be presented to the Implementing Agency
9	Flag Men	Inspection of the site	Contractor Results to be presented to the Implementing Agency

10.4.4 Roles and Responsibilities

It is the responsibility of the Contractor to ensure that the health and safety management policy is clearly understood by all workers and that all mitigation measures are carried out and that monitoring reports are prepared.

It is the responsibility of the workers to ensure that they understand the health and safety requirements and that they abide by them.

The Implementing Agency is responsible for monitoring the Contractor to ensure that monitoring is being undertaken and mitigation measures are being enforced.

10.4.5 Data Analysis and Reporting

If there are any violations, this will be reported immediately to the EHS Manager to allow for management strategies to be changed according to the results.

10.5 Water Quality– Sediment and Erosion Control

10.5.1 Monitoring Standards

The works will be monitored by the Contractor based on adherence to the NEPA environmental permit.

10.5.2 Monitoring Frequency

Monitoring will be carried out by the Contractor (via a qualified environmental specialist) according to the frequency that is stipulated in the NEPA Permit.

During both Construction, monitoring of the water quality from the wells should be done once per month and the results submitted to WRA and UDC. During Operation, it should be done twice per year, volume readings should be done monthly.

10.5.3 Management and Mitigation Measures

The Contractor will ensure that the following measures are put in place to manage sediment and/or sediment-laden water from entering the gully:

- The use of sediment traps where necessary;
- Works should be undertaken as much as possible in the dry season;
- Logs should be kept which indicate when and for what reason work was halted.

10.5.4 Key Performance Indicators

The following KPIs have been selected in order to evaluate the effectiveness of the water quality management programme.

Table 10-8: Key performance indicators

No.	Key Performance Indicators	Monitoring and Measuring Methods	Responsibility
1	Sediment traps	Site Inspection	Contractor Results to be presented to the Implementing Agency

No.	Key Performance Indicators	Monitoring and Measuring Methods	Responsibility
2	Logs indicating when work was halted	Review and inspection of documentation	Contractor Results to be presented to the Implementing Agency
3	Water Quality within the required NEPA Standards	Water Quality tests and results certificate	HOP Results to be presented to NEPA and the UDC.

10.5.5 Roles and Responsibilities

It is the responsibility of the Contractor to ensure that the management and mitigation measures for water quality are clearly understood by all workers and that they are carried out and relevant monitoring reports are prepared.

The Implementing Agency is responsible for monitoring the contractor to ensure that monitoring is being undertaken and mitigation measures are being enforced.

10.5.6 Data Analysis and Reporting

If there are any violations, this will be reported immediately to the EHS Manager to allow for management strategies to be changed according to the results.

10.6 Emergency response

This pertains to both phases of the project but primarily the construction phase when there will be more workers on the project site.

10.6.1 Monitoring Standards

The works will be monitored by the Contractor based on adherence to the NEPA environmental permit.

10.6.2 Monitoring Frequency

Monitoring will be carried out by the Contractor monthly. During Operation this should also be done every 6 months.

10.6.3 Management and Mitigation Measures

The Contractor will ensure that the following measures are put in place for effective emergency response:

- In the event of a fire, there should be sufficient, available and well-maintained firefighting equipment;
- If the fire is too large, the Fire Brigade shall be called to extinguish it;
- In the event of pending heavy rainfall, all equipment and material should be covered as best as possible;
- Preparation of an Emergency Response Management Plan
- See also section 11.4.

10.6.4 Key Performance Indicators

The following KPIs have been selected in order to evaluate the effectiveness of the emergency response measures.

Table 10-9: Key performance indicators

No.	Key Performance Indicators	Monitoring and Measuring Methods	Responsibility
1	Maintenance log	Review and inspection of documentation	Contractor Results to be presented to the Implementing Agency
2	Incident log	Review and inspection of documentation	Contractor Results to be presented to the Implementing Agency
3	Emergency Response Plan	Review and inspection of documentation	HOP Submitted to NEPA and ODPEM

10.6.5 Roles and Responsibilities

It is the responsibility of the Contractor to ensure that the emergency response measures are clearly understood by all workers and that all management and mitigation measures are carried out and that monitoring reports are prepared.

The Implementing Agency is responsible for monitoring the Contractor to ensure that monitoring is being undertaken and mitigation measures are being enforced.

10.6.6 Data Analysis and Reporting

If there are any violations, this will be reported immediately to the EHS Manager to allow for management strategies to be changed according to the results.

10.7 Flora and fauna

10.7.1 Monitoring Standards

The works will be monitored by the Contractor based on adherence to the NEPA environmental permit.

10.7.2 Monitoring Frequency

Monitoring will be carried out by the Contractor (via a qualified environmental specialist) according to the frequency that is stipulated in the NEPA Permit. It should be done during the land preparation phase and done every two weeks. Thereafter, it will no longer be required.

10.7.3 Management and Mitigation Measures

The Contractor will ensure that the following measures are put in place to manage the flora and fauna in the construction area:

- Clearing of vegetation shall be kept to the minimum required;
- All construction sites should be clearly demarcated;
- No clearing of vegetation, storage of materials or other construction-related activities shall be permitted outside the demarcated construction area.

10.7.4 Key Performance Indicators

The following KPIs have been selected in order to evaluate the effectiveness of the community access.

Table 10-10: Key performance indicators

No.	Key Performance Indicators	Monitoring and Measuring Methods	Responsibility
1	Signage	Inspection of the site	Contractor Results to be presented to the Implementing Agency

10.7.5 Roles and Responsibilities

It is the responsibility of the Contractor to ensure all workers are made aware of the importance of following the management and mitigation and that monitoring reports are prepared.

The Implementing Agency is responsible for monitoring the Contractor to ensure that monitoring is being undertaken and mitigation measures are being enforced.

10.7.6 Data Analysis and Reporting

If there are any violations, this will be reported immediately to the EHS Manager to allow for management strategies to be changed according to the results.

10.8 Summary of Monitoring Frequency

Table 10-11 summarizes the monitoring frequency required for each area described previously:

Table 10-11: Monitoring frequency in Construction and Operation

PARAMETER	FREQUENCY (CONSTRUCTION)	FREQUENCY (OPERATION)
Air Quality	Twice per month or as stipulated by NEPA	N/A
Noise	Twice per month or as stipulated by NEPA	N/A
Waste Management	Twice per month	Monthly
Traffic Management	As stipulated by NWA	N/A
Health and Safety Management	Daily	TBD
Water Quality	Monthly or as stipulated by NEPA	Volume- monthly readings Quality – Twice per year
Emergency Response	Monthly	Every Six Months
Flora and Fauna	Once every two weeks	N/A

10.9 Chance Find Programme/ Watching Brief

During the construction activities, cultural heritage assemblages may be discovered or identified. The Chance Find Programme is intended to manage impacts to known, probable and unknown cultural sites. Consultations and communication with the legal and regulatory institutions, such as JNHT, will be had and procedures and protocols for assessing any unanticipated cultural heritage sites or materials encountered during the project construction phase are outlined below.

Essentially there are four main protocols involved in the implementation of a Chance Find Procedure. These include:

1. Stop work authority/procedure in the immediate area for the protection of cultural heritage materials encountered during construction activities;
2. Document and assess Chance Finds to determine if additional investigations are required;
3. Adhere to protocols for consultation with project management of Implementing Agency, Contractors, cultural heritage specialists, local regulatory bodies (for the design and implementation of additional investigations, if needed);
4. Identify the roles and responsibilities of the various stakeholders involved.

The Chance Find Programme includes the following procedures:

1. A local specialist should remain on call and shall provide oversight of the entire Chance Find Programme. The on-call specialist should be used on an as-needed-basis and will monitor the Chance Find Programme. The on-call specialists are only required to conduct field monitoring in the case of unusual or highly sensitive and important chance finds;
2. An archaeologist should be available and remain on-call and shall only conduct field monitoring if the project either encroaches on areas of known archaeological sensitivity or encounters chance finds of low to moderate importance;
3. The archaeologist must be present during all ground disturbing works conducted within culturally sensitive areas;
4. Ground works in other areas should be monitored by at least one member of the project staff who has previously received cultural heritage training;
5. Considering that a chance find can be reported by any member of the project staff, it is important that cultural training be provided to all project staff and sub-contractors.

If a Chance Find is encountered, the following steps should be undertaken:

1. Issue a stop work order in the vicinity of the find;
2. Inform the site supervisor or project manager;
3. Install temporary site protection measures such as warning tape of avoidance signs;
4. Inform all personnel of the Chance Find if access to any part of the work area is restricted;
5. Establish a localized no-go area needed to protect the Chance Find;

6. Arrange for the specialists to perform a preliminary evaluation to determine whether the Chance Find is cultural heritage and if so, whether it is an isolate or part of a larger site or feature;
7. Leave artefacts in place if possible; if materials are collected, they will be placed in bags and labelled by an archaeologist and transported to the relevant agency. Artefacts are not allowed to be taken by any project personnel as personal possessions;
8. Document the find via the use of photography, notes, GPS coordinates and maps as appropriate;
9. If the Chance Find proves to be an isolated find or not of cultural heritage, the specialist will authorize the removal of the site protection measures and activity in the area;
10. If, however, the specialist confirms the Chance Find as a cultural heritage of artefact or site of significance, inform the JNHT and initiate discussions about treatment;
11. Prepare and retain archaeological monitoring records including initial reports whether they are later confirmed or not. The record shall include coordinates of all observations to be retained within the project's GIS system;
12. Develop and implement treatment plans for confirmed finds using the services of qualified cultural heritage experts;
13. If a Chance Find is a verified cultural heritage site, prepare a final Chance Find report once treatment has been completed;
14. While investigation is ongoing, co-ordination with onsite personnel is needed so as to keep them informed of the status and schedule of the investigations and inform them of when construction will resume.

In the event that mitigation is required, then expedient rescue excavations should be undertaken by the relevant archaeological specialists unless the chance find is of international importance. If this is the case, then special care should be taken and archaeologists with the appropriate expertise in addressing the find should be appointed.



CONCLUSION AND RECOMMENDATIONS

11 CONCLUSION AND RECOMMENDATIONS

Since the 1950s, there was awareness for the need for a new Houses of Parliament due to the increasing demand for parliamentary office space. It was imperative for the new location and buildings to be not only important, but also a national symbol for the country. The preferred location was identified from then as the National Heroes Park.

The new Houses of Parliament, to be located in the National Heroes Park, are expected to allow the space to evolve into one that begins to improve the image of the city, to uplift the mood of its environs, to give value and a sense of place, and to continue to provide opportunities for our citizens to partake of their democratic rights. It is intended to provide the freedom to socialize, relax, connect with nature and participate in trading activities.

The project has the potential to generate both positive and negative impacts. The negative impacts are anticipated to be short in duration and reversible. The positive impacts are significant and would result in an overall improvement in the area and nearby communities.

As a result, based on the findings of the environmental impact assessment, the Consultants' professional opinion is that the project, once the recommended mitigation measures are followed, is not likely to result in significant environmental and social impacts.

However, in consideration of the wider development plans for the general area, it is important that serious consideration be given to improving the water supply, sewage and general solid waste management of the area. New developments should be encouraged to use permeable parking spaces, roof top green spaces, rainwater harvesting, and solar energy. Traffic Management will also be an important consideration especially once the Master Plan for the Government Area has been implemented.

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13 APPENDICES

13.1 Appendix 1- Terms of Reference

TERMS OF REFERENCE

for an

ENVIRONMENTAL IMPACT ASSESSMENT

for the

JAMAICA HOUSES OF PARLIAMENT

At

National Heroes Park, Kingston

By

Urban Development Corporation

**Prepared and Submitted by:
Date Submitted**

**Environmental Solutions Ltd.
October 2019**

TABLE OF CONTENTS

1	EXECUTIVE SUMMARY	3
2	INTRODUCTION	3
3	LEGISLATION AND REGULATORY CONSIDERATION	3
4	METHODOLOGY & APPROACH.....	4
5	PROJECT DESCRIPTION.....	4
6	DESCRIPTION OF THE ENVIRONMENT	4
	PHYSICAL ENVIRONMENT	4
	BIOLOGICAL ENVIRONMENT.....	4
	SOCIO-ECONOMIC ENVIRONMENT	5
	HERITAGE.....	5
7	PUBLIC PARTICIPATION.....	5
8	IMPACT IDENTIFICATION AND ANALYSIS	6
	PHYSICAL.....	6
	NATURAL HAZARD	6
	BIOLOGICAL	6
	HERITAGE.....	6
	HUMAN/SOCIAL/CULTURAL	7
	PUBLIC HEALTH ISSUES OF CONCERN	7
9	IMPACT MITIGATION	7
10	ENVIRONMENTAL MANAGEMENT AND MONITORING	7
11	ANALYSIS OF ALTERNATIVES & AREAS FOR FURTHER ASSESSMENT.....	7
12	LIST OF REFERENCES	7
13	CONCLUSION AND RECOMMENDATIONS.....	7
14	APPENDICES.....	7

The purpose of this document is to establish the Terms of Reference (TOR) for the Environmental Impact Assessment (EIA) to be undertaken by the Urban Development Corporation (UDC) in respect of the proposed Jamaica Houses of Parliament, National Heroes Park, Kingston.

An EIA seeks to ensure that all environmental and social issues are considered during the development and implementation of project activities. The EIA should inform the project design and provide guidelines for identifying and addressing all environmental and social issues, ensuring that all concerns are addressed by the appropriate project including an assessment of reasonable alternatives. The EIA should be prepared using a participatory approach involving key stakeholders and sectors.

The EIA report must be produced in accordance with the approved TOR.

Where the need arises to modify the TOR, the required amendments/modifications are to be made and submitted to the Agency. Approval for the TOR must be obtained from the Agency, in writing, prior to the commencement of the EIA study.

The Terms of Reference to conduct the Environmental Impact Assessment (EIA) are as follows:

1 EXECUTIVE SUMMARY

The executive summary should provide a brief overview of the main findings of the EIA report, including purpose and project objectives, main impacts and mitigation measures proposed, analyses and conclusions of the report. In addition the executive summary should outline the strategic and cumulative issues, and the various strategic options.

2 INTRODUCTION

The introduction should provide a background and seek to explain the rationale for the project. It should outline the purpose and objectives of the EIA. It should also provide the delineation and justification of the boundary of the project area, assumptions and constraints of the study.

3 LEGISLATION AND REGULATORY CONSIDERATION

Outline the pertinent regulations, standards, government policies and legislation governing environmental quality, safety and health, culturally significant finds, protection of endangered species, siting and land use control at the local and national levels. The examination of the legislation should include at minimum, legislation such as the Natural Resources Conservation Authority Act 1991, amended 2015, Natural Resources Conservation Regulations 1996, amended 2015, Natural Resources Conservation (Wastewater and Sludge) Regulations, 2013, Jamaica National Heritage Trust Act, Wild Life Protection Act, National Solid Waste Management Authority Act, the Town and Country Planning Act, Building Act and Codes and Standards promulgated there under, Development Orders and Plans and all appropriate international conventions/protocols/treaties where applicable. Describe traditional land use and advise of any prescriptive rights including public access rights.

4 METHODOLOGY & APPROACH

Outline the methodology and approaches in conducting the study including collecting and analysing data, stakeholder consultations, etc.

5 PROJECT DESCRIPTION

Prepare a description of the overall project concept. This section should include:

- History and background of the project
- A location map at a scale of 1:12,500 (or an appropriate scale)
- The total area of the site
- A master site layout plan showing the various project components
- Expected project components that may be considered by the developer, noting areas to be prepared for construction, areas to be preserved in their existing state as well as activities and features which will introduce risks or generate impact (negative and positive) on the environment. This should involve the use of maps at appropriate scales, site plans, aerial photographs and other graphic aids and images, as appropriate.
- Proposed access(es) to the site to be used for pre-construction, construction and operational phases.
- Infrastructure requirements including the proposed wastewater/sewage treatment, potable water, electricity, solid waste management, drainage, roads and other services
- Proposed project implementation including phasing and scheduling

6 DESCRIPTION OF THE ENVIRONMENT

A survey of the proposed development site should be conducted. Where secondary data of this nature is lacking, primary data should be collected using appropriate methods and the details of the methodologies used should be outlined in the Methodology Section of the EIA report. This information will form the basis upon which impacts of the project will be assessed.

The following aspects should be described in this section:

PHYSICAL ENVIRONMENT

- Topography, soils, climate, natural hazards, hydrology and drainage (emphasis should be placed on storm water run-off and existing drainage patterns), geology (including but not limited to seismicity and faults), and geomorphology, geotechnical and engineering requirements, current landscape. Consideration should be given to sewage treatment and solid waste disposal.
- Air quality in the area of influence including particulate emissions (PM10 and PM 2.5) and noise levels of undeveloped site and the ambient noise in the area of influence.

BIOLOGICAL ENVIRONMENT

Provide a description of the terrestrial and marine environments. This should include

- Description of various ecosystem types/habitat zones, including ecological health, species dominance, community structure and diversity, etc.

- Flora and fauna surveys within the identified zones inclusive of a species lists. Special emphasis should be placed on rare, endemic, threatened, protected, endangered, invasive and economically important species. Migratory species should also be considered.
- The relationship between biological diversity, ecosystem functions and services should be discussed.

SOCIO-ECONOMIC ENVIRONMENT

Demography, regional setting, location assessment, current and potential land-use patterns (including neighbouring properties); description of existing infrastructure such as transportation, electricity, water, sewage, schools, telecommunications, public health and safety; cultural peculiarities, aspirations and attitudes should be explored; and other material assets of the area should also be examined. There should also be an assessment of the present and proposed uses of the site and surrounding areas including any land acquisition needs.

A socio-economic survey of the surrounding communities (within a 1km radius of the project site) to determine public perception of the project should also be completed and this should include but not be limited to potential impacts on social, aesthetic and historical/ cultural values. This assessment may vary with community structure and may take multiple forms such as public meetings or questionnaires.

HERITAGE

An assessment of artefacts, archaeological, and cultural features of the site should be undertaken. Where there is a need this should be conducted in collaboration with the Jamaica National Heritage Trust.

7 PUBLIC PARTICIPATION

This section should detail the results of the public perception surveys conducted. It should summarize the issues identified during the public participation process and how these have been addressed or incorporated in the Environmental Impact Assessment Report.

It should describe the public participation methods, timing, type of information provided and collected from public and stakeholder target groups. The sampling methodology employed must be appropriate for the population size and distribution, and must be weighted towards the communities/interest groups in closest proximity to the proposed development. The instrument used to collect the information must be included in the appendix. Stakeholder meetings should also be held to inform the public of the proposed development and the possible impacts and gauge the feeling/response of the public toward the development.

The issues identified during the public participation process should be summarized and public input that has been incorporated or addressed in the EIA should be outlined.

Public Meeting(s) should be held in accordance with the Guidelines for Conducting Public Presentation at a time and location signed off by the National Environment and Planning Agency (NEPA). A public meeting will be held to present the findings of the EIA once completed and submitted for consideration. All relevant documents are required to be made available to the

public. In addition, any material change to the design of the project will require a further public meeting to be undertaken by the developer and all changes made to the document and project should be clearly outlined to the public.

8 IMPACT IDENTIFICATION AND ANALYSIS

An analysis of the proposed project components should be done in order to: identify the major potential environmental, health and safety impacts of the project; distinguish between levels of impact, significance of impact (a ranking from major to minor/significant to insignificant should be developed), positive and negative impacts, duration of impacts (long term or short term or immediate), direct and indirect and impacts, reversible or irreversible, long term and immediate impacts and identify avoidable impacts.

Cumulative impacts should also be evaluated taking into account previous developments and any proposed development immediately adjacent to the subject development.

The potential impacts may be subdivided into Physical Impacts, Biological Impacts and Socio-economic and Cultural Impacts. All impacts should be listed, ranked and assessed, preferably in a single table.

The impacts to be assessed will include but not be limited to the following:

PHYSICAL

- Impacts of construction activities such as site clearance, earthworks, geotechnical and engineering requirements, spoil disposal, and spills (such as oil and chemical spills)
- Impacts on Air Quality and Noise
- Impacts on Traffic during and after construction.
- Impacts on visual aesthetics and landscape.
- Change in drainage pattern - This assessment should take into consideration existing natural drainage channels, proposed man-made drainage/water features or any proposed changes in topography. Potential issues of increased surface runoff and sedimentation must also be addressed.

NATURAL HAZARD

A risk assessment of the development in relation to the following must be undertaken

- Natural hazard risk assessment should take in account climate change projections

BIOLOGICAL

An assessment of direct and indirect impacts of the proposed development on the ecology of the area. This should include an assessment of potential habitat loss and fragmentation, loss of species and natural features due to construction and operation.

HERITAGE

Assess loss of and damage to artefacts and archaeological, features.

HUMAN/SOCIAL/CULTURAL

Effects on socio-economic status such as changes to public access and recreational use, impacts on existing economic activities, public perception, contribution of development to national economy and development of surrounding communities should be explored. Socio- economic and cultural impacts to include land use/resource effects should also be assessed. Clearly indicate if any resources currently used by the public will be removed from the public domain as a result of the proposed development.

PUBLIC HEALTH ISSUES OF CONCERN

Analyse the risks to human health associated with the development from both human activities and natural phenomenon.

9 IMPACT MITIGATION

The mitigation measures should endeavour to avoid, reduce and remedy the potential negative effects identified while at the same time enhance the positive impacts projected. Mitigation and abatement measures should be proposed for each potential negative impact identified.

10 ENVIRONMENTAL MANAGEMENT AND MONITORING

Environmental management and monitoring plans and will need to consider actions to be implemented prior to and during construction and during operation. It must identify who the responsible parties are for each activity. It must include a detailed outline of the Plan for the pre-construction and construction phases.

11 ANALYSIS OF ALTERNATIVES & AREAS FOR FURTHER ASSESSMENT

Alternatives to the proposed development, or specific components, including the no-action alternative should be examined.

Recommendation of areas for further detailed analysis should also be provided and may include specific environmental or development aspects of the project.

12 LIST OF REFERENCES

13 CONCLUSION AND RECOMMENDATIONS

14 APPENDICES

The appendices should include but not be limited to the following documents:

- Reference documents
- Photographs/ maps
- Data Tables
- Glossary of Technical Terms used

- Final Terms of Reference
- Composition of the consulting team, team that undertook the study/assessment
- Instruments used in community surveys

13.2 Appendix 2- Water Quality Results

UDC 2001ET108_etc, shr.doc



Water and Wastewater Report Sheet, Page 1 of 3

REF. #: 2001ET108

ATTENTION: Dr. Sean Townsend

COMPANY	UDC (Urban Development Corporation)	MEANS OF CONTRACT	Written
DATE RECEIVED	January 29, 2020	DATE REPORTED	February 4, 2020
NO. OF SAMPLES	One (1)	SAMPLE VOLUME	Approx. 1.5 L
STARTED	January 29, 2020	SAMPLE TYPE	Untreated Well Water
- - -	- - -	FACILITY NAME/LOCATION	Heroes Park Well

SAMPLE ID	SAMPLE NAME	DATE SAMPLED	TIME SAMPLED
2001ET108	Heroes Park Well	January 29, 2020	11:20 AM

Parameter	Sample Name	Remarks
- - -	2001ET108	- - -
- - -	Heroes Park Well	- - -
BOD ₅ , mg/L D. O.	2.6	
Coliform, Faecal, MPN/100 mL	>1600	
COD, mg/L (Low Range)	<3	
Conductivity, µS/cm	958	
Fats Oil and Grease (FOG), mg/L	3.50 ± 0.39	
pH ± 0.5 (pH units) @ Temp. ±1°C	6.69 @ 20.9 °C	AP109
Nitrate-Nitrogen (Low Range) mg/L	10.2	
Phosphorus in phosphate, mg/L	0.43	
Salinity, S ppt	0.48	
Total Dissolved Solids (TDS), mg/L	669	

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Water and Wastewater Report Sheet, Page 2 of 3

REF. #: 2001ET108

ATTENTION: Dr. Sean Townsend

Parameter	Sample Name	Remarks
- - -	2001ET108	- - -
- - -	Heroes Park Well	- - -
Total Suspended Solids (TSS), mg/L	36.00 ± 0.20	

AP109	"Dear Client: The test for pH must be done in situ otherwise accuracy cannot be assured."
-------	---

Parameter	Test Method	Detection Limit
BOD ₅ , mg/L D. O.	Dilution Method adapted from HACH Method 8043 and Standard Methods for the Examination of Water and Wastewater, 21 st Edition, 2005 (SMEWW) Method 5210.	(Method 1a) Sample unseeded & diluted: 2 mg/L X Dilution Factor (Method 1b) Sample unseeded & undiluted: Approx 0.1 mg/L

Parameter	Test Method	Detection Limit	Range	Remarks
Coliform, Faecal, MPN/100mL	Standard Methods for the Examination of Water and Wastewater, (SMEWW), 9221-E.1			
Conductivity, µmhos/cm (OR, mS/m)	As per instructions for EXTECH Instruments ExStik II (Salinity, Conductivity and Total Dissolved Solids, Temperature) Meter		0 to 199.9 µS 200 to 1999 µS 2.00 to 19.99mS	
COD, mg/L (Low Range)	Reactor Digestion, HACH Method 8000	3 mg/L	3 to 150 mg/L COD	
Oil and Grease [or "Fats, Oil & Grease (FOG)", mg/L	Partition / Gravimetric Method. Standard Methods for the Examination of Water and Wastewater, 18 th Edition, 1992 (SMEWW) Method 5520B.	---	92% recovery	Fats, Oil & Grease (FOG)", mg/L
pH (pH units)	Meter [NOTE: Temperature is given along with result.]			

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Water and Wastewater Report Sheet, Page 3 of 3

REF. #: 2001ET108

ATTENTION: Dr. Sean Townsend

Parameter	Test Method	Detection Limit	Range	Remarks
Nitrate / Nitrate- Nitrogen, mg/L (<u>Low Range</u>)	Cadmium Reduction Method, HACH Method 8192	0.01 mg/L Nitrate- Nitrogen; 0.044 mg/L Nitrate	0.01 to 0.50 mg/L NO ₃ ⁻ N 0.044 to 2.2 mg/L NO ₃ ⁻	
Nitrate / Nitrate- Nitrogen (<u>High Range</u>)	Cadmium Reduction Method, HACH Method 8039 [NOTE: Unit is "mg/L"]	0.3 mg/L Nitrate- Nitrogen; 1.32 Nitrate	0.3 to 30.0 mg/L NO ₃ ⁻ N 1.32 to 132 mg/L NO ₃ ⁻	
Orthophosphate/Phosphorus in phosphate, mg/L	PhosVer 3 (Ascorbic Acid) Method, HACH Method 8048	0.00652 mg/L Phosphorus in phosphate 0.02 mg/L Orthophosphate	0.00652 to 0.815 mg/L 0.02 to 2.50 mg/L	
Salinity S ‰	As per instructions for EXTECH Instruments ExStik II (Salinity, Conductivity and Total Dissolved Solids, Temperature) Meter		0 to 99.9ppm (mg/L) 100 to 999ppm (mg/L) 1.00 to 9.99ppt (g/L)	
Total Dissolved Solids (TDS) mg/L	As per instructions for EXTECH Instruments ExStik II (Salinity, Conductivity and Total Dissolved Solids, Temperature) Meter		0 to 99.9ppm 100 to 999ppm 1.00 to 9.99ppt	
Total Suspended Solids (TSS)mg/L	Filtration / Gravimetric Method	0.1 mg/L	0 to 20,000 mg/L	

Certified By :
 Ryan Warburton, Quality Manager

.....
 Certified Analyst (Name)
 By :
 (Signature)

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Form ET2

REF. #: 1911ET1483

ATTENTION: Dr. Sean Townsend

COMPANY	UDC	MEANS OF CONTRACT	Written
DATE RECEIVED	November 27, 2019	DATE REPORTED	December 11, 2019
NO. OF SAMPLES	One (1)	SAMPLE VOLUME	Approx. L
STARTED	November 27, 2019	SAMPLE TYPE	Well Water (Untreated)
- - -	- - -	FACILITY NAME/LOCATION	Heroes Park Well

SAMPLE ID	SAMPLE NAME	DATE SAMPLED	TIME SAMPLED
Heroes Park Well	1911ET1483	November 27, 2019	10:30 AM

Parameter	Sample Name	Remarks
- - -	1911ET1483	- - -
- - -	Heroes Park Well	- - -
Alkalinity, mg CaCO ₃ /L	342.28	
Aluminum, mg/L		RM1
Arsenic, µg/L		RM1
Cadmium, µg/L		RM1
Calcium, mg/L		RM1
Coliform, Faecal, MPN/100 mL	33	
Coliform, Total, MPN/100 mL	79	RM1
Conductivity, µS/cm	1009	RM1
Chloride, mg/L	51.5	



Water and Wastewater Report Sheet, Page 2 of 5

REF. #: 1911ET1483

ATTENTION: Dr. Sean Townsend

Parameter	Sample Name	Remarks
- - -	1911ET1483	- - -
- - -	Heroes Park Well	- - -
Chromium, µg/L		RM1
Copper, µg/L		RM1
Cyanide mg/L		RM1
Fluoride, mg/L		RM1
Hardness, mg/L	202	
Iron, µg/L		RM1
Lead, µg/L		RM1
Magnesium, mg/L		RM1
Manganese, µg/L		RM1
Mercury, µg/L		RM1
Nickel, µg/L		RM1
Nitrate (NO ₃ ⁻), mg/L (High Range)	51.0	
Orthophosphate, mg/L	0.53	
pH ± 0.5 (pH units) @ Temp. ±1°C	7.00 @ 29.1 °C	
Potassium, mg/L		RM1
Salinity, S ppt	0.51	
Selenium, µg/L		RM1

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Water and Wastewater Report Sheet, Page 3 of 5

REF. #: 1911ET1483

ATTENTION: Dr. Sean Townsend

Parameter	Sample Name	Remarks
- - -	1911ET1483	- - -
- - -	Heroes Park Well	- - -
Sodium, mg/L	130	RM1
Sulphate, mg/L	55	
Zinc µg/L		RM1
Total Dissolved Solids (TDS), mg/L	709	
Turbidity (FTU)	48	

Parameter	Test Method	Detection Limit
BOD ₅ , mg/L D. O.	Dilution Method adapted from HACH Method 8043 and Standard Methods for the Examination of Water and Wastewater, 21 st Edition, 2005 (SMEWW) Method 5210.	(Method 1a) Sample unseeded & diluted: 2 mg/L X Dilution Factor (Method 1b) Sample unseeded & undiluted: Approx 0.1 mg/L (Method 1c) Sample seeded & undiluted: Approx 1 mg/L

Parameter	Test Method	Detection Limit	Range	Remarks
Coliform, Faecal, MPN/100mL	Standard Methods for the Examination of Water and Wastewater, (SMEWW), 9221-E.1			
Coliform, Total, MPN/100mL	Standard Methods for the Examination of Water and Wastewater, (SMEWW), 9221-B			
Conductivity, µS/cm	As per instructions for EXTECH Instruments ExStik II (Salinity, Conductivity and Total Dissolved Solids, Temperature) Meter		0 to 199.9 µS 200 to 1999 µS 2.00 to 19.99mS	



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Hope Gardens, P.O. Box 28, Kingston 6
Telephone: 927-1944

Water and Wastewater Report Sheet, Page 4 of 5

REF. #: 1911ET1483

ATTENTION: Dr. Sean Townsend

Parameter	Test Method	Detection Limit	Range	Remarks
Dissolved Oxygen (DO), mg/L	DO Meter [NOTE: Temperature is given along with result.]		0 to 20 mg/L	
pH (pH units)	Meter [NOTE: Temperature is given along with result.]			
Nitrate / Nitrate- Nitrogen (High Range)	Cadmium Reduction Method, HACH Method 8039 [NOTE: Unit is "mg/L"]	0.3 mg/L Nitrate-Nitrogen; 1.32 Nitrate	0.3 to 30.0 mg/L NO ₃ ⁻ -N 1.32 to 132 mg/L NO ₃ ⁻	Nitrate / Nitrate-Nitrogen (High Range)
Nitrate / Nitrate-Nitrogen, mg/L (Low Range)	Cadmium Reduction Method, HACH Method 8192	0.01 mg/L Nitrate-Nitrogen;	0.01 to 0.50 mg/L NO ₃ ⁻ -N 0.044 to 2.2	Nitrate / Nitrate-Nitrogen, mg/L (Low Range)
Orthophosphate/Phosphorus in phosphate, mg/L	PhosVer 3 (Ascorbic Acid) Method, HACH Method 8048	0.00652 mg/L Phosphorus in phosphate 0.02 mg/L Orthophosphate	0.00652 to 0.815 mg/L 0.02 to 2.50 mg/L	
Salinity S 0/00 [NB: ppt same as S 0/00 and we report S 0/00]	As per instructions for EXTECH Instruments ExStik II (Salinity, Conductivity and Total Dissolved Solids, Temperature) Meter		0 to 99.9ppm (mg/L) 100 to 999ppm (mg/L) 1.00 to 9.99ppt (g/L)	
Total Dissolved Solids (TDS) mg/L	As per instructions for EXTECH Instruments ExStik II (Salinity, Conductivity and Total Dissolved Solids, Temperature) Meter		0 to 99.9ppm 100 to 999ppm 1.00 to 9.99ppt	
Total Suspended Solids (TSS)mg/L	Filtration / Gravimetric Method	0.1 mg/L	0 to 20,000 mg/L	
Turbidity (FTU)	Absorptometric Method, HACH Method 8237		0 to 450 FTU	



ENVIRONMENTAL, TECHNICAL AND ANALYTICAL SERVICES LIMITED
Hope Gardens, P.O. Box 28, Kingston 6
Telephone: 927-1944

Water and Wastewater Report Sheet, Page 5 of 5

REF. #: 1911ET1483

ATTENTION: Dr. Sean Townsend

Certified By :
Ryan Warburton, Quality Manager

Certified By :
Analyst (Name)

.....
(Signature)

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Form ET2

13.3 Appendix 3 – Species Lists

Table 13-1: List of flora identified in study area (September 5, 2019)

Common Name	Scientific Name	Family	DAFOR
Guango	<i>Samanea samon</i>	Mimosaceae	O
Ficus	<i>Ficus benjamina</i>	Moraceae	O
Vervine	<i>Stachytarpheta jamaicensis</i>	Verbanaceae	O
Cockspur	<i>Macfadyena unguis</i>	Bignoniaceae	R
Poinciana	<i>Delonix regia</i>	Cesalpiniaceae	R
Royal Palm	<i>Roystonea regia</i>	Arecaceae	R
Bougainvillea	<i>Bougainvillea sp.</i>	Nyctaginaceae	F
West Indian Jasmine	<i>Ixora coccinea</i>	Rubiaceae	F
Hibiscus	<i>Hibiscus rosa-sinensis</i>	Malvaceae	
Lignum Vitae	<i>Guaiacum officinale</i>	Zygophyllaceae	
Poor man's orchid	<i>Bauhinia variegata</i>	Fabaceae	
Oleander	<i>Nerium oleander</i>	Apocynaceae	
Periwinkle	<i>Catharanthus roseus</i>	Apocynaceae	

DAFOR index: 80-100% occurrence → dominant (D); 60%-79% occurrence → abundant (A);
 40%-59% occurrence → frequent(F), 20%-39% occurrence → occasional(O);
 No occurrence during survey only: rare (R)

Table 13-2: List of avian species observed at National Heroes Park (September 5, 2019)

Common Name	Scientific Name	IUCN Rating	DAFOR
Northern Mockingbird	<i>Mimus polyglottos</i>	LC	A
Common Ground Dove	<i>Columbina passerina</i>	LC	F
Turkey Vulture	<i>Cathartes aura</i>	LC	O
Rock Dove	<i>Columba livia</i>	LC	A
Common Ground Dove	<i>Columbina passerina jamaicensis</i>	LC	O
Zenaida Dove	<i>Zenaida aurita</i>	LC	O

DAFOR index: 80-100% occurrence → dominant (D); 60%-79% occurrence → abundant (A);
 40%-59% occurrence → frequent(F), 20%-39% occurrence → occasional(O);
 No occurrence during survey only: rare (R)

13.4 Appendix 4– Historical Photos: National Heroes Park

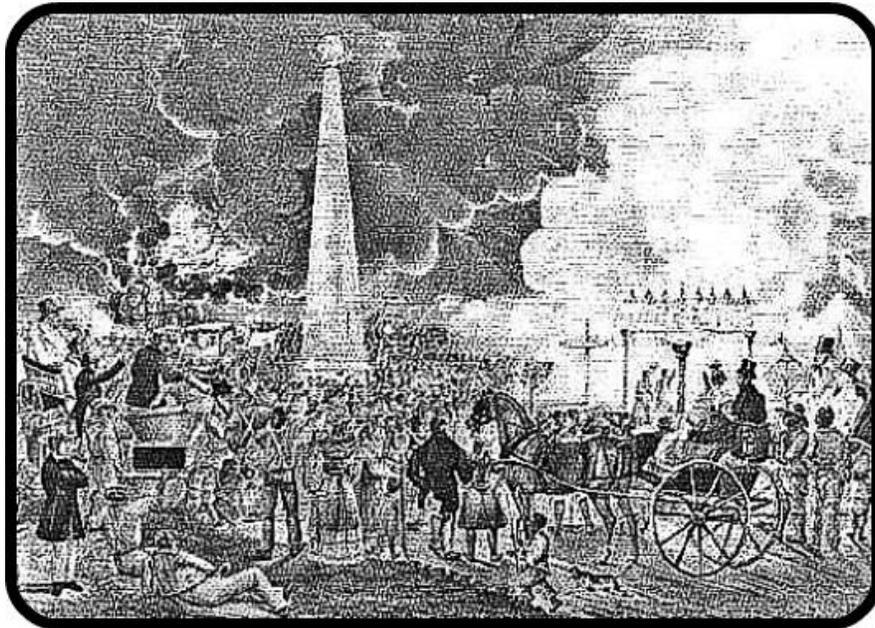


Figure 13-1: Black and white version of Adolphe Duperley’s lithograph, ‘Commemorative of the Extinction of Slavery on the 1st of August 1838’ which shows the gathering at the Race Course to celebrate emancipation.

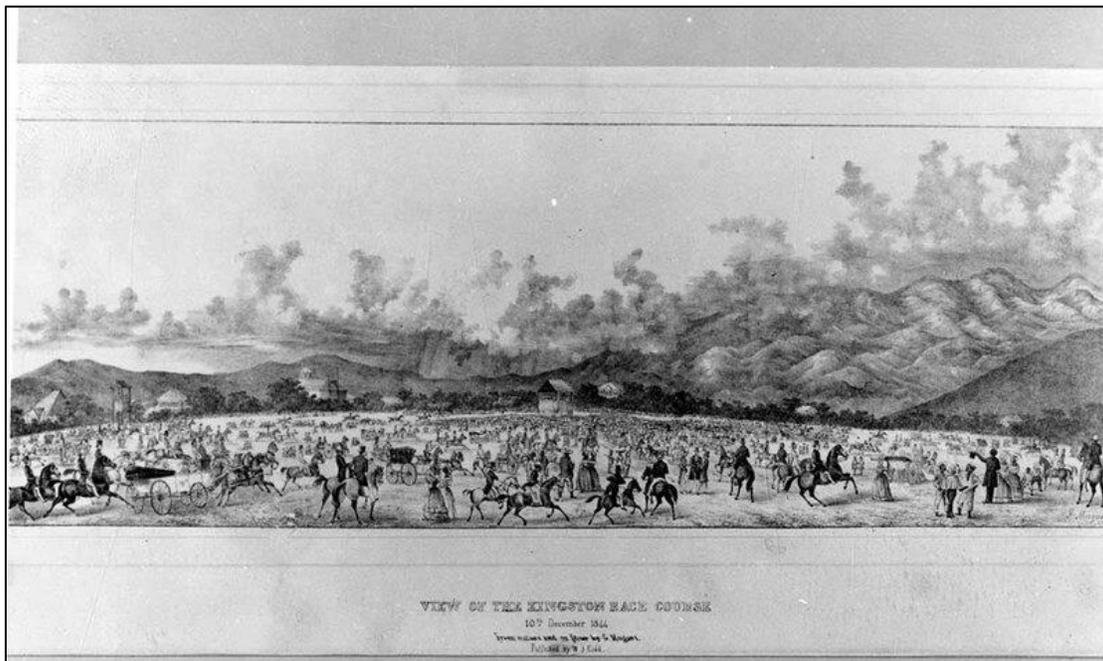


Figure 13-2: Kingston Race Course 1844



Figure 13-3: The City of Kingston from Starks History and Guide to Jamaica 1897– showing location of Kingston Race Course



Figure 13-4: One of the refugee camps at the Race Course



Figure 13-5: Performance at the Simon Bolivar statue

13.5 Appendix 5– Survey Forms

13.5.1 Business Survey Form

ESL ID Code

Community Name

Type of business

Name of Respondent

Gender:

Do you accept the project concept?

How do you think your community views this project?

In your opinion do you think that this project is:

Why do you think the project is not necessary?

Can you think of a better use of the space?

In your opinion, what impact do you think the project will have on your business?

Would a positive impact be:

Would a negative impact be:

Do you think that this concept would meet the acceptance of the other businesses in your community?

In your opinion, how do you think the local business community views this project?

What other use of the area do you think local business operators would prefer for the site?

Do you have environmental concerns for the community in relation to the project?

Are your concerns for construction or operation?

Based on your preference, should the project proceed as designed?

Why?

How would your community decide?

What is your age range

How many persons are in your household?

Is the head of your household male or female?

How many persons under 15 years are in your household?

How many persons in your household are 65 and older?

How many members of your household attend basic school?

How many members of your household attend primary school?

How many members of your household attend secondary school?

How many members of your household attend a tertiary institution?

How many members of your household have no academic qualifications?

Does the head of your household own or rent the house?

What is the highest level of educational attainment of the head of household?

Which of the following best describes the employment status of your head of household?

Which of the following best describes their current occupation?

13.5.2 Community Survey

ESL ID Code

Community Name

Name of Respondent

Gender:

Do you accept the project concept?

How do you think your community views this project?

In your opinion do you think that this project is:

Why do you think the project is not necessary?

Can you think of a better use of the space?

Do you have environmental concerns for the community in relation to the project?

Are your concerns for construction or operation?

Based on your preference, should the project proceed as designed?

Why?

How would your community decide?

What is your age range

How many persons are in your household?

Is the head of your household male or female?

How many persons under 15 years are in your household?

How many persons in your household are 65 and older?

How many members of your household attend basic school?

How many members of your household attend primary school?

How many members of your household attend secondary school?

How many members of your household attend a tertiary institution?

How many members of your household have no academic qualifications?

Does the head of your household own or rent the house?

What is the highest level of educational attainment of the head of household?

Which of the following best describes the employment status of your head of household?

Which of the following best describes their current occupation?

13.7 Appendix 6 – Moderator’s Discussion Guidelines for Focus Group

TALK ABOUT YOUR COMMUNITY:

1. Is your Community growing in population? What reasons explain your answer.
2. What age groups do you think comprises the highest % of your population?
3. Are young people leaving your community and if yes, why and where to?
4. Do you consider your community to be pulling together and working for your collective upliftment?
5. Which one of these do you see as the main issues holding your community back?

Lack of Jobs Opportunities Lack of proper social amenities? Lack of Leadership. Lack of physical infrastructure? Lack of Central Government Involvement? Lack of Local Government Involvement? Lack of adequate housing accommodation. Crime and Gangs. Lack of Skills Training Education/Opportunities. Lack of Community Pride. OTHER?

6. What are the positive things about your community and what can you build on?

TALK ABOUT – THE ECONOMY and SOCIAL CONDITIONS

7. If people work within the community what are some of the main occupations they would be doing.
8. How would you describe unemployment in your community? Is it voluntary or involuntary? Does your community have people or pockets of people living in poverty?
9. Are there vulnerable groups in your community? Describe the problems they face?
10. Are females at a social or living and working disadvantage in your community? What specific opportunities do you see for economic betterment?

TALK ABOUT THE PROJECT & THE ENVIRONMENT.

11. Have you been given the opportunity to learn about and discuss this House of Parliament Project?
12. From all that you have learnt or heard what do you think about the general design concept of the project?
13. Do you think that better use could be made of the land space?

If so what would some of your ideas be? Do you fear any negative environmental impacts for your community or generally, if the project is implemented?

14. What benefits could you see the Project having on your community generally?
15. Specifically what could your community offer the Project?

TALK ABOUT PROJECT ACCEPTANCE

16. Based on all you have heard and discussed what is the consensus on the Project.
17. Would you support it? And if not, why?
18. FINALLY – do you have any last question or comment you wish to make.

Thank You

13.8 Appendix 7 – Summary Socio Economic Profiles For each Community.

Greater Allman Town

The number of active Community Based Organizations in the Community is 14.

GREATER ALLMAN TOWN IS BORDERED BY:

- North: Cross Roads
- West: Fletchers Land
- South: Rose Gardens
- East: Franklin Town

Demographic Data

Data garnered from the Social Development Commission estimated the population size to be 10,915.

The estimated number of households was 2,950 and the average household's size was 3.7. Thirty-nine percent (39%) of households were headed by males and Sixty-one percent (61%) by females. Thirty-eight point one percent (38.1%) of all households were headed by persons without academic qualifications. The percentage households headed by unemployed persons was 22%.

Table 1 – Summary of Age Sex Distribution of Greater Allman Town Population.

AGE COHORT	MALE	FEMALE	PERCENTAGE OF TOTAL POPULATON
0-14	11.8	13.8	12.8
15 - 24	6.7	9.8	8.25
25 - 29	3.7	12.5	8.1
30 - 64	6.5	11.2	8.85
65+	9.8	14.2	12

TOTAL	38.5	61.5	50
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“Within the youngest age cohort 0-14 years, females represent 13.8% of cohort, while males represent 11.8%. The cohort accounts for 12.8% of the population.

In the 65 + cohort, the distribution of males accounted for 9.8 versus females with 14.2%. This cohort accounts for 12% of the total population”

Community Priority Issues

1. High levels of youth unemployment (14-24 years)
2. High levels of adult unemployment
3. Low skill levels
4. Poor roads
5. Poor representation by elected political representatives

Social & Physical Amenities

Housing	66% are made from concrete and blocks, 21% from board, 9% from bricks and 2.8% from a combination of concrete and board - 40% of respondents own the land on which they live; 32.3% live on rented land; 7.1% live on family owned land and 4.7% live on captured lands
Utilities	45.5% of residents have public water piped into their dwelling, while 41.6% receive public water pipe into yard - 98.8% of residents use electricity for lighting
Communication	Telephone services are utilized by all residents. Of this amount, 75% utilize cellular phones, 3.6% had landlines and 21.3% had both cellular phones and landlines

Sanitation	Garbage is picked up by truck from 98.4% households - Water closet not linked to a main sewer system is utilized by 79.6% of households
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7.2 Fletchers Land

The number of active Community Based Organizations in the Community is 9.

COMMUNITY BORDERS:

FLETCHERS LAND IS BORDERED BY:

- North: Cross Roads
- West: Jones Town and Hannah Town
- South: Central Downtown
- East: Allan Town

Demographic Data

At the time of their survey SDC estimated the population size to be 5000.

The estimated number of households was 1,429 and the average household's size was 3.5. Fifty percent (50%) of households were headed by males. Seventy- six percent (76%) of all households were headed by persons without academic qualifications while the percentage household headed by unemployed persons was 29%.

Table 2 - Summary of Age Sex Distribution of Fletchers Land Population.

Age Cohort	Male	Female	Average
0-14	15.8	14.5	15.15
15 - 24	11.5	8.5	10

25 - 29	5.2	8.2	6.7
30 - 64	14.8	17.3	16.05
65+	1.5	2.7	2.1
TOTAL	48.8	51.2	50

“Within the youngest age cohort 0-14 years, females represent 14.5% of cohort, while males represent 1.8%. The cohort accounts for 12.8% of the population.

In the 30-64 cohort, the distribution of males accounted for 14.8 while the female cohort represented the highest age sex distribution in the population at 16.05%. This cohort accounts for 16.05% of the total population”

Community Priority Issues

These are the main issues that affected the community of Fletchers Land:

1. High levels of unemployment and youth unemployment
2. Poor parenting
3. Limited/no opportunities for training & employment
4. Low skill levels
5. High level of high school drop-outs

Social & Physical Amenities

Housing	57% of houses were made from block and/or concrete 44.7% of houses were owned by occupants
Utilities	41% of residents received water from NWC piped into yard 99% of residents used electricity for lighting
Communication	Telephone services utilized by 94% of residents(30.7% used both land lines and mobile phones while 68.2% used mobiles phones only)

Sanitation	Garbage was picked up for 79% of the households. 93.6% of households utilized water closets linked to sewer while 5.3% used water closets not linked to sewer 36% shared toilet facilities with other households.
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Hannah Town

The number of active Community Based Organizations in the Community is 7.

COMMUNITY BORDERS:

HANNAH TOWN IS BORDERED BY:

- North: Jones Town
- West: Central Downtown
- South: Denham Town
- East: Fletchers Land

Demographic Data

The Social Development Commission estimated the population size to be 2,240.

The estimated number of households in Hannah Town was 560 with an average household's size of 4.0. Thirty- two percent (32%) of households were headed by males. Sixty- nine percent (69%) of all households were headed by persons without academic qualifications while the percentage household headed by unemployed persons was 60%.

Table 3- Summary of Age Sex Distribution of Hannah Town Population.

Age Cohort	Male	Female	Average
0-14	13.4	21.6	17.5
15 - 24	15.6	10.0	12.8

25 - 29	2.2	2.6	2.4
30 - 64	10.2	20.3	15.25
65+	2.2	2.2	2.2
TOTAL	43.6	56.7	50.15

The age cohort 65+ represented the lowest cohort from the five groups with both males and females averaging 2.2%.

Community Priority Issues

These are the main issues that affected the community of Hannah Town:

1. High Unemployment and Youth Unemployment
2. Crime and Violence
3. Limited/No Opportunity for Training and Employment
4. Poor Parenting
5. High Level of High School Dropouts

Social & Physical Amenities

Housing **73% of Land were made from concrete and blocks 52% of houses were owned by occupants**

Utilities	28% of residents received water from NWC -public water piped into yard, 50% had public water piped into their dwelling • 98% of residents used electricity for lighting
Communication	89% of residents utilized telephone services (14% used both land lines and mobile phones while 86% used mobiles phones only)
Sanitation	Garbage was picked up for 86% households 87% of households utilized water closets linked to sewer while 2% used water closets not linked to sewer 30% shared toilet facilities with other households.

Jones Town

The number of active Community Based Organizations in the Community is 3 .

JONES TOWN IS BORDERED BY:

- North: Arnette Gardens
- West: Rema
- South: Denham Town
- East: Fletchers Land

Demographic Data

The community of Jones Town had an estimated population of 12,948 individuals with 46.4% Males while the remaining 53.5% Females. The average household size is 3.9 persons. An estimated fifty one percent (51.4%) of the households were headed by males and forty nine (49%) by females. The age composition of the population shows that approximately 63.8% of the population was in the working group age of 15-64 years.

Age Cohorts

The working age group consisted of 34.9% females and 28.9% males. Approximately 31% of the population is under 15 years. The elderly population (60 years and over) accounted for 7% of the total population.

The data indicate that approximately 57.6 % of the household heads had attained secondary education. Higher level education (Post secondary, Other Tertiary, university and Vocational) was attained by only 13.3% of the household heads. Approximately 14.3% of household heads have attained primary, all age or elementary level education only.

Approximately 69.6% of households surveyed had members enrolled in an educational institution. An estimated 30.3% were enrolled in an early childhood institution, 30.1% were enrolled in primary level institutions and 32.4% enrolled in secondary level institutions, and 5% were enrolled in tertiary level institutions.

The data on academic qualifications of household heads reveal that 72.6% of all household heads had no academic qualifications, 2.7% had an associate degree, degree, post graduate degree or professional

qualifications. Approximately 7% of household heads had vocational training with certificate and 6.4% had passed.

Community Priority Issues

1. Lack of Jobs opportunities
2. Lack of central government leadership
3. Poor housing infrastructure
4. Lack of adequate housing accommodation
5. Lack of education

Social and Physical Amenities

Health Indicators

The majority of household (59.6 %) indicated that they utilized health centers for primary health centres, 45% utilized hospitals while 11.7% used private health facilities. Fifty four percent of respondents indicated that a financial constraint was the major obstacle in accessing health care.

Housing amenities

Water closet linked to sewer was the most prevalent type of toilet facility used in Jones Town accounting for 86% of households. Approximately 1% of the households reported having water closets which are not linked to a main sewer system while 1% had pit latrine.

The majority (80%) of households in Jones Town had private water piped into their yard while 6.9% of households had public water piped into their dwelling. Approximately 97% of households surveyed had electricity. Food is prepared by 89.5% of households using Liquid Petroleum Gas (LPG). Household garbage was predominantly disposed of by garbage pick-up truck (93%).

Cross Roads

The number of active Community Based Organizations in the Community is 19.

CROSS ROADS IS BORDERED BY:

- North: Oxford Road
- West: Slipe Road, Studio One Boulevard, Lyndhurst Road, Beechwood Avenue and Half Way Tree Road
- South: Torrington Road, North Heroes Circle, Marescaux Road and Conolley Avenue
- East: Arnold Road, Camp Road and Tom Redcam Avenue

Demographic Data

The Social Development Commission estimated the population size of Cross Roads Community to be 3,552.

1,054 was estimated number of households in Cross Roads with an average household's size of 3.7. Forty-Five point two percent (45.2%) of households were headed by males while the remaining Fifty- four point eight (54.8) were headed by females. Seventy-one point seven percent (71.7%) of all households were headed by persons without academic qualifications while the percentage household headed by unemployed persons were 20%.

Table 4- Summary of Age Sex Distribution of Hannah Town Population.

Age Cohort	Male	Female	Average
0-14	11.1	17.0	14.05
15 - 24	9.3	10.0	9.65
25 - 29	4.3	3.4	3.85
30 - 64	18.7	21.9	20.3
65+	1.7	2.6	2.15

TOTAL	45.1	54.9	50
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Community Priority Issues

These are the main issues that affected the community of Cross Roads:

1. High levels of adult unemployment (25 years and over)
2. High levels of youth unemployment (14-24 years)
3. Low skill levels
4. Limited/No opportunities for training and employment
5. Poor representation by elected political representatives

Social & Physical Amenities

Housing	62% of houses were made from block and/or concrete 55% of houses were owned by occupants
Utilities	45.8% of residents received water from NWC public piped into dwelling <ul style="list-style-type: none"> • 100% of residents used electricity for lighting
Communication	Telephone services utilized by 96% of residents (40.2% used both land lines and mobile phones while 54% used mobiles phones only)
Sanitation	Garbage was picked up for 86% households. 45% of households utilized water closets linked to sewer while 54% used water closets not linked to sewer 18% shared toilet facilities with other households

Below is a Comparative Summary Table of all the communities that participated in the survey along with their demographic data.

Table 5- Comparative Summary Table of Communities

	Greater Allman Town	Fletchers Land	Hannah Town	Jones Town	Crossroads
Population Size	10,915	5000	2240	12,948	3,552
# of Households	295	1429	560		1,054
Largest Residing Age Cohort	0-14	30-64	0-14	0-14	30-64
Age Distribution %	12.8	16.05	17.5	31	20.3

The Comparative Summary Table shows the five communities Greater Allman Town, Fletchers Land, Hannah Town, Jones Town and Crossroads with their respective Population size, # of Households, the age group that constituted the largest cohort of individuals living in the community and their Average Distribution Percentage

13.9 Appendix 8 – CDC Leadership (Personal Opinion) Questionnaire

CDC LEADERSHIP (PERSONAL OPINION) QUESTIONNAIRE

Community _____

Meeting with: _____

Date _____

Interviewed By: _____

ISSUES FOR INFORMED OPINIONS	
PROJECT CONCEPT (SHOW DESIGN LAYOUT)	
1	Do you think that this concept would meet the approval of your community? 1. <input type="checkbox"/> Highly approved 2. <input type="checkbox"/> Approved 3. <input type="checkbox"/> Not highly approved 4. <input type="checkbox"/> Not approved 5. Don't Know _____ If 3 or 4 please note most likely reasons:
2	Do you perceive that the community views this Project as being? 1. <input type="checkbox"/> Very Necessary 2. <input type="checkbox"/> Necessary 3. <input type="checkbox"/> Not Very Necessary 4. <input type="checkbox"/> Unnecessary If 3 or 4 please note the most likely reasons.
3	What alternative land use do you think the community would prefer for the intended project site, if any? None <input type="checkbox"/> Or indicate:
4	Please identify the main benefits you see arising for your community from the project.
5	What would be the main environmental concerns that you would have regarding the Project?
6	Please identify any other fears or reservations you may have about the Project?
7	What do you think your Community can offer the Project?
8	Has your CBO or Community had either a public consultation on the HOP Project or been Invited to attend one outside of the Community? What has been the Community's source of information on the Project.
THANK YOU	
