Caymanas Special Economic Zone
Feasibility Study



Final Report

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CONTENTS

ABBREVIATIONS

AEO	Authorized Economic Operator
AMSL	Meters Above Sea Level
APM	APM Terminals
ASEAN	Association of Southeast Asian Nations
ASYCUDA	Computerized Customs Management System
AWP	Gulf Coasts of Panama
BPO	Business Process Outsourcing
CACM	Central American Community
CAFTA	Central America Free Trade Agreement
CARIBCAN	Caribbean-Canadian Trade Agreement
CARICOM	Caribbean Community
CBI	Caribbean Basin Initiative
CCTV	Close Circuit Television
CEDA	Caymanas Estate Development Area
CFS	Caribbean Feeder Services
CHEC	China Harbor Engineering Company
CPTED	Crime Prevention Through Environmental Design
CSEZ	Caymanas Special Economic Zone
DB	Doing Business
DHL	Deutsche Postal Service
ECLAC	Economic Commission for Latin America and the Caribbean
EIA	Environmental Impact Assessment
EPZ	Export Processing Zones
EU	European Union
FCJ	Factories Corporation of Jamaica
FDI	Foreign Direct Investment
FMCG	Fast Moving Consumer Goods
FT2	Square Feet
FT	Feet
FTA	Free Trade Agreement

FY	Fiscal Year
FZ	Free Zones
GDP	Gross Domestic Product
GoJ	Government of Jamaica
GPS	Global Positioning Systems
HA	Hectares
HACCP	Hazard Analysis Critical Control Point
HR	Hour
ICAO	International Civil Aviation Organization
ICM	Integrated Catchment Modeling
ICT	Information and Communication Technology
IDG	International Development Group LLC
IPs	Industrial Parks
IP(R)	Intellectual Property (Rights)
IXP	Internet Exchange Points
FSE	Fluid Systems Engineering Ltd.
J$	Jamaica Dollars
JDF	Jamaica Defense Force
JPS	Jamaica Public Service
JRC	Jamaica Rail Corporation
JSEZA	Jamaica Special Economic Zone Authority
Km	Kilometers
KV	Kilovolt
LAC	Latin American Countries
LCL	Less Than A Container Load
LDSL	Logistical Distribution Services Ltd.
LHI	Logistics Hub Initiative
LNG	Liquefied Natural Gas
M2	Square Meters
M3	Cubic Meters
M3/S	Cubic Meters Per Second
M	Meter

MDA	Ministries, Departments and Agencies
MEGJC	Ministry of Economic Growth and Job Creation
MERCOSUR	Southern Common Market
MFN	Most Favored Nation
MIIC	Ministry of Industry, Investment and Commerce
MM	Millimeter
MICAF	Ministry of Industry, Commerce, Agriculture and Fisheries
MTW	Maximum Takeoff Weight
MV	Megavolt
MVA	Megavolt Ampere
MW	Mega Watt
NEPA	National Environment and Planning Agency
NMIA	Norman Manley International Airport
NRCS	National Resources Conservation Service
NSWMA	National Solid Waste Management Agency
NTE	Non-Traditional Exports
NWA	National Works Agency
NWC	National Water Commission
OSS	One-Stop Shop
PIOJ	Planning Institute of Jamaica
PPP	Purchasing Price Parity
PPPs	Public Private Partnerships
PTP	Pelabunhan Tanjung Pelepas Port
ROW	Rest of The World
RORO	Roll On/Roll Off
S	Second
SADC	Southern African Development Community
SCS	Sligoville and Cayman
SEZ	Special Economic Zone
SIA	Sangster International Airport
SFB	Standard Factory Building
SQ.FT.	Square Feet

SWMA	Storm Water Management Area
T25	1:25 Year Return Period for Design Storm
T100	1:100 Year Return Period for Design Storm
TEU	Twenty-Foot Equivalent Units
TCPA	Town and Country Planning Authority
TOR	Terms of Reference
UDC	Urban Development Corporation
UK	United Kingdom
UPS	United Postal Service
US	United States
USA	United States of America
USEC	United States East Coast
VAT	Value Added Taxes
VoIP	Voice over Internet Protocol
WB	World Bank
WRA	Water Resource Authority
YR	Year

Executive Summary

Background

To help jumpstart Jamaica's economy, the Government of Jamaica (GoJ) spearheaded the Logistics Hub Initiative (LHI), a strategy to leverage the country's strategic, geographical location in order to position itself as a global leader in cargo transshipment and logistics services. One of the premier projects under the LHI is the Caymanas Special Economic Zone (CSEZ). The CSEZ is to be the flagship SEZ in Jamaica and one of the first zones developed under the new Special Economic Zone (SEZ) Act of 2016. The Act repealed the old Export Free Zone legislation replacing it with a new, modern SEZ regime and framework. Together the LHI and the SEZ Act are intended to help stimulate economic development, attract Foreign Direct Investment (FDI) and new technologies to the country and encourage manufacturers to engage in value-added activities for goods transshipped through Jamaica.

In order to better understand the economic, financial and market aspects of the CSEZ project, the GoJ decided to commission the CSEZ Feasibility Study. This study is funded by the World Bank's (WB) Foundations for Competitiveness and Growth Project (FCGP) in Jamaica. In June 2017, the CSEZ Feasibility Study was awarded to the International Development Group (IDG) and their partners – Gensler and Fluid Systems Engineering (FSE). The project, which began June 26, 2017 was managed by the Planning Institute of Jamaica (PIOJ), in collaboration with the Caymanas Enterprise Team, and the Jamaica Special Economic Zone Authority (JSEZA).

The CSEZ Phase I report was delivered to the Caymanas Enterprise Team on January 31, 2018. The report's key findings were presented to the GoJ in a Stakeholder Workshop in early February 2018. At that time, the Phase I recommendations were to move the CSEZ to the north site of the Caymanas Estates Development Area (CEDA). The report was accepted by the GoJ in March 2018 and the Phase II work began by the IDG team. In May 2018, IDG was directed by the GoJ to relocate the CSEZ to the CEDA south site and as such, IDG designed the CSEZ project accordingly.

1.0 Introduction

Chapter 1 of this feasibility study provides an introduction to the CSEZ project and includes: i) an overview of the project's Terms of Reference (TOR), ii) IDG's methodology and approach to the feasibility study, and iii) key takeaways from IDG's stakeholder meetings and engagement.

1.1 The CSEZ Feasibility Study

The main objective of this project is to prepare a comprehensive feasibility study for the CSEZ, which identifies the preferred location, proposed market and demand for the zone and determines the highest and best land uses, development option, phasing, and infrastructure/utility requirements for the CSEZ in a manner that is financially viable to attract a private developer via a public private partnership (PPP) or through other financial arrangements.

In accordance with the Terms of Reference (TOR), the feasibility study was undertaken in two phases. At the end of each phase, a report was prepared, and a Client/Stakeholder Workshop was held.

Phase I of the CSEZ Feasibility Study contains six tasks: i) Task 1- A Vision for the CSEZ, ii) Task 2 - A Site Assessment, iii) Task 3 - A Drainage Study for the CEDA, iv) Task 4 - A Transport Assessment, v) Task 5 - A Market Analysis, and vi) Task 6 - A Demand Forecast.

Phase II of the study is comprised of five tasks: i) Task 7 – A Concept Master Plan, ii) Task 8 - An Infrastructure Assessment, Plans and Cost Estimates, iii) Task 9 - A Financial Analysis, iv) Task 10 - Identification of a Development Framework, and v) Task 11 - An Implementation Action Plan.

1.2 Methodology and Approach

IDG's methodology and approach to the feasibility study includes the following:

- **Date Collection and Due Diligence.** The collection, review, synthesis, and analysis of the background materials, documents, reports, maps and statistics for the CEDA area, as a whole. This included individual meetings with key public and private stakeholders to discuss the CSEZ project and a Client/Stakeholder Workshop for 50 persons, at the start of the project.

- **A Vision and Value Proposition.** The preparation of a vision for the CEDA and a vision and value proposition for the CSEZ, which optimizes the development potential of the CSEZ and its surrounding lands by identifying strategic locational advantages, appropriate land uses, and supporting activities, which bring

the greatest value to the project. The intent of the vision and value proposition is to also align with the LHI and maximize the economic and social cost/ benefits to Jamaica and the GoJ.

- **A Site Assessment.** An examination of the CEDA North and South areas to determine the strengths, weaknesses and threats of the lands, set out opportunities and constraints, and identify any fatal flaws or deal breakers, which would make the CSEZ project or the development of the CEDA North or South areas non-viable or problematic. This assessment is also key in identifying the 'preferred' location for the CSEZ in order to enlarge the projects development potential as a 'regional hub' and to increase the attractiveness of the SEZ for developers and investors. (Note: The Phase I report identified the North area of the CEDA as the 'preferred' location of the CSEZ. At the GoJ's request, the CSEZ site was later changed to the CEDA South area. For reference purposes, the GoJ has requested that the initial site recommendations be left in the final feasibility study.)

- **An Environmental and Social Review.** A review of the applicable environmental and social laws and regulations in force in Jamaica and a high-level examination of the CEDA North and South areas to identify key environmental/social issues, concerns or opportunities for development of the CSEZ and associated activities. The review was undertaken using secondary information and materials and site visits to the CEDA.

- **A Hydrology and Drainage Study.** The preparation of a topographic survey for the CEDA South area and an examination and analysis of the hydrology and hydraulic issues on the CEDA North and South catchment areas. The intent is to provide initial drainage recommendations to mitigate storm water and drainage flows on both sites.

- **A Transportation and Logistics Assessment.** A review of Jamaica's LHI strategy and reports prepared by Nathan in 2017, an examination of the regional sea and air cargo flows and patterns in the region, as well as, an assessment of the transportation facilities and networks (air, road, rail and sea) in Jamaica. In addition, a logistics strategy for the CSEZ and the port of Kingston in order to optimize their inter-relationship was prepared by IDG.

- **A Market Analysis.** An analysis of barriers to investment in Jamaica, current market conditions and future industry sector trends and requirements. This includes an investor survey, benchmarking the CSEZ's regional competitors to identify Jamaica's competitive and comparative advantages, and the examination of

the country's trade and investment policies, agreements, and statistics. From this, a list of industry sectors was proposed for the CSEZ and profiles for each sector were created.

- **Demand Forecast.** The estimation of investors/tenants, land, pre-built facilities, power, and water requirements for the CSEZ, as well as, identifying employment potential over a 20-year period. This information is required for the design of the CSEZ and its phasing.

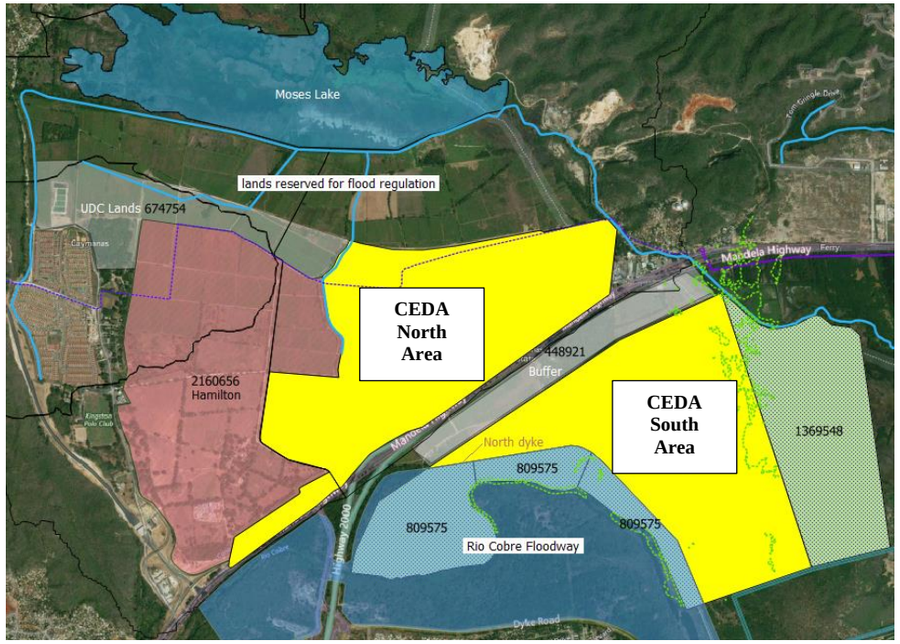
- **Master Planning.** The preparation of planning principles, a master plan, a land use plan, a zoning plan, a phasing plan, and urban design guidelines, which creates a comprehensive planning framework for the CSEZ project. The intent is to optimize the use of land in the CSEZ and provide guidance to a future developer for the implementation of the project.

- **Infrastructure Assessment, Plans and Cost Estimates.** An assessment of on and off-site infrastructure and utility requirements for the CSEZ and conceptual infrastructure/utility plans for the project. These plans are based on the CSEZ master plan and are required in order to prepare cost estimates for the project. The project costs are the key inputs into the financial and economic model.

- **Financial Analysis.** The preparation of a financial and economic model, which identifies the CSEZ's project internal rate of return (IRR) and economic rate of return (ERR) under a variety of scenarios. This data along with the project's Net Present Value (NPV) are the key indicators of the CSEZ's viability and attractiveness to a developer. Sensitivity testing was undertaken on the 'preferred' development scenario to identify any impacts on the IRR, ERR and NPV, if costs change over time.

- **Development Framework.** The development framework is closely linked to the financial/economic model results. The framework examines different development options for the CSEZ and identifies the best development model for the project in order to minimize the project's risks and optimize the project's returns.

- **Implementation Action Plan.** This is a short, medium and long-term implementation action plan with steps, actions/activities, milestones, responsibilities and timeframes for the implementation of the CSEZ project. It includes programs for: i) a developer search, ii) a developer selection/implementation strengthening, iii) site development, iv) off-site infrastructure/utilities development, v) marketing and promotions, and v) communications.



Source. FSE/Google Earth

Figure i-1. The CEDA North and South Areas within the Boundaries of the CEDA

2.0 Vision for the CEDA and the CSEZ

Chapter 2 sets out the vision for the CEDA and the CSEZ. It includes: i) a description of the CEDA and identifies the location of the CSEZ project, ii) the vision for the CEDA and CSEZ, and iii) the value proposition for the CSEZ.

2.1 The CEDA Development Areas

The CSEZ is to be located in the CEDA. The CEDA falls within the parishes of St. Catherine and St. Andrew and is split by the Mandela Highway. The entire CEDA is comprised of 1,201-ha (2,968-acres)[1] and the Urban Development Corporation (UDC) and Alexander Hamilton are the largest land owners. (Figure i-1.)

The CEDA, north of the Mandela Highway, is bounded by the Ferry River to the east, the toll road to the west, Mandela Highway to the south and the foothills to the north. This area contains Moses Lake, the Caymanas Golf and Country Club, the Caymanas Polo Club, the New Era Housing project, Digecel, a number of existing communities, and sugar cane fields. UDC owns the CEDA North area, which is approximately 286.62-ha (708.3-acres) in size.

The CEDA, south of the Mandela Highway, is bounded by the Mandela Highway to the north, the Rio Cobre to the west, the Soapberry Wastewater Treatment Plant to the south-west, the old Jamaica Railway Corridor to the south, and the Ferry River and the Riverton Solid Waste Facility to the east. The lands are also low-lying, flat, crop lands and act as a flood catchment area for the CEDA.

The 'preferred location' for the CSEZ in the Phase I report was the CEDA North area, but in May 2018 at the GoJs request, the CSEZ project was re-located to the CEDA

[1] The CEDA North and South areas as defined by UDC are 4,332-ha. For the purpose of this study, only land that could be used for locating the CSEZ have been defined and comprise the 1,201-ha.

South area. The CEDA South area is approximately 425[2]-ha (1,050-acres) in size but because of the site's hydrology and environmental issues, the development parcel for the CSEZ had to be reduced to 236-ha (583-acres). The site's location adjacent the Soapberry Wastewater Treatment Plant and Riverton Solid Waste Facility, makes the CSEZ project more challenging to develop.

2.2 The CEDA and CSEZ Visions

IDG prepared a vision for the CEDA and the CSEZ, which is intended to: i) maximize the development potential of the location, ii) create more value for the CSEZ, and iii) provide greater benefits for Jamaica.

The CEDA and CSEZ visions were formulated by IDG with stakeholder inputs. The visions are **bold**, **innovative and based on excellence**. To realize the visions and all their backward and forward benefits, the GoJ must stand firm on its commitment to support the CSEZ project and provide champions to overcome potential hurdles. They must also engage the private sectors and civil society early on, to gain their inputs and needed support. The vision for the CSEZ is as follows:

The CSEZ is to be the '**flagship SEZ'** for the country. Because Jamaica is strategically positioned, the CSEZ will become an '**regional hub'** and '**the**' location for international business' in the Caribbean/LAC region and beyond. The CSEZ will attract foreign and domestic investors and provide seamless, multi-transport/logistics (sea, air, road) to support a broad range of vibrant and up-and-coming sectors. The CSEZ will be constructed with state-of-the art infrastructure and utilities, a focus on green technology and sustainability, and a commitment to the environment. The zone will spearhead new industry trends, sponsor value added production, and employ new technologies to put the CSEZ at the forefront of innovation around the world. In addition, the zone will offer a One-Stop Shop (OSS) with streamlined and fast-tracked services and after-care facilitation to its investors. With Customs on-site and available 24-hours, an investor will be able do business how and when they like, within a secured environment. For Jamaica, the CSEZ will attract new investment opportunities, growth in exports, diversification in industry sectors, the transfer of new technologies, and a variety of new exciting jobs for the Jamaican population.

[2] All numbers in this report have been rounded up.

For the CSEZ vision to be realized, Jamaica will require **'a grander vision'** to set it apart from its competitors. Hence to maximize the success of the CSEZ, it must be placed within the following vision for the CEDA:

The CSEZ will be the focus of a comprehensive, integrated development plan for the CEDA as a whole, creating a dynamic, multi-faceted live, work, and play environment for investors, Jamaicans and visitors alike. The CEDA development plan will package the site's: i) strategic location, ii) natural landscape and beauty, iii) views over Greater Kingston, iv) unique biodiversity, v) heritage, and vi) supporting amenities with the CSEZ at its center, and the catalyst for programed/phased growth.

The CEDA development plan locates the CSEZ on the CEDA South area (as defined in Section 2.1 above) and the zone becomes the anchor for the comprehensive development plan. The CSEZ grows in a phased manner and connects, links and supports a combination of commercial, retail, entertainment, boutique hotels, residential and institutional land uses, which are planned on the CEDA North area. The interaction between the CSEZ and these supporting land uses on the CEDA North area must be prioritized to allow important synergies to be created between the lands. Directly adjacent the CSEZ on the CEDA's North area site, should be a commercial/retail/institutional area with a campus-like atmosphere that will help support and stimulate investment on the northern boundary of the CSEZ.

West of this commercial center on the CEDA North lands should be areas dedicated to residential development. The housing typologies in this area should be varied and built to international standards (villas, single-family houses, townhouses, and apartment buildings) to accommodate a mix of foreign and Jamaican entrepreneurs and professional, workers and visitors. To take advantage of the panoramic views from the CEDA (Hunts Bay, Portmore, Greater Kingston, and the Blue Mountains), vertical living should be permitted within the CEDA, hence, allowing for mid-rise/tall apartment buildings with wide balconies for outdoor living. These buildings should offer a range of services (gyms, business, tennis, and wellness facilities, butler service, and swimming pools).

Critically important to this vision and maybe the element, which will propel the CSEZ project into becoming '**the international business location to invest in**,' is the incorporation of the CEDA's natural beauty, diverse landscape, and interesting heritage. The pre/post Colombian ruins, history of rum manufacturing and sugar cane plantations, the mesmerizing and ever-changing landscape of Moses Lake, the Ferry, Fresh and Duhaney Rivers, Rio Cobre, the wetlands, the flora and fauna, birds, animals and insects should be highlighted and knitted into the fabric of the CSEZ and the CEDA development plan. Active and passive outdoor space should be planned so there is a mix of

physical activities in close proximity to the CSEZ and are unique to the CEDA such as nature walks, exercise circuits, history trails, bird watching, mountain climbing, and places to meditate in nature etc. It is this environmental aspect of the CEDA development plan that if implemented carefully, will make the CSEZ a sought-after destination for business and investment. Lastly, the existing amenities such as the Caymanas Golf Course, Polo Club, and Stud farm, as well as Jamaica's local cuisine should be showcased within the CEDA development plan. Once the CEDA development plan is completed, it should be phased to optimize the development potential of the CEDA lands and the CSEZ project.

2.3 The CSEZ's Value Proposition

Intended to support the vision is the CSEZ's value proposition. The following are the goals and objectives for the CSEZ:

- The CSEZ is the flagship project for Jamaica
- It builds upon the LHI and the SEZ Act
- The CSEZ is to be a 'regional hub for businesses' for foreign and domestic investors
- Targeting traditional and up-and- coming industry sectors
- Stimulating logistics, manufacturing, and value addition production utilizing cutting-edge technology
- Spurring industry trends, innovation and creativity
- Supporting exports
- Seamlessly connected to the port of Kingston
- Direct access to national highways, airports and seaports

- Designed with state-of-the art infrastructure and utilities, support amenities such as training facilities, business incubators, research and development labs, and exhibition space
- Has a strong environmental and sustainability mandate
- Supports green technologies and alternative energy
- Creates a safe and secure environment for investors and visitors
- Offers an OSS with streamlined and fast-tracked processes and procedures as well as after-care facilitation
- Houses Customs on a 24-hr basis
- Properly branded to attract the widest audience and give the CSEZ an international appeal
- Developed and operated by the private sector through a PPP or a similar financial arrangement
- Employs an aggressive marketing/investment promotion strategy
- Transfers knowledge, technology and innovation to local entrepreneurs, professionals and workers
- Creates new job opportunities for the Jamaican population.

Table i-1. Comparative Ranking Matrix

	CEDA North Area			CEDA South Area		
Best Practice Locational Factors	**High Score**	**Medium Score**	**Low Score**	**High Score**	**Medium Score**	**Low Score**
Site Factors						
Site in Single Ownership	X			X		
Appropriate Size	X					X
Expansion Lands Available	X					X
Located on Periphery of Rural/Urban Area	X			X		
Greenfield Site	X			X		
No or Limited Resettlement	X				X	
Unencumbered Topography	X			X		
Few Hydrology Issues			X			X
Access Factors						
Access to National Infrastructure (port, airport, highway)	X			X		
Located Along a Highway	X			X		
Infrastructure/Utilities Factors						
Access to Required Off-Site Infrastructure and Utilities		X			X	
Off-Site Earthworks Required		X			X	
On-Site Earthworks Required		X	X		X	
Access to On-Site Power		X			X	
Access to On-Site Water		X			X	
Minimal Environmental and Social Issues		X				X
Operating Factors						
Can Facilitate Demand	X					X
Can Deliver an Eco-Friendly Environment	X					X
Existing Industrial Clusters Around Site	X			X		
Located Where Demand Is	X			X		
Available Labor Around Site	X			X		
Can Provide a Secured Environment	X			X		

3.0 Site Assessment

Chapter 3 examines the CEDA North and South areas (Figure i-1) above. It includes: i) an overview of the planning framework for the development area, ii) the identification of the CEDA's strengths, weaknesses and threats, iii) key development opportunities for each location, iv) key development challenges and constraints, as well as, any fatal flaws or deal breakers for the CEDA North and South areas, and v) identifies the 'preferred' development location for the CSEZ.

A thorough assessment of the CEDA North and South areas was undertaken and then the sites were compared against best practice 'SEZ locating criteria' in a ranking matrix. (Table i-1) The comparative ranking matrix showed that although both the CEDA North and South areas are geographically and contextually similar and there are no fatal flaws on either site, the CEDA South area does have some potential deal breakers, such as:

The site is small and constrained. Because of its location between the Mandela Highway (north), Rio Cobre (west), the Ferry/Duhaney Rivers (east), the Soapberry Wastewater Treatment Plant (south) and the Riverton Solid Waste Facility (south-east) and because the site is a storm water catchment area, the CEDA South area is left with a smaller land parcel - approximately 236 ha (583-acres) available for the CSEZ.

The site cannot be contiguously expanded. Because the CEDA South area has well-defined, physical boundaries, the CSEZ in this location cannot expand in a contiguous manner.

Later phases of the CSEZ could be constructed on the CEDA North area however, this would physically split the zone into two, which is not best practices. In addition, a divided solution significantly increases development costs and duplicates services.

There is a small level of resettlement required. Although only a few structures and some moveable property needs to be resettled on the CEDA South area, this does increase development timeframes and costs. To make the CEDA South area an attractive development parcel for a potential developer, resettlement should be undertaken by the GoJ.

The site has hydrology issues. Although the CEDA as a whole has hydrology issues, the CEDA South area also has tidal surges on its southern boundary. To mitigate this problem, earthworks, a retention pond, and control gates are required, which could be designed into the CSEZ master plan but would further reduce the total leasable space within the CSEZ.

There are a number of environmental issues to mitigate. If the GoJ is going to give the CSEZ a 'strong environmental brand' to be competitive with top SEZ's around the world, the CSEZ cannot be located directly adjacent Kingston's solid waste facility and wastewater treatment plant. Although solutions to the environmental issues posed by these entities are available, they will take time to implement. The CSEZ is to be constructed in the next 3-4 years and the timeframes to mitigate the serious environmental issues raised from the Riverton Solid Waste Facility and Soapberry will be 5-7 years, if a decision is made today. (Note: The GoJ is currently considering relocating the Riverton Solid Waste facility in the next 3-5 years and are willing to try and negotiate new technology for the Soapberry expansion, which would have a smaller footprint to the south of the existing plant.)

The site will not be able to support the potential demand for the project. Without taking into account the land required for the retention pond, the CEDA South area has 236 ha (583-acres) of land available for the CSEZ. This amount of land will only be large enough to support the CSEZ's 20-year base case scenario according to the Chapter 8 Demand Forecast. This limits the investment program for the CSEZ. Hence, at the time of the Phase I report, the 'preferred location' for the CSEZ was the CEDA North area. The CEDA North site: i) is large, flat, unencumbered, and a 'greenfield' location, ii) can be developed as a +250-ha/618-acre zone, iii) can be contiguously expanded, iv) has a contained hydrology solution for the CSEZ, though a CEDA solution is still required, v) has fewer environmental issues and no resettlement, vi) is in close proximity to existing infrastructure and utility networks, vii) is simpler to brand (better able to create an image that will attract a wider range of investors), and viii) is farther away from the

Riverton Solid Waste Facility and the Soapberry Wastewater Treatment Plant making it easier to maintain as 'an eco-friendly environment' within the CSEZ, which is required in today's competitive environment.

4.0 Environmental and Social Review

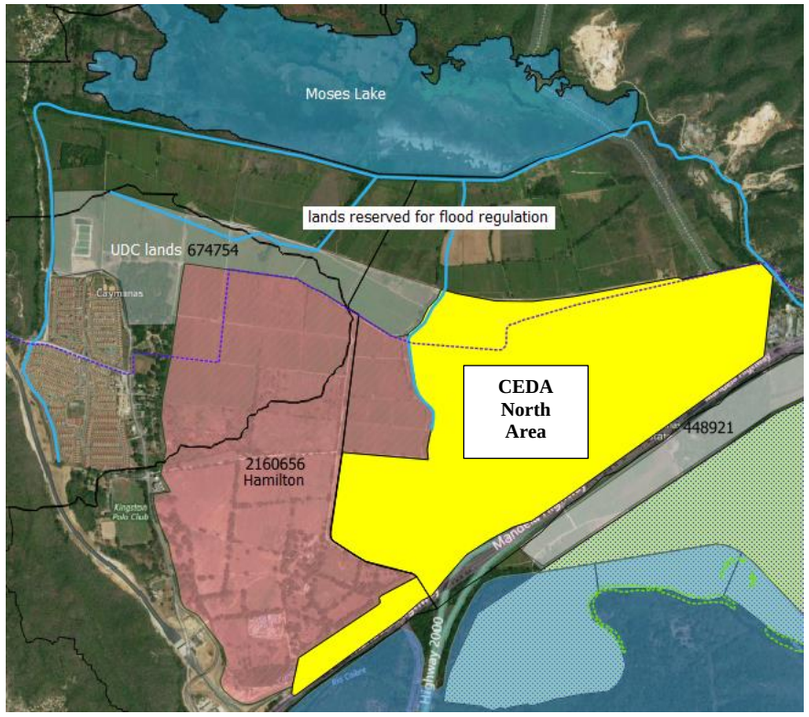
Chapter 5 is a high-level review of the key environmental and social issues and considerations for the CEDA, with a focus on the CEDA South area, as this was the original TOR for IDG. It was prepared using secondary information and materials and through site visits to the CEDA. This review is not meant to be an environmental impact assessment (EIA), although one will be necessary for the CSEZ project. As such, this chapter includes: i) a description of the physical environment of the CEDA South area, ii) a review of the area's biological environment, iii) a socio-economic profile of the CEDA, and iv) an overview of the legislation the CSEZ project will have to follow. The review highlights the importance of protecting the sensitive biodiversity in the CEDA, so it can be showcased in the CEDA development plan. It also identifies the need to find environmental mitigation measures for Soapberry and Riverton, in order to protect the development potential of the CEDA.

5.0 Drainage Study

Chapter 5 provides an overview of the hydrology and drainage issues for the CEDA North and South areas according to IDG's original TOR. The chapter contains: i) a review of previous drainage reports undertaken for the CEDA North with a specific focus on the recently constructed drainage infrastructure by UDC and the GoJ under the Mandela Highway improvement works, ii) an overview of the assumptions, components, and inputs that comprise the hydrology and drainage modeling, and iii) analysis, findings and approximate costs for storm/drainage designs in the CEDA North and South areas.

5.1 The CEDA

Because the CEDA is located adjacent foothills and between the Ferry, Fresh, and Duhaney Rivers and the Rio Cobre, the CEDA North and South areas have a number of hydrology and drainage issues. IDG/FSE have reviewed these issues and propose the following initial solutions.



Source. FSE/Google Earth

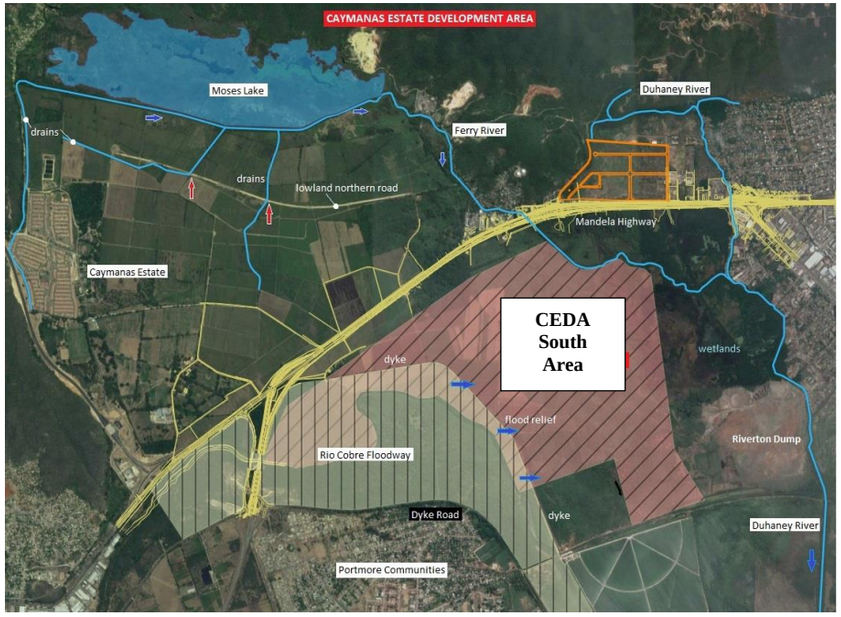
Figure i-2. The CEDA North Area with Flood Regulation Area and Moses Lake

5.2 CEDA North Area

Although there have been a number of studies undertaken to examine the significant drainage challenges on the CEDA, north of the Mandela Highway, a comprehensive solution has not yet been proposed for the relationship between: i) surface runoff, ii) ground water flows, iii) storage regulation associated with changing water levels in Moses Lake, iv) storage regulation associated with the inundation of the lowlands adjacent to Moses Lake, and v) storm water flows that could be conveyed by the Ferry River to the Mandela Highway and beyond.

In order to examine the CEDA North area properly, IDG/FSE developed a drainage solution for only the flood regulation area of the CEDA for storms of up to T100 (100-year storm). This constitutes the area adjacent and north of the CEDA North area between the North Road and Moses Lake (Figure i-2). The drainage concept is that if all storm water flows from the interior foothills to the western interception drain, then storm water could be contained and released in a regulated manner from Moses Lake, so as not to coincide with storm flows from the lowland development area.

The reach of the Ferry River from Moses Lake to the Mandela Highway currently has a capacity of approximately 51.6 cubic meters /second (m^3/s), which is able to discharge for the T100 storm flow from the flood regulation area with no flow adding to the Ferry River from the interior elevated sections of the catchment area. For this flow however, inundation of up to 3.5-m AMSL is expected in the local Ferry community. To mitigate this problem, 170-ha of land between the CSEZ and Moses Lake will have to be regraded. This will improve discharge from the newly constructed culverts and conveyance to the interception drain south of the Moses Lake berm. Earthworks for this solution is estimated at +/- J$750,000,000/US$6,000,000 and this cost includes flood storage, berms and a new drainage channel. If this solution is put in place, then development within the CEDA North area will experience no off-site drainage issues. It does however, mean that development within this area must have finished floor levels above 4.5m AMSL.



Source. FSE/Google Earth

Figure i-3. The CEDA South Area Flood Areas

It should be noted that a viable drainage solution for the total CEDA will require significant investments for flood flow regulations and conveyance capacity improvements, both for Moses Lake (as a flood regulation area) and in order to improve conveyance across the Mandela Highway.

5.3 CEDA South Area

For the CEDA South area, IDG/FES prepared a topographic survey, which was used for the hydrology modeling. The hydrology and drainage assessment of the CEDA South area identified that out of the 425-ha (1,050-acres) available, only 236 ha (583-acres)) of land is viable for development. (Figure i-3) This is because the Rio Cobre has a flood plain (west) that must be respected. In addition, there are wetlands, 54-ha (135-ha) adjacent the Ferry River (east), which are subject to flooding that must be protected. The remainder of the land is generally well protected from flooding and can be planned with viable drainage infrastructure to support the requirements of the CSEZ. The finished floor levels of the CSEZ on this site must be kept above 3.5-m AMSL however. The exception is a portion of the site at its south-east corner, which are lowland. This area (20-ha) will have to be raised and the volume required for this fill at a 2.5m height is approximately 125,000m3.

The primary drainage infrastructure required to service the CSEZ on the CEDA South area would be a paved drain approximately 1,800-m in length varying in width from 10m to 30m. Also, a special flood regulation area (retention pond) at the south-east boundary of the site is required to manage significant rainfall events and storm surges. The cost of creating this flood regulation pond including the regrading of the area, construction of the berms to an elevation of 2.5-m AMSL, erosion protection of the berms and the JRC railway embankment, plus construction of the flood gate is estimated in Chapter 10.

6.0 Transportation Assessment

Chapter 6 builds upon Nathan's LHI reports and provides a more focused assessment of the transport and logistics issues related to the port of Kingston and the CSEZ. The chapter hence: i) examines the regional sea and air cargo flows, shipping patterns and inter-port competition in the region, and ii) presents a focused transport and logistics strategy for the development of the CSEZ.

The transport and logistics strategy for the CSEZ examines: i) interlinked locations for logistics activities at and around the port of Kingston and the CSEZ, ii) types of activities for these locations, iii) trade facilitation improvements for long-term success, and iv) alternative routes to connect the port with the CSEZ. The strategy for the port and the CSEZ is as follows:

6.1 The Logistics Strategy for the Port of Kingston and the CSEZ

The development of the CSEZ requires an efficient port to serve as the gateway for international and domestic imports to be stored, processed and distributed to the domestic and regional markets. These activities will, in turn, make the port more attractive to both shippers, shipping lines and logistics providers. From lessons learnt, the synergies between ports and nearby SEZ's has become increasingly important and has been the basis for the success of high performing zones such as Tianjin SEZ in China, Jebel Ali FZ in the UAE, Subic Bay SEZ in the Philippines, Tangier FZ in Morocco, and Pelabuhan Tanjung Pelepas Port (PTP) in Malaysia among others.

A wide variety of logistics services are required to assist the containerized cargo moving through Kingston Port. Some services will be provided within the CSEZ, but others will be provided in facilities closer to the port. Thus, the success of the CSEZ is linked to the success of these other facilities, not only because of synergies between different types of services offered but also because these services contribute to the success of the broader vision of Jamaica as a logistics hub.

Because of this, IDG examined both the port and the CSEZ and developed a logistics strategy for these movements and the storage of goods. The proposed locations for the first three categories are shown in Figure i-4. On-port facilities include the area in the port to the north of the container terminal, which would serve the container cargo and the area to the west of the terminal, which would serve the vehicle cargo. Off-port facilities include Tinson Pen and the warehousing district northeast of Tinson Pen up to Spanish Town Road. The characteristics of these locations and activities are shown in Table i-2.

Source. IDG

Figure i-4. Location for Logistics

Table i-2. Inter-linked Locations for Logistics Activities

Location	Container Terminals	Terminal Backup Area	Tinson Pen	Warehousing District	CSEZ
Area (ha.)	90 +35	50	40	58	~210
Functions	Transshipment	Un-stuffing/ Reconsolidation	Consolidation/ Distribution	Domestic Distribution	Regional Distribution
Inputs	Containers	Cargo	Imports/Exports/ Consumer Goods	Cleared Imports	Intermediate Goods/ Final Products
Turnover	5-14 Days	5-21 Days	2 Weeks-2 Months	2 Weeks-2 Months	3 Weeks-3 Months
Services	Temporary Storage/ Minor Repairs	Temporary Storage/ Clearance/ Minor Repairs	Processing/ Inventory Management	General Warehousing	Processing/ Inventory Management/ Repairs and Warranty Work
Customs Status	Bonded		Partially Bonded		Partially Bonded
Connections	Internal Truck Movements	Internal and External Truck Movements	Bonded Trucks Major Roads/Regular and Bonded Trucks		

Category 1. **Transshipment.** For the container terminal, it will be necessary to allocate additional area for berthing and storage as containers and roll on/roll off (RoRo) traffic increases. Over the next 15 years, it is anticipated that the 1.5 kilometers of wharf concessioned to Kingston Wharves Ltd. (KWL) as multipurpose berths will be converted to container berths to handle the overflow from the existing container terminal This requires that the backup area behind the wharf be converted into container storage yards. The RoRo storage area would be relocated to the western end of the terminal in the area where the soils have limited load-bearing capacity.

Category 2. **Container** activities would be performed in the area to the north of the existing container terminal where the bonded area (CFS) and customs inspection facilities are located. The area would be reconfigured not only to improve the flow of cargo but also to replace older structures with modern transit storage and cargo inspection facilities. As the demand for transit storage and related services increases, this area would be extended east, and the port boundary would be pushed back to Newport Boulevard. The storage activities currently located in this area would be relocated to Tinson Pen or to the nearby general warehousing area, both of which, are currently underutilized.

Category 3. **Short Term Warehousing** activities would be performed in Tinson Pen. This is effectively a 16-ha (40-acre) greenfield site with close proximity to the port. It has been proposed to include this area within the port boundary by constructing a limited-access flyover. However, once the port area has been expanded to include the area up to Newport Boulevard, there should be no need for further expansion. Instead, the site could serve as a near-port logistics platform for storage and distribution of imported goods that have been cleared. These would be primarily fast-moving consumer goods (FMCG) and spare parts. This cargo could be transferred from the container terminal using a nighttime shuttle
service.

Category 4. **Consolidation, Processing, Storage and Distribution** activities would be performed in the CSEZ. The zone would have both bonded and unbonded facilities. Goods would be transferred to and from the port by either 2 public roads or 1 new, dedicated road utilizing the old Jamaica Rail Corporations (JRC) rail right-of-way.

Table i-3. Competitive and Comparative Advantages of Jamaica and the CSEZ

Factors	The CSEZ Jamaica	Barranquilla Atlantico FZ Colombia	Quantum FZ Costa Rica	Las Americas FZ Dominican Republic	Panama Pacifico Panama
Macroeconomic Environment		B	B	B	B
External Risks to Investment		W	B	W	B
Ease of Doing Business		B	B	W	W
Operating Conditions		W	W	E	W
Quality of Life Factors		B	B	B	B

- B – Better than Jamaica
- W –Worst than Jamaica
- E – Equal to Jamaica

7.0 Market Analysis

Chapter 7 is an overview of Jamaica and the CSEZ's competitive and comparative advantages, as well as, a market analysis to determine possible industry sectors for the CSEZ. The chapter includes: i) a comparative benchmarking exercise, ii) a review of key barriers to investment in Jamaica, iii) an evaluation of industry trends, trade agreements, flows and patterns, iv) a summary of key sectors for the CSEZ, and v) industry operating parameters, which will be used in for the demand forecast.

7.1 Competitive and Comparative Advantages

Because the CSEZ will compete for investors/tenants against a number of SEZs, FZs, EPZs and IPs in the Caribbean and Latin American region, IDG undertook a benchmarking exercise to determine the CSEZ's comparative and competitive advantages. At present, Jamaica's key competitors are: i) Colombia, ii) Costa Rica, iii) the Dominican Republic and iv) Panama. Hence, IDG selected zones with similar profiles as the CSEZ to benchmark. These zones were:

- Barranquilla Atlantico Free Zone, Colombia
- Quantum Free Zone, Costa Rica
- Las Americas Free Zone, Dominican Republic
- Panama Pacifico, Panama

The results of the benchmarking (Table i-3) showed that when examining Jamaica's macroeconomic factors such as: i) Total Gross Domestic Product (GDP), ii) GDP annual growth, iii) GDP per capita - Purchasing Price Parity (PPP), iv) inflation rate by percentage, v) population estimates, vi) literacy rate by percentage, and vii) unemployment rate by percentage, Jamaica performed lower than all its competitors. This is most likely because Jamaica has the

smallest population of the benchmarked countries, a significantly lower general literacy rate, and a notably higher unemployment rate. This however could be seen as an advantage for the CSEZ, as Jamaica has an abundant labor ready to work.

On external risk to investment however, using the Cato Institute, the Heritage Foundation and the World Economic Forum Indexes, Jamaica ranked ahead of Colombia and the Dominican Republic but worst than Costa Rica and Panama. The key issues for Jamaica's lower ratings were significant levels of corruption, poor enforcement, and a non-negligible business costs, mostly attributed to crime. Although Colombia ranks lower than Jamaica in its human, personal and economic freedoms, Colombia received the highest FDI out of the benchmarked countries at US$13,593 billion. In 2016, Jamaica received US$790 million in FDI.

Jamaica ranked in the middle of its competitors in the doing business category. According to the World Bank (WB) Doing Business, which ranks 190 countries around the world, Jamaica has made some improvements in its regulatory environment but still ranked 70, compared to Colombia and Costa Rica who ranked 59 and 61 respectively in 2018. Jamaica's strong indicators were for starting a business, enforcing contracts, resolving insolvency and protecting minority investors. These are all considered strengths for attracting new investors to the CSEZ.

When examining operating costs in Jamaica, the cost of land and standard factory space was extremely competitive. Power is more expensive in Jamaica (US$0.18/kWH) than in all other benchmarked countries except for the Dominican Republic (US$0.20/kWH). Water however is US$0.37/m3, which is cheaper than all competing countries except for the Dominican Republic, where water is only US$0.21. Jamaica's monthly salaries are relatively high in all labor categories except unskilled labor, which is US$215/month and the lowest against its competitors. Costa Rica and Panama's unskilled salaries are US$528 and US$416/month respectively.

With regard to the quality of life factors – international level schools, hospitals, entertainment and leisure activities, and safety Jamaica ranks low. Although Jamaica is a beautiful island with sun and beaches, it ranks lower than most benchmarked countries, mainly due to crime and personal safety issues. Also, although Jamaica has a number of international schools, it does not have quality medical facilities, so an expat would most likely go to the USA for any services required.

Table i-4. Potential Investment Sectors for the CSEZ	
Potential Sectors	**Potential Subsectors**
Warehousing/Logistics	Open Storage, Private/Shared Refrigerated Warehouses, Containers (De)Stuffing, Logistics, and Distribution
ICT/BPO	ICT, Call Centers, Back-Office Support, Added-Value Services, Data Mining, and Coding
Creative/Innovation	Artificial Intelligence, Robotics, Sound, Post-Production, Advertising and Graphics, Print, Crafts, Fashion and Jewelry
Furniture	Traditional wood, Part-Assembly, Mattresses and Upholstery, Hospitality and Shop Fittings, and Bespoke
Paper	Paper Products, Medical Disposables, Beauty, Packaging and Labeling
Repairs	Motor Vehicles and Parts, Appliances, and Refurbishment
Metal fabrication	Building Materials, Window and Door Frames, Fences and Gates, and Hand Tools
Textiles	Apparel, Uniforms, and Household Linens
Food & beverages	Canned foods, Fruit and Nut Preparations, Confectionery, Snacks, Specialty and Gourmet Preparations, Shared Packing and Research and Development
Pharmaceuticals	Health and Beauty, Specialty Oils, and Optical Devices Assembly
Plastics	Bottles and Containers, Household Goods, Furniture, Plastics for Industrial Use, Pipes, and Films
Other	Hospitality, Technical Training, and Business Incubators

7.2 Barriers to Investment

IDG surveyed foreign and domestic investors to identify their top five barriers to investment in Jamaica. Not surprisingly, the cost and availability of electricity was ranked as the number 1 barrier to investment, followed by bureaucracy, lack of government support, poor work ethic of the labor force, and lack of industrial land and facilities. Other barriers, which were highlighted were: i) security and crime, ii) quality of life (wealth inequities), iii) quality of the workforce, and iv) too much government involvement for the CSEZ.

7.3 Market Analysis

Over the years a number of studies have been prepared to determine the potential industry sectors for the CSEZ. These studies focused on traditional exports and existing production, which had merit. However, IDG believes that the CSEZ is a **'game-changer,'** as it offers an opportunity to explore new ground in Jamaica, utilizing the new legal, regulatory and institutional environment put in place through the SEZ Act and being central to the LHI strategy. With government working with the private sector - new technologies, products, services, and markets could be developed. It is in this context, IDG utilized a broader range of investment data to widen the range of potential industry sectors. As such, IDG's detailed market analysis identified 11 potential sectors for the CSEZ. (Table i-4) IDG prepared profiles for each of these industries identifying their land, pre-built facilities, power, and water requirements, as well as, the sector's employment potential. These requirements were used as the basis for the demand forecast for the CSEZ.

Table i-5. Summary of Demand Forecast for the CSEZ (20-Yr)			
Demand Projections For:	**Conservative Case**	**Base Case**	**Aggressive Case**
Investors/Tenants	33	**82**	149
Land (Gross Land) (Ha/Acres)	83/205	**204/504**	364/899
Land (Net Land) (Ha/Acres)	64/158	**157/388**	280/692
Pre-Built Facilities (Ha/Acres)	6/15	**15/38**	28/69
Power (Monthly MWh)	4,610	**11,305**	22,630
Water (Monthly m^3)	213,850	**792,900**	1,757,200
Employment	20,058	**47,005**	71,223

Source. Gensler
Figure i-5. The CSEZ Master Plan

8.0 Demand Forecast

Chapter 8 identifies: i) a demand methodology, ii) three demand scenarios – a conservative, base, and aggressive case – with associated assumptions, and iii) 20-year demand projections for tenants/investors, land, pre-built factories, electricity, water, and employment generation for the CSEZ. Table i-5 shows the 20-year demand forecast for the CSEZ under each scenario.

From the demand forecasts, it can be determined that the CSEZ would require approximately 83-ha (205-acres) of gross land under the conservative case scenario, 204-ha (504-acres) under the base case scenario, and 364-ha (899-acres) under the aggressive scenario.

9.0 A Concept Master Plan

Chapter 9 presents the planning framework for the CSEZ, which includes: i) an overview of the existing conditions in the CEDA, ii) an examination of the CSEZ lands, iii) planning principles, iv) a master plan, land use plan, zoning plan, and phasing plan, and iv) urban design guidelines. The master plan was developed from the findings in the Market Analysis and Demand Forecast Chapters in this feasibility study.

9.1 The CSEZ Master Plan

The CSEZ Concept Master Plan (Figure i-5) is based on the following development principles:

- The master plan responds directly to the topography of the site.
- The master plan respects the uniqueness of the surrounding natural environment and highlights its biodiversity.
- The zone is fenced, secured and monitored to guarantee a safe environment for all tenants and their investment/products/goods.
- Customs is available 24/7 within the zone to support tenants and aid the logistics of the CSEZ.
- An administrative/commercial/retail area is located at the entrance of the zone to provide business support and associated amenities to investors.
- There is a road hierarchy within the zone to support and improve the traffic flow of trucks, vehicles, and pedestrians within the zone.
- The design of the CSEZ is flexible in order to support a change in market demand through a 20-year period. Plots are 0.5 ha in size and can be assembled or divided to provide investors/tenants with the amount of land required for their specific businesses.
- The master plan provides a variety of open spaces/parks in and around the CSEZ to allow workers and visitors to gather, socialize and exchange ideas in a comfortable, relaxed environment.
- The master plan provides a number of quality of life conditions, which improves and enhances the work, live and play experience for tenants and visitors in the CSEZ.

Source. Gensler
Figure i-6. The CSEZ Land Use Plan

Table i-6. Summary of Leasable Land within the CSEZ Project

Land Use	Area (Ha)	Area (M^2)	Area (Acres)
LEASABLE LAND			
Industrial Plots (Serviced Land)	118.38	1,183,800	292.50
Pre-Built Factories (Units for Lease)	16.68	166,700	41.20
Commercial Plots (Offices/Retail/Incubators)	3.88	38,800	10
Energy Plots (Serviced Land)	39.31	393,100	97.10
TOTALS*	**182.51**	**1,825,100**	**451**

*All numbers above have been rounded

9.2 The Land Use Plan for the CSEZ

The CSEZ is a mixed-use zone, which supports the following land uses: i) industrial, ii) commercial/retail, iii) administrative/institutional, iv) logistics, v) utilities, and vi) open space.

In Figure i-6, the land uses are denoted as:

- Industrial – Purple
- Industrial for Pre-Built Factories/Warehouses – Turquoise
- Industrial for Energy/Logistics – Orange
- Commercial/Retail/Administrative/Institutional – Red Striped
- Utilities – Grey
- Open Space – Green

9.3 The Zoning Plan for the CSEZ

A Zoning Plan was prepared for the CSEZ master plan. Each land use was given a maximum density, building coverage, height limit and minimum setback requirements. The following zoning is proposed for the CSEZ: (Table i-7)

Table i-7. Zoning for the CSEZ Project

Land Uses	Max. Density (FAR)	Max. Building Coverage (%)	Max. Building Height (m)	Min. Front Setback (m)	Min. Side Setback (m)	Min. Rear Setback (m)
Commercial	2	50	12	10	10	10
Industrial	1	75	8	5	5	5
Utilities	0.5	50	N/A	15	15	15
Open Space	0	0	0	0	0	0

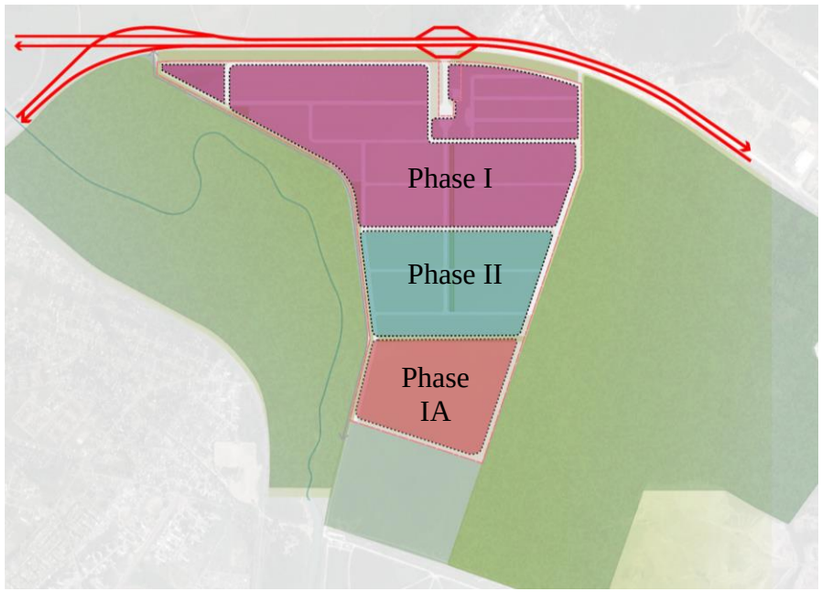
9.4 The Phasing Plan

The CSEZ will be implemented in two phases. Phase I of the project contains the administrative/commercial area, the pre-built factory area, and approximately two-thirds of the industrial plots. Phase II is the remaining industrial land for the project. The land designated for the energy area remains flexible, so it can be used either in Phase I or II depending upon demand.

Table i-8. Phasing for the CSEZ

Phase	Industrial (m^2)	Pre-Builts (m^2)	Commercial (m^2)	Energy (m^2)	Utilities (m^2)
Phase I	766,650	166,700	38,800	0	42,650
Phase 1A	0	0	0	393,100	0
Phase II	1,183,800	0	0	0	0

*All numbers above have been rounded



Source. Gensler
Figure i-7. The CSEZ Phasing Plan

10.0 Infrastructure Assessment, Concept Infrastructure Plans and Cost Estimates

Chapter 10 presents the: i) infrastructure/utility requirements for the CSEZ, ii) concept infrastructure/utility plans for roads, power, water, drainage, sewerage, and telecom and iii) cost estimates for the project in accordance with the master plan. The infrastructure/utilities and core buildings for the CSEZ were designed to be environmentally-friendly and incorporate green technology, wherever possible. IDG also explored a number of types of power options for the CSEZ ranging from obtaining electricity from the national grid to various LNG power plant scenarios in order to bring in or supply power to the project at a reduced cost to tenants.

The total on-site costs for the CSEZ project is estimated at **JD$23,828,111,549** or **USD$183,293,166.** Of this amount, the total on-site core infrastructure/utilities costs are estimated at **JD$15,052,461,549** or **USD$115,788,166.** The construction of infrastructure/utilities for Phase I will be **JD$10,516,045,957** or **USD$80,892,661** and Phase II will be **JD$4,536,415,592** or **USD$34,895,505**. Hence, key on-site infrastructure and utility infrastructure for the CSEZ will cost approximately **JD$6,461.78/m^2** or **USD$49.71/m^2**, which is indicative for developing a zone on an island. The core buildings and pre-built factories/warehouses will be constructed under Phase I at an estimated cost of **JD$8,775,650,000** or **USD$67,505,000.** The off-site infrastructure/utility costs for the project are **JD$4,950,299,909** or **USD$38,079,230,** which makes the total on and off-site project costs **JD$28,778,411,457** or **USD$221,372,396**.

11.0 Financial Analysis

Chapter 11 examines the financial and economic feasibility of the CSEZ from the perspective of the GoJ and the developer. This includes: i) identifying key assumptions/variables used to populate the financial/economic model, ii) examining the financial/economic viability of the CSEZ project and undertaking analysis of different scenarios, iii) selecting the preferred development scenario, which achieves the highest IRR, ERR and NVP and the least financing costs for the GoJ, and iv) undertaking sensitivity testing on the preferred option to identify areas/impacts of stress, which could alter the project's IRR to the developer.

The financial/economic model developed by IDG is a live, flexible model, easily used by the GoJ to update costs, if the CSEZ project gets delayed. The model allows for a comprehensive analysis of all revenues, benefits, costs, and cash outflows for the CSEZ project. The key variables used in the model were:

Table i-9. Key Variables	
Variables	**Values**
Land Details	
Land Area	**Phase I**: 186.187 Hectares **Phase II**: 49.641 Hectares **Total: 235.828 Hectares**
Industrial Land	**Phase I**: 98.562 Hectares **Phase II**: 41.716 Hectares **Total: 140.278 Hectares**
Land for Pre-Built Factories/Warehouses	**Phase I:** 16.675 Hectares **Phase II:** 0.000 Hectares **Total: 16.675 Hectares**
Land for Commercial Buildings	**Phase I:** 16.675 Hectares **Phase II:** 0.000 Hectares **Total: 16.675 Hectares**
Capital Infrastructure	
Earthworks	**Phase I:** USD$ 8.786 Million **Phase II:** USD$ 0.000 Million **Total: USD$ 8.786 Million**
On-Site Infrastructure	**Phase I:** USD$ 139.612 Million **Phase II:** USD$ 34.895 Million **Total: USD$ 174.507 Million**
Off-Site Infrastructure	**Phase I:** USD$ 38.079 Million **Phase II:** USD$ 0.000 Million **Total: USD$ 38,079 Million**
Financial Analysis	
General Inflation Rate	4%
Power Inflation Rate	2%
Discount Rate	12% Base, and Tested 15%
Developer Equity	50% and 70% in Sensitivity Analysis
Interest Rate	7% and tested 9% in Sensitivity Analysis

Table i-9. Key Variables	
Variables	**Values**
Repayment Period	10 Years and tested 15 and 20 years for phase I
Lease Variables	
Land Annual Lease from GoJ to Developer	USD$ 2
Land Annual Lease per m^2	USD$ 13.5 (Starting Rate)
Pre-built Annual Lease per m^2	USD$ 85.0 (Starting Rate)
Lease Inflation Rate	4%
Power Variables	
JPS Power Grid	Margin: 0%
JPS LNG Plant	Margin: 10%
CSEZ Own LNG Power Plant	Margin: 15%

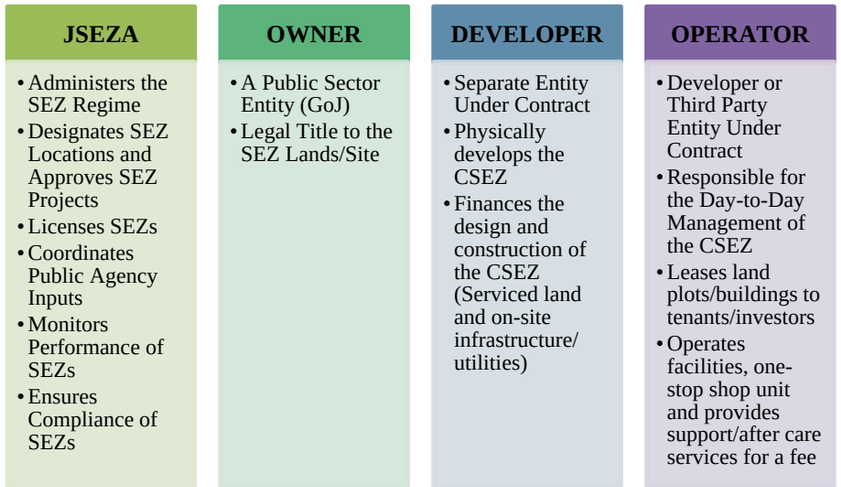
Ten development scenarios were prepared and analyzed for the CSEZ project to determine:

- **Project ERR and Project Economic NPV:** This is the economic rate of return and economic net present value for the CSEZ project over a 22-year period.
- **Project IRR and NPV for the Developer:** The project's internal rate of return and net present value for the private developer over a 22-year period.
- **Project IRR and NPV for the GoJ:** The project's internal rate of return and net present value to the GoJ over a 22-year period.
- **Onsite Infrastructure:** The amount of money required to be invested in onsite, capital infrastructure.

Table i-10. Preferred Development Scenarios		
Details	**Scenario 2**	**Scenario 8**
Demand	**Base Case**	**Base Case**
Power Scenario	**JPS LNG Power Program**	**JPS LNG Power Program**
IRR/ERR		
Dev IRR	**12.33%**	**12.61%**
Project IRR	**13.97%**	**14.99%**
Project EIRR	**61.03%**	**61.03%**
NPV		
Dev NPV	**$6**	**$10**
Project NPV	**$43**	**$65**
Project Eco. NPV	**$5,979**	**$5,979**
GoJ NPV	**$1,487**	**$1,449**
Discount Rate for NPV	**12%**	**12%**
Concession		
Lease to GoJ (US$) per m^2	**US$ 2**	**US$ 4**
Percentage of Profit to GoJ	**0.00%**	**0.00%**
Financing Terms		
Interest	**7%**	**7%**
Repayment Period	**10 Years**	**10 Years**
Onsite Infrastructure		
Loan on Developer	**70.00%**	**70.00%**
GoJ	**0.00%**	**0.00%**
Grant	**0.00%**	**0.00%**
Developer	**30.00%**	**30.00%**
Offsite Infrastructure		
Loan on Developer	**50.00%**	**0.00%**
Developer	**50.00%**	**0.00%**
GoJ	**0.00%**	**100.00%**

It is IDG's understanding that the GoJ is not interested in providing off-site infrastructure to the project as proposed under Scenario 8. In this case, the following are the key assumptions for Scenario 2, which is then the 'preferred' development scenario for the CSEZ. Details for both options are listed in Table i-10. An overview of the key assumptions for Scenario 2 are presented below:

- The potential developer of the CSEZ should provide power to the zone via the JPS LNG Power Plant Program and charge a 10% margin on the sale of power to the CSEZ tenants.
- The potential developer of the CSEZ should finance 30% of the on-site infrastructure costs, 50% of all off-site infrastructure costs and finance the rest of the project through loans.
- The potential developer pays the GoJ a lease rate of USD$2/$m^2$ for the use of land.
- The lease rates for the CSEZ should be USD$13.50/$m^2$ for serviced industrial land and USD$85/$m^2$ for pre-built factories.



Source. IDG
Figure i-8. Governance Framework for the CSEZ

12.0 Development Framework

Building on the results of the financial modeling, Chapter 12 identifies a concession agreement as the preferred development model for the CSEZ. This would be a long-term concession of 30-years with an option to extend or return the asset to the GoJ as a build-operate-transfer (BOT) project.

13.0 Implementation Action Plan

Chapter 13 outlines a 24-year Implementation Action Plan for the CSEZ. The plan identifies: i) the key steps, ii) actions/activities, iii) responsibilities, iv) timeframes, and v) milestones, which are required by the GoJ and the developer in order to effectively and efficiently implement the CSEZ project throughout its life cycle.

The Implementation Action Plan for the CSEZ was developed using a three-phased approach – i) a Developer Search/Selection Phase, ii) a Transitional Phase, and iii) an Operational Phase.

- **The Developer Search/Selection Phase** covers Years -4 to -2, when a developer is identified and selected through a transparent and accountable tender process and pre-construction requirements for the CSEZ are undertaken.

- **The Transitional Phase** covers Years -2 to 0 when the construction of the CSEZ is undertaken and the developer is able to start leasing land within the CSEZ.

- **The Operational Phase** starts in Year 0 and denotes the activities required during the short, medium and long-term of the CSEZs life-cycle. In Year 0 through 1, the initial tenants of the CSEZ are able to begin construction of their facilities.

The timeframes proposed in the Implementation Action Plan are 'average time periods' using best practices. During the implementation of the CSEZ project, these timelines may vary (be lengthened or shortened), as appropriate.

The Implementation Action Plan has been divided into the following components.

- The Developer Search Program
- The Developer Selection and Institutional Strengthening Program
- The Pre-Construction Program
- The CSEZ's Site Development Program
- The Off-Site Infrastructure Program
- The Marketing and Promotions Program
- The Communications Program

Each program has a table with a corresponding write up for implementation.

Table i-11. The Developer Search Program

Steps	Actions/Activities	Key Responsibility	Year -4				Year -3				Year -2				Year -1				Year 0			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1.	Prepare a TOR for a Consulting Firm	GoJ																				
2.	Hire a Consulting Firm to Undertake a Developer Search for the CSEZ	GoJ																				
3.	Prepare CSEZ Offerings Package	CONSULTANT		*																		
4.	Organize a Developer Conference (Location/Date)	CONSULTANT/GoJ																				
5.	Identify List of Potential Developers	CONSULTANT																				
6.	Prepare and Send Invitations to Potential Developers with the CSEZ Offerings Package	CONSULTANT																				
7.	Track and Assist Attendees to the Developer Conference	CONSULTANT																				
8.	Prepare a PPT and Hand-Outs on the CSEZ for Developers	CONSULTANT																				
9.	Prepare Additional Promotional Materials for the Developer Conference	CONSULTANT																				
10.	Hold the Developer Conference	CONSULTANT/GoJ			*																	

Chapter One
Introduction

1.0 Background

To help jumpstart Jamaica's economy, the Government of Jamaica (GoJ) spearheaded the Logistics Hub Initiative (LHI), a strategy to leverage the country's strategic geographical location in order to position itself as a global leader in cargo transshipment and logistics services. One of the premier projects under the LHI is the Caymanas Special Economic Zone (CSEZ). The CSEZ is to be the flagship SEZ in Jamaica and one of the first zones developed under the new Special Economic Zone (SEZ) Act of 2016. (The Act repealed the old Export Free Zone legislation replacing it with a new, modern SEZ regime and framework.) Together the LHI and the SEZ Act are intended to help stimulate economic development, attract Foreign Direct Investment (FDI) and new technologies to the country, and encourage manufacturers to engage in value-added activities for goods transshipped through Jamaica.

In order to better understand the economic, financial and market aspects of the CSEZ project, the GoJ commissioned the CSEZ Feasibility Study. This study is funded by the World Bank's (WB) Foundations for Competitiveness and Growth Project (FCGP). The FCGP is aimed at strengthening the business environment in Jamaica for private sector investment. The CSEZ study falls under Component 2: Facilitating strategic private sector investments through a Project Preparation Facility for private-public partnerships (PPPs), divestments and other strategic investments. The CSEZ project is being implemented and managed by the Planning Institute of Jamaica (PIoJ), in collaboration with the Caymanas Enterprise Team, and the Jamaica Special Economic Zone Authority (JSEZA).

The CSEZ Feasibility Study was undertaken between June 2017 and October 2018 by the International Development Group (IDG). The CSEZ Phase I report was delivered to the Caymanas Enterprise Team on January 31, 2018. The report's key findings were presented to the GoJ in a Stakeholder Workshop in early February 2018. At that time, the Phase I recommendations were to move the CSEZ to the north site of the Caymanas Estates Development Area (CEDA). The report was accepted by the GoJ in March 2018 and the Phase II work began by the IDG team. In May 2018, IDG was directed by the GoJ to re-locate the CSEZ to the south site of the CEDA and as such, IDG designed the CSEZ project accordingly.

2.0 The CSEZ Project Team

IDG together with its United States (US) and Jamaican partners – Gensler (G) and Fluid Systems Engineering (FSE) – were awarded the CSEZ Feasibility Study in June 2017. The IDG Team is a consortium of international advisors specializing in the planning, development, and implementation of SEZ's world-wide.

IDG's Project Team included the following key experts: i) Deborah Porte, (Team Leader), ii) John Arnold, (Transportation/Logistics), iii) Maurice Jones, (Hydrology/Drainage/Engineering), iv) Carlos Cubillos, (Master Planner/Architect), v) Chia Chang (Master Planner), vi) Donovan James (Electrical Engineer), vii) Denise Forest, (Social/Environmental), viii) Tania d'Allonnes (Economist), ix) Ahmad Al Azaam (Financial/Economics) and x) Maurice Diamond (Development Framework). Additional support was provided by David Snelbecker, CEO of IDG and Engagement Manager, IDG Senior Operations Manager, Jessica Tolliver, IDG Project Coordinators Oana Mermeze and Hilary Eaton from IDG's Headquarters in Arlington Virginia, and Project Assistants Amahl Clarke and Trojean Burrell in Kingston, Jamaica, as well as, Fountain Jones (Hydrology Modeler) from FSE. Throughout the CSEZ Feasibility Study, the IDG Team worked directly with Melvin Smith (PIoJ), Professor Gordon Shirley (Head of the Enterprise Team) and Dr. Eric Deans (JSEZA) and their teams. IDG would like to thank the above, as well as the CSEZ Enterprise Team members for their inputs into this study and the generous time provided to IDG in preparation of this study.

3.0 Terms of Reference

The main objective of this project was to prepare a comprehensive feasibility study for the CSEZ, which identifies the preferred location, the proposed markets and demand for the zone, and determines the highest and best land uses, development option, phasing, and infrastructure/utility requirements for the CSEZ in a manner that is financially viable to attract a private developer via a public private partnership (PPP) agreement.

In accordance with the Terms of Reference (TOR), the feasibility study was undertaken in two phases. At the end of both phases, a report and a Client/Stakeholder Workshop was held.

Phase I of the CSEZ Feasibility Study contained six tasks:

Task 1. A Vision for the CSEZ
Task 2. A Site Assessment
Task 3. A Drainage Study for the CEDA
Task 4. A Transport Assessment
Task 5. A Market Analysis
Task 6. A Demand Forecast

Phase II of the Study was comprised of five tasks:

Task 7. A Concept Master Plan
Task 8. An Infrastructure Assessment, Plans and Cost Estimates
Task 9. A Financial Analysis
Task 10. Identification of a Development Framework
Task 11. An Implementation Action Plan

4.0 Methodology and Approach

Below is an overview of IDG's methodology and approach for the feasibility study:

- **Date Collection and Due Diligence.** The collection, review, synthesis, and analysis of the background materials, documents, reports, maps and statistics for the CEDA area, as a whole. This included individual meetings with key public and private stakeholders to discuss the CSEZ project and a Client/Stakeholder Workshop for 50 persons, at the start of the project.

- **A Vision and Value Proposition.** The preparation of a vision for the CEDA and a vision and value proposition for the CSEZ, which optimizes the development potential of the CSEZ and its surrounding lands by identifying strategic locational advantages, appropriate land uses, and supporting activities, which bring the greatest value to the project. The intent of the vision and value proposition is to also align with the LHI and maximize the economic and social cost/ benefits to Jamaica and the GoJ.

- **A Site Assessment.** An examination of the CEDA North and South areas to determine the strengths, weaknesses and threats of the lands, set out opportunities and constraints, and identify any fatal flaws or deal breakers, which would make the CSEZ project or the development of the CEDA North or South areas non-viable or problematic. This assessment is also key in identifying the 'preferred' location for the CSEZ in order to enlarge the projects development potential as a 'regional hub' and to increase the attractiveness of the SEZ for developers and investors. (Note: The Phase I report identified the North area of the CEDA as the 'preferred' location of the CSEZ. At the GoJ's request, the CSEZ site was later changed to the CEDA

South area. For reference purposes, the GoJ has requested that the initial site recommendations be left in the final feasibility study.)

- **An Environmental and Social Review.** A review of the applicable environmental and social laws and regulations in force in Jamaica and a high-level examination of the CEDA North and South areas to identify key environmental/social issues, concerns or opportunities for development of the CSEZ and associated activities. The review was undertaken using secondary information and materials and site visits to the CEDA.

- **A Hydrology and Drainage Study.** The preparation of a topographic survey for the CEDA South area and an examination and analysis of the hydrology and hydraulic issues on the CEDA North and South catchment areas. The intent is to provide initial drainage recommendations to mitigate storm water and drainage flows on both sites.

- **A Transportation and Logistics Assessment.** A review of Jamaica's LHI strategy and reports prepared by Nathan in 2017, an examination of the regional sea and air cargo flows and patterns in the region, as well as, an assessment of the transportation facilities and networks (air, road, rail and sea) in Jamaica. In addition, a logistics strategy for the CSEZ and the port of Kingston in order to optimize their inter-relationship was prepared by IDG.

- **A Market Analysis.** An analysis of barriers to investment in Jamaica, current market conditions and future industry sector trends and requirements. This includes an investor survey, benchmarking the CSEZ's regional competitors to identify Jamaica's competitive and comparative advantages, and the examination of the country's trade and investment policies, agreements, and statistics. From this, a list of industry sectors was proposed for the CSEZ and profiles for each sector were created.

- **Demand Forecast.** The estimation of investors/tenants, land, pre-built facilities, power, and water requirements for the CSEZ, as well as, identifying employment potential over a 20-year period. This information is required for the design of the CSEZ and its phasing.

- **Master Planning.** The preparation of planning principles, a master plan, a land use plan, a zoning plan, a phasing plan, and urban design guidelines, which creates a comprehensive planning framework for the CSEZ

project. The intent is to optimize the use of land in the CSEZ and provide guidance to a future developer for the implementation of the project.

- **Infrastructure Assessment, Plans and Cost Estimates.** An assessment of on and off-site infrastructure and utility requirements for the CSEZ and conceptual infrastructure/utility plans for the project. These plans are based on the CSEZ master plan and are required in order to prepare cost estimates for the project. The project costs are the key inputs into the financial and economic model.

- **Financial Analysis.** The preparation of a financial and economic model, which identifies the CSEZ's project internal rate of return (IRR) and economic rate of return (ERR) under a variety of scenarios. This data along with the project's Net Present Value (NPV) are the key indicators of the CSEZ's viability and attractiveness to a developer. Sensitivity testing was undertaken on the 'preferred' development scenario to identify any impacts on the IRR, ERR and NPV, if costs change over time.

- **Development Framework.** The development framework is closely linked to the financial/economic model results. The framework examines different development options for the CSEZ and identifies the best development model for the project in order to minimize the project's risks and optimize the project's returns.

- **Implementation Action Plan.** This is a short, medium and long-term implementation action plan with steps, actions/activities, milestones, responsibilities and timeframes for the implementation of the CSEZ project. It includes programs for: i) a developer search, ii) a developer selection/implementation strengthening, iii) site development, iv) off-site infrastructure/utilities development, v) marketing and promotions, and v) communications.

5.0 Stakeholder Engagement

One of the key pillars of a feasibility study is stakeholder engagement. IDG believes strongly in stakeholder engagement throughout the entire study, however, it is often most important at the start of a study - as it is imperative to understand the main stakeholder's goals, objectives and perspective of a project. As such, during the inception mission, IDG met individually with key public and private stakeholders[1] to discuss: i) Jamaica, ii) the CSEZ project,

[1] List of Stakeholders. Appendix B

iii) SEZ's in general, and iv) to learn about their vision for the CSEZ. Once these meetings were completed, IDG held a Client/Stakeholder Workshop to review their findings with the larger audience and obtain their inputs and feedback before beginning to develop IDG's strategic vision and value proposition for the CSEZ. The following is an overview of the key takeaways from IDG's initial examination of the project and stakeholder discussions:

5.1 Jamaica and Greater Kingston

- **Greater Kingston is changing.** Greater Kingston is poised for change. There are a number of new private and public-sector projects proposed in Greater Kingston, which will create new investment opportunities in the country. Some examples are: i) the Logistics SEZ at the Port of Kingston, ii) the privatization of the Norman Manley International Airport, iii) the Vernamfield Development, iv) the Tinson Pen Aerodrome, and v) the diversification and proposed growth of Kingston Wharves Ltd. etc.

- **Jamaica first.** IDG found that all stakeholders interviewed expressed a consistent message of 'Jamaica First.' All parties stressed that they wanted to do the 'best for Jamaica' and this message was clear and central in all stakeholder discussions.

- **Innovation is paramount.** Stakeholders interviewed specified their interest in and their commitment to 'innovation, technology improvements, and out of the box thinking' when discussing new projects in Greater Kingston. (There are a number of exciting ideas and forward-thinking strategies being proposed in Jamaica by leaders in the business community. Many stakeholders told IDG how Jamaica had lost out on a number of potential investments in the past, and as a country, Jamaica now needs to leapfrog over its competitors and focus on innovation and future trends to become the Caribbean's foremost regional destination.

- **Alignment of investment projects with the CSEZ is required to create new synergies and opportunities.** To get the 'biggest bang for Jamaica's buck,' all new projects being proposed in Greater Kingston need to be aligned to help create new opportunities, synergies, and linkages with the CSEZ. This will give the CSEZ the best chance to be a success.

5.2 The Caymanas SEZ Project

- **Political will for the CSEZ is in place.** Although top decision-makers are under significant pressure to rapidly move the CSEZ project forward, the GoJ is committed to the CSEZ feasibility study and to the goal of preparing the best possible project for Jamaica.

- **Caymanas SEZ is a flagship project for Jamaica.** There is unanimous agreement amongst stakeholders that Caymanas SEZ is a national priority, a flagship project for the Logistics Hub Initiative (LHI) and must succeed.

- **Caymanas SEZ should be a regional destination.** The CSEZ project should be a regional destination, building upon upcoming strategies proposed for the LHI. It will be critically important to ensure the agendas of the LHI and CSEZ are strategically linked to capitalize on making Jamaica and the CSEZ the foremost regional destination and leader in the Caribbean.

- **Innovation will be the key to the CSEZ.** The vision for the CSEZ must be big, bold, and innovative. That means the SEZ must offer its developer and investors something that cannot be found elsewhere in the region.

- **Commitment to the environment is necessary.** The GoJ understands the value of preparing an environmentally friendly/compliant SEZ to make this zone an attractive project for new investors. Today, corporations have a commitment to preserving the environment and search for locations that meet their high environmental standards.

- **Competing projects and interests must be managed.** There are a number of projects currently being reviewed by the GoJ, which could impact or affect the success of the CSEZ. The GoJ should carefully review new projects with an eye to supporting the CSEZ and its development. New projects should complement rather than compete with the CSEZ.

- **Demand for the CSEZ project must be protected.** To give the CSEZ the best opportunity to succeed, demand must be protected. If competing industrial or SEZ projects like those proposed by China Harbour Engineering Company (CHEC) and the Factories Corporation of Jamaica (FCJ) are implemented before the CSEZ, then demand for this project will be compromised in the short-term. Instead, these projects should be considered within the greater objective of the CSEZ project and harmonized in order to get the best outcome for Jamaica.

- **Link the CSEZ with the future achievements and successes of CMA.** It will be important, at least in the short-term, to link the first phase of the CSEZ with the strategic growth plans for the Port of Kingston. As such, the growth of the port and increased TEUs should be leveraged in the next 3-5 years to create new synergies between the port's activities and the CSEZ's future development.

- **Branding the CSEZ is important.** The CSEZ must be properly branded to help create added value for the project and to help create a regional and international buzz.

- **A communication plan for the project is necessary.** A detailed communication plan for the CSEZ project should be developed to ensure that residents of the CEDA, Kingston, Portmore and Spanish Town are kept abreast of the project and its implementation. Lessons learnt shows that early communication with the private sector, community leaders, and civil society will limit stakeholder dissatisfaction and promote greater project buy-in.

- **Security issues must be planned for and managed.** In today's world, investors are looking for secure environments to do business in. To ensure the best investment environment for the CSEZ, security solutions must be built into the SEZ program. This will add value to the CSEZ project, create opportunities for the local population, and reduce potential conflicts in the future.

5.3 Additional Stakeholder Engagement

Throughout the CSEZ project, the IDG Team continued to meet with public and private sector stakeholders as well as with the Enterprise team to obtain their inputs and feedback. A Stakeholder Workshop was undertaken at the end of the Phase I report for the GoJ and the Enterprise Team. In July 2018, IDG presented the draft Master Plan to the CSEZ Enterprise Team for comments and impressions. In October 2018, IDG held the final CSEZ Feasibility Study Workshop with the Enterprise Team.

Chapter Two
Vision for the CEDA/CSEZ

1.0 Overview

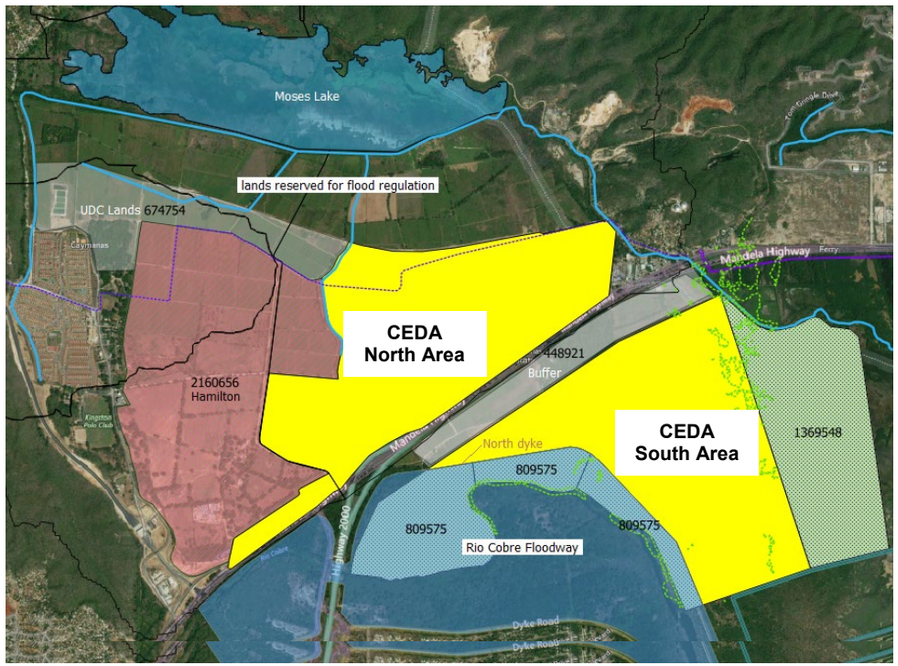
This chapter presents: i) the CEDA and the site for the CSEZ, ii) a vision for the CSEZ project and the CEDA, and iii) an initial value proposition for the CSEZ.

2.0 The CEDA and the CSEZ

The CSEZ is to be located in the CEDA. The CEDA falls within the parishes of St. Catherine and St. Andrew and is split by the Mandela Highway. The entire CEDA is comprised of 1,201-ha (2,968-acres) of land and currently acts as a greenbelt between Kingston and St. Andrew to the east, Portmore to the south, and Spanish Town to the west. The largest land owners in the CEDA are the Urban Development Corporation (UDC) and Alexander Hamilton.

The CEDA, north of the Mandela Highway, is bounded by the Ferry River to the east, the Toll Road to the west, Mandela Highway to the south and the foothills to the north. This area contains Moses Lake, the Caymanas Golf and Country Club, the Caymanas Polo Club, the New Era Housing project, Digecel, a number of existing communities, and sugar cane fields.

The CEDA, south of the Mandela Highway, is bounded by the Mandela Highway to the north, the Rio Cobre to the west, the Soapberry Wastewater Treatment Plant to the south-west, the old Jamaica Railway Corridor to the south, and the Ferry River and the Riverton Solid Waste Facility to the east. The lands are also low-lying, flat, crop lands and act as a flood catchment area for the CEDA.



Source. FSE/Google Earth

Figure 2-1. The CEDA North and South Areas within the Boundaries of the CEDA

The 'preferred location' for the CSEZ in the Phase I report was the CEDA North area, which is approximately 286.62-ha (708.3-acres) in size and is situated between the Mandela Highway to the south, Moses Lake to the north, the Ferry River to the east, and the western drain to the west. These lands are low-lying, flat, crop lands and owned by UDC. (Figure 2-1)

In IDG's original TOR and in May 2018 at the GoJs request, the CSEZ project was re-located to the CEDA site, south of Mandela Highway. This site is referred to as the CEDA South area, which is approximately 425[1]-ha (1,050-acres). Because of the site's hydrology and environmental issues, the development envelope for the CSEZ had to be reduced to 236-ha (583-acres). The site's complexities along with the Soapberry Wastewater Treatment Plant and Riverton Solid Waste Facility on its boundaries, makes the CSEZ project more challenging to develop in this location.

3.0 Vision for the CEDA and CSEZ

IDG prepared a vision for both the CEDA and the CSEZ, which is intended to: i) maximize the development potential of the CEDA, ii) create more value for the CSEZ, and iii) provide greater benefits to Jamaica.

The visions for both the CEDA and CSEZ are '**bold**, **innovative and based on excellence'**. To realize the vision and all its backward and forward benefits, the GoJ must stand firm on its commitment to support this project and provide champions to overcome potential hurdles. The GoJ must also engage the private sectors and civil society early on, to gain their inputs and needed support.

[1] All numbers in this report have been rounded up.

3.1 Vision for the CSEZ

The vision for the CSEZ is as follows:

The CSEZ is to be the '**flagship SEZ'** for the country. Because Jamaica is strategically positioned, the CSEZ will become an '**regional hub'** and '**the**' location for international business' in the Caribbean/LAC region and beyond. The CSEZ will attract foreign and domestic investors and provide seamless, multi-transport/logistics (sea, air, road) to support a broad range of vibrant and up-and-coming sectors. The CSEZ will be constructed with state-of-the art infrastructure and utilities, a focus on green technology and sustainability, and a commitment to the environment. The zone will spearhead new industry trends, sponsor value added production, and employ new technologies to put the CSEZ at the forefront of innovation around the world. In addition, the zone will offer a One-Stop Shop (OSS) with streamlined and fast-tracked services and after-care facilitation to its investors. With Customs on-site and available 24-hours, an investor will be able do business how and when they like, within a secured environment. For Jamaica, the CSEZ will attract new investment opportunities, growth in exports, diversification in industry sectors, the transfer of new technologies, and a variety of new exciting jobs for the Jamaican population.

3.2 Vision for the CEDA

For this vision to be realized, Jamaica will require '**a grander vision'** to set it apart from its competitors. Hence to maximize the success of the CSEZ, it must be placed within the following vision for the CEDA:

The CSEZ will be the focus of a comprehensive, integrated development plan for the CEDA as a whole, creating a dynamic, multi-faceted live, work, and play environment for investors, Jamaicans and visitors alike. The CEDA development plan will package the site's: i) strategic location, ii) natural landscape and beauty, iii) views over Greater Kingston, iv) unique biodiversity, v) heritage, and vi) supporting amenities with the CSEZ at its center, and the catalyst for programed/phased growth.

The CEDA development plan locates the CSEZ on the CEDA South area (as defined in Section 2 above) and the SEZ becomes the anchor for the area's comprehensive development plan. The CSEZ grows in a phased manner and connects, links and supports a combination of commercial, retail, entertainment, boutique hotels, residential and institutional land uses, which are planned on the CEDA North area. The interaction between the CSEZ and these

supporting land uses on the CEDA North area must be prioritized to allow important synergies to be created between the lands. Directly adjacent the CSEZ on the CEDA's North area site, should be a commercial/retail/institutional area with a campus-like atmosphere, which will help support and stimulate investment on the northern boundary of the CSEZ lands.

West of this commercial center on the CEDA North lands should be areas dedicated to residential development. The housing typologies in this area should be varied and built to international standards (villas, single-family houses, townhouses, and apartment buildings) to accommodate a mix of foreign and Jamaican entrepreneurs and professional, workers and visitors. To take advantage of the panoramic views from the CEDA (Hunts Bay, Portmore, Greater Kingston, and the Blue Mountains), vertical living should be permitted within the CEDA, hence, allowing for mid-rise/tall apartment buildings with wide balconies for outdoor living. These buildings should offer a range of services (gyms, business, tennis, and wellness facilities, butler service, and swimming pools).

Critically important to this vision and maybe the element, which will propel the CSEZ project into becoming **'the international business location to invest in**,' is the incorporation of the CEDA's natural beauty, diverse landscape, and interesting heritage. The pre/post Colombian ruins, history of rum manufacturing and sugar cane plantations, the mesmerizing and ever-changing landscape of Moses Lake, the Ferry, Fresh and Duhaney Rivers, Rio Cobre, the wetlands, the flora and fauna, birds, animals and insects should be highlighted and knitted into the fabric of the CSEZ and the CEDA development plan. Active and passive outdoor space should be planned so there is a mix of physical activities in close proximity to the CSEZ and which are unique to the CEDA such as nature walks, exercise circuits, history trails, bird watching, mountain climbing, and places to meditate in nature. It is this environmental aspect of the CEDA development plan that if implemented carefully, will make the CSEZ a sought-after destination for business and investment. Lastly, the existing amenities such as the Caymanas Golf Course, Polo Club, and Stud farm as well as Jamaica's local cuisine should be showcased within the CEDA development plan. Once the CEDA development plan is completed, it should be phased to optimize the development potential of the CEDA lands and the CSEZ project.

4.0 Value Proposition for the CSEZ

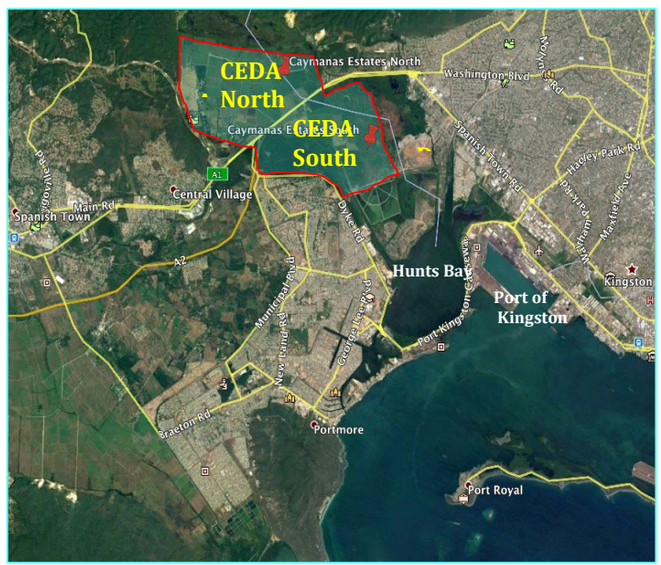
The following is the value proposition for the CSEZ:

- The CSEZ is the flagship project for Jamaica
- Builds upon the LHI and the SEZ Act
- The CSEZ is to be a 'regional hub for businesses' for foreign and domestic investors
- Targeting traditional and up-and- coming industry sectors
- Stimulating logistics, manufacturing, and value addition production utilizing cutting-edge technology
- Spurring industry trends, innovation and creativity
- Supporting exports
- Seamlessly connected to the port of Kingston
- Direct access to national highways, airports and seaports
- Designed with state-of-the art infrastructure and utilities, support amenities such as training facilities, business incubators, research and development labs, and exhibition space
- Has a strong environmental and sustainability mandate
- Supports green technologies and alternative energy
- Creates a safe and secure environment for investors and visitors

- Offers an OSS with streamlined and fast-tracked processes and procedures as well as after-care facilitation
- Houses Customs on a 24-hr basis
- Properly branded to attract the widest audience and give the CSEZ an international appeal
- Developed and operated by the private sector through a PPP or a similar financial arrangement
- Employs an aggressive marketing/investment promotion strategy
- Transfers knowledge, technology and innovation to local entrepreneurs, professionals and workers
- Creates new job opportunities for the Jamaican population

The above value proposition was used to develop the master plan for the CSEZ.

Chapter Three
Site Assessment



Source. IDG/Google Earth

Figure 3-1. CEDA North and South Areas

1.0 Overview

This site assessment chapter examines the CEDA North and South areas. It includes: i) an overview of the planning framework for the development area, ii) the identification of the CEDA's strengths, weaknesses, and threats, iii) sets out the key development opportunities for each location, iv) outlines the key development challenges and constraints, as well as, identifies any fatal flaws or deal breakers for the CEDA North and South areas, and v) identifies the 'preferred' development location for the CSEZ. At the request of the GoJ, the following chapter remains as per the Phase I report, though the CEDA South site was the location used for the CSEZ Master Plan and for Chapters 9-13 in this feasibility study.

2.0 Caymanas Estate Development Area: North and South Areas

IDG examined approximately 1,201-ha (2,968-acres) of land in the CEDA to determine the appropriate boundaries of the CEDA North and South areas. These sites were then analyzed and compared to determine the 'preferred' location for the CSEZ.

3.0 Site Assessment Methodology

In accordance with IDG's TOR, IDG prepared the CEDA South site assessment and the Urban Development Corporation (UDC) completed the CEDA North site assessment[1]. Both IDG and UDC utilized the following best practice site assessment methodology:

- Data collection and a review of secondary sources:
  - Gathering of relevant maps, data, statistics, and background information
  - Conducting desk research on the locations
- An evaluation of the areas against best practice

[1] UDC's Northern Site Assessment has been synthesized for the purpose of this feasibility study.

- Site visits to the CEDA North and South areas to examine the following factors:
  - Context and location attributes
  - Site characteristics
  - Proximity to national transport infrastructure
  - Availability of existing on and off-site infrastructure and utilities
  - Environmental and social constraints and issues
  - Quality of life factors
  - Existing markets
  - Labor availability
  - Other existing industrial clusters in the area

- Consultations with key stakeholders

- A review of the key environmental and social issues of the lands

- An examination of key development issues and challenges to:
  - Determine if there are any fatal flaws
  - Assess any potential deal breakers

- A comparative ranking matrix to determine the 'preferred' location.

4.0 Locating SEZs: Best Practices

IDG prepared the following list of **'locating criteria'** to be used as part of this site assessment. The CEDA North and South areas were then evaluated, keeping the following criteria in mind:

In accordance with international best practices, SEZs should ideally be situated: i) on a large, unencumbered, flat track of land (+/-200-ha, ii) on land with single ownership, iii) on the outskirts/periphery of a city, town or village, iv) adjacent to a highway or main road leading to a highway, v) in close proximity to national infrastructure such as an airport, port, rail corridor, and highway network, vi) with access to reliable, stable and consistent power, water, drainage, telecom and wastewater treatment, vii) on land with minimal environmental or social implications, viii) where existing industrial activities and markets are already prevalent, ix) where investors want to be clustered, x)

where labor is readily available to support industry, and xi) in a secure location. As such, when looking for an appropriate SEZ site, the location and lands should have the following attributes:

Single ownership. Land for an SEZ must be in single ownership. Lands for an SEZ are often purchased from the private sector at market rates or acquired through expropriation - providing fair market value.

An appropriate land size and contiguous configuration. The size of an SEZ should be based upon a 20-year demand forecast for that location. Normally, if an SEZ is planned in a rural region, the size of an SEZ should generally be smaller than an SEZ that was planned in a more economically vibrant, urban area. A track of land ranging from 150-300-ha is, on average, most appropriate for SEZ development though some governments identify as SEZs lands that are over 1,000-ha in size. In order to optimize development and operating costs, land for an SEZ should be contiguous.

Developed on a 'greenfield' rather than a 'brownfield' site. An SEZ should be constructed on a 'greenfield' site, if possible. 'Greenfield' sites are vacant lands that have no existing encumbrances. A 'brownfield' site is much more difficult to develop and is more expensive because a 'brownfield' site often has existing communities, buildings and/or activities on it, and as such, is difficult to design the site in a comprehensive manner.

No or limited resettlement requirement. Resettlement is a lengthy and time-consuming process and increases the cost of the project significantly. If possible, the selected SEZ site should have no communities residing on the lands and no existing buildings/structures to remove or households to relocate. If resettlement is required, then a resettlement action plan (RAP) is required, land and moveable property should be compensated at fair market value, and households should be relocated.

Unencumbered topography. Land for an SEZ should be relatively flat and unencumbered. Zones that are constructed on lands with low-lying vegetation are less expensive to implement than when a zone is designed on a hilly, rocky, or waterlogged site.

Few hydrology issues. SEZs should not be developed on/in flood plains, water catchment areas, or sensitive wetlands, and should not contain ponds. The land's water issues must be respected and if mitigated, will significantly increase the development cost.

Limited earthworks to reduce development costs. An SEZ that requires minimal earthworks (cut and fill operations to make the land flat or to raise the site), will reduce the project's development and construction costs and make it a more viable project.

Located on the periphery of urban/rural areas. SEZs are best located on the outskirts or periphery of cities, towns or villages because they will be away from existing communities, (hence minimizing land use conflicts), will have easy access to national highways (improving logistics performance), and will reduce traffic congestion between vehicular and heavy trucks (making roads safer).

Located on or near a highway. SEZs are also best located adjacent to a highway or main road leading to a highway. This improves the logistics of the SEZ and allows trucks to have direct access to the national highway system.

Access to national infrastructure. It is important that SEZs are situated in close proximity or linked to airports, ports, and the rail corridor, as well as to national highways. This improves the attractiveness of SEZs to investors and makes it easier/faster/cheaper to get goods/products to their final domestic and/or international destination.

Highway presence. SEZs should have access to a national highway, if possible. This helps brand the SEZ and provides visibility to investor's buildings within and outside the SEZ. In turn, this also allows the developer to set up a more dynamic rental/sale structure for the land within the SEZ.

Access to infrastructure and utilities. SEZs must be located in areas with dedicated access to industrial levels of power and water. The most critical aspect of an SEZ is power. SEZs must have constant, stable, reliable and clean power for investors. Power can be self-generated in an SEZ or can be acquired from a country's national grid. Back-up power is always required in SEZs. The cost of power or the lack of power can make or break an SEZ project. Water (potable and grey water) is also critically important to SEZ projects. Typically, water can be either taken from a municipal piped network or supplied through boreholes on site. Power and water requirements are determined by the industry sectors located within the SEZ, and hence, may differ from location to location. In addition, SEZs must have state-of-the-art IT platforms to allow for e-business to be undertaken with ease and control and monitor wastewater treatment to support their needs.

Minimal environmental and social issues. SEZs should not be located on contaminated lands or lands that have significant environmental issues related to soil, air, noise water, or hazardous pollution, sensitive flora, fauna, or animals, environmentally sensitive coastal areas, protected areas, reserves, or any lands that contain historical, religious, or culturally significant buildings. SEZs should also not be situated adjacent to lands with industries that create air, water, noise or hazardous pollution (such as hazardous areas, coal plants, solid waste facilities etc.). These activities will: i) limit the use of the SEZ lands, ii) reduce the lease/sell price of the land, and iii) make the SEZ site less attractive to international/foreign investors who typically have strong environmental charters and/or investment requirements. In addition, land that involves significant resettlement (the moving of illegal or informal settlements or uprooting livelihoods) should be avoided, if possible, as all occupants are entitled to financial compensation before SEZ development is able to occur. Resettlement is both lengthy and costly and will drastically increase the total cost of an SEZ project. If a community is located on the SEZ lands and cannot be resettled off the property, then this area should not remain within the SEZ boundaries and a buffer between the community and the SEZ should be developed to mitigate any negative effects. An existing community cannot be located within an SEZ.

Eco-friendly environments and green technology. In today's competitive SEZ world, SEZs are required to be eco-friendly and utilize green technology and recycling mechanisms. Investors have mandates for these type of investment factors and expect locations that employ this type of commitment to the environment.

Existing industrial clusters. SEZs are most successful when they are located where an industry is already situated. An existing industry cluster identifies to an SEZ developer that a value chain is already present in that area and that the location will have the qualities to potentially attract new investors.

Located where 'investors want to go'. Location is critical to the success of an SEZ. Investors must want to 'locate/reside/do business' in an area where an SEZ is being developed. Best practice shows that a 'build it and they will come' strategy does not work for SEZs. Investors must be able to: i) do business in an area, which has logistics, infrastructure and utilities, ii) have access to a strong labor pool, and iii) have quality of life elements such as international level housing, schools, hospitals, entertainment facilities, and recreational areas in close proximity to the site to make it an attractive SEZ location. Without these critical factors, an SEZ will have limited success.

Available labor. The availability of local labor (both skilled and unskilled) is an important factor to potential investors. The region around an SEZ must have an abundance of low-cost labor with the ability to be trained in order to be employable within the SEZ. Investors expect labor regulations within an SEZ to facilitate both high-quality working conditions and efficient interactions between employers and employees.

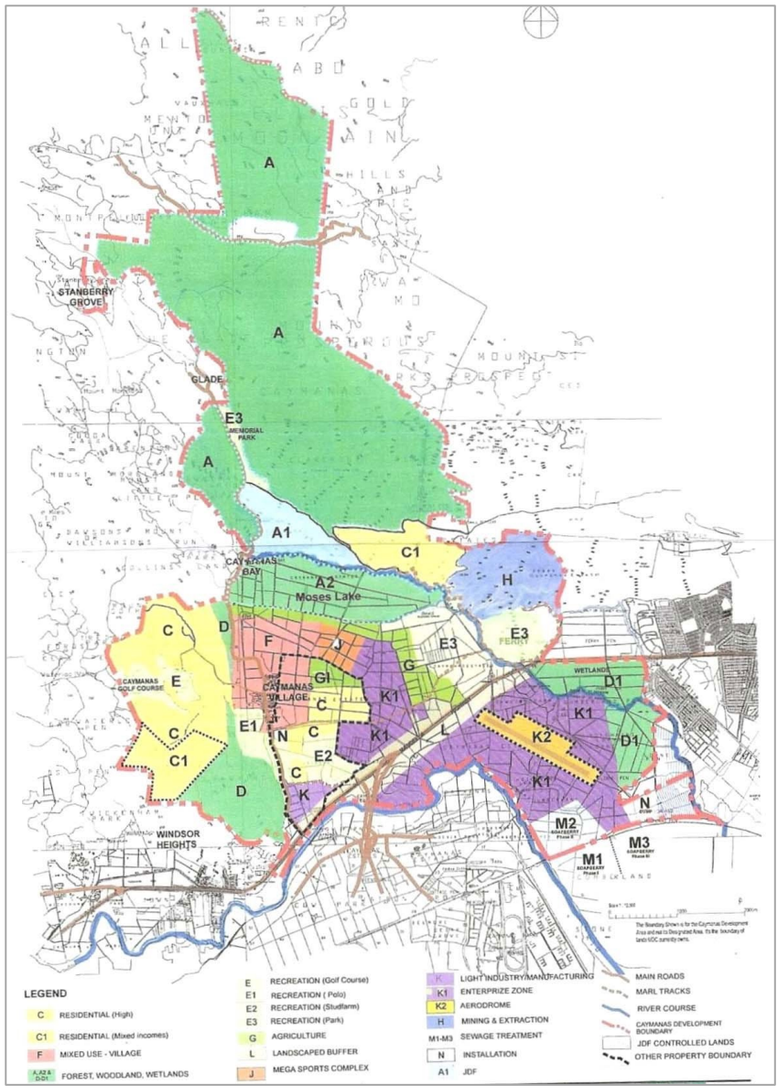
A secure environment. For an investor, an SEZ must offer a secure workplace environment. SEZs should be safe locations to do business in. Typically, this means they are fenced areas with Close Circuit Television (CCTV) and security officers/patrols protecting the perimeter. In addition, investors also require that once their goods/products leave the SEZ, their cargo will remain safe and will arrive at its destination on time and without problems. As such, investors look for safe areas/locations to invest in, when choosing an SEZ. They do not want to increase their operating costs because of security issues.

5.0 The CEDA's Planning and Development Context

5.1 CEDA Land Use Planning

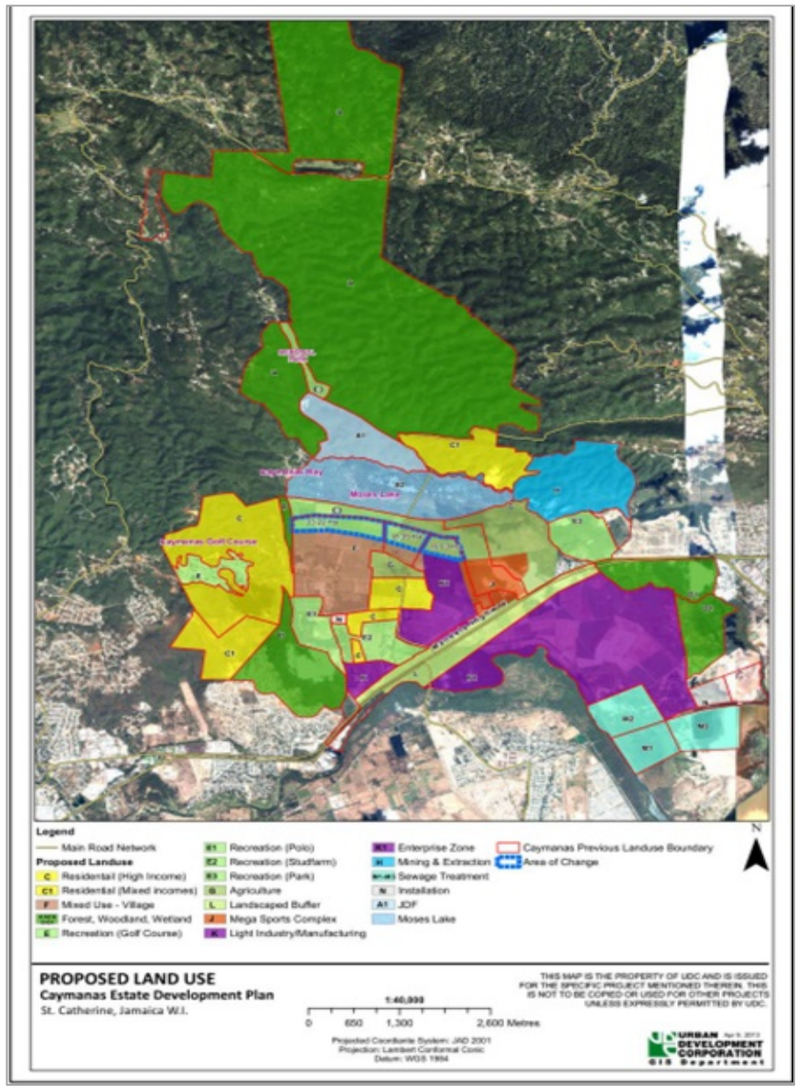
Under the UDC Act 1968, the UDC is the planning authority responsible for preparing development plans, setting planning guidelines, and carry out development in accordance with an approved development plan in the CEDA. Hence, in 2009 UDC prepared its first comprehensive master plan for the CEDA lands. This plan was developed through a series of consultations with major stakeholders and the communities in the surrounding areas. The development concept focused on creating a live, work and play environment. The outcome of this work (Figure 3-2) was an extensive mixed use development program that included: i) a selection of low to high density housing, ii) a town center with commercial, retail and institutional facilities such as schools, a university and training centers and community centers etc., iii) parklands comprised of open space, linear parks, forest, woodlands and wetlands, iv) recreational facilities such as a golf course, a polo field, a stud farm, and a mega sport complex, v) agricultural lands, vi) light industry and manufacturing, vii) an enterprise zone, viii) an aerodrome, ix) mining and extraction activities, x) utilities, and xi) facilities for the Jamaica Defense Force. (JDF)

In 2012, the CEDA master plan was revised and simplified by UDC. (Figure 3-3) The greatest change to the plan was the removal of the aerodrome proposed within the enterprise zone.



Source. UDC

Figure 3-2. CEDA North and South 2009



Source. UDC

Figure 3-3. Revised CEDA North and South 2012

5.2 CEDA Planning Approvals

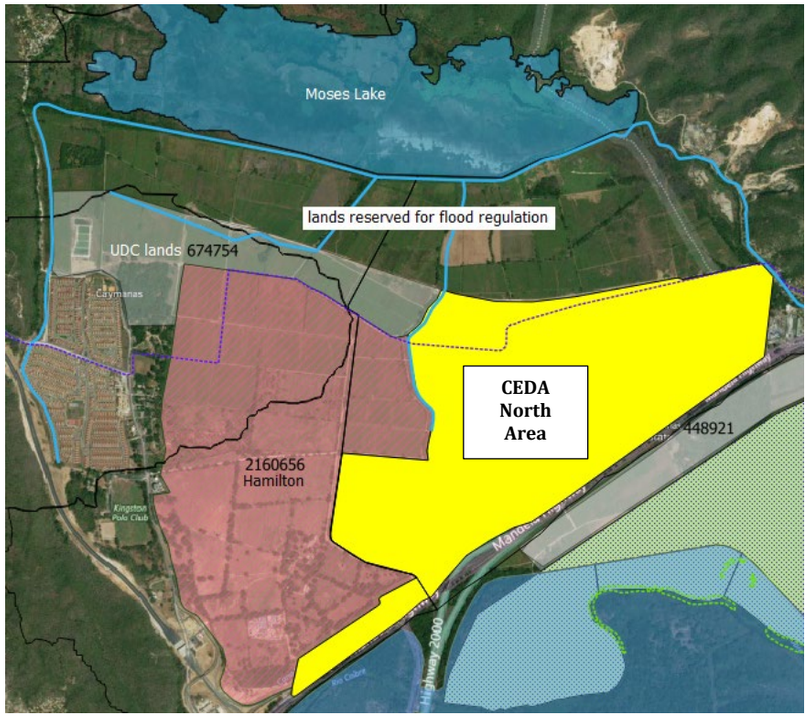
The Town and Country Planning Authority (TCPA) is Jamaica's physical planning and enforcement authority and it administers the national Town and Country Planning Act (TCP) via the local parish councils in the country. For CEDA, the planning authorities of the municipalities of St. Catherine's and Portmore are responsible for approving the CSEZ. Also, central to the development approval process will be the National Environmental and Planning Agency (NEPA). NEPA's mandate is to promote sustainable development by ensuring the protection of the environment throughout the country. NEPA will have a critically important role in approving all development within CEDA. It should be noted that a number of other Ministries, Departments and Agencies (MDAs) such as the Water Resource Authority (WRA) and the Forest Department of the Ministry of Industry, Commerce, Agriculture and Fisheries (MICAF) amongst others, will be responsible for providing additional approvals for the CSEZ constructed within CEDA.

5.3 Jamaica's Logistics Hub Initiative

Led by the Ministry of Economic Growth and Job Creation (MEGJC), the LHI initiative involves: i) the development and/or expansion of several key national infrastructure assets, including ports, airports, rail and ground transportation, ii) a re-examination of the transport and logistics sectors, and iii) the development of SEZs within Jamaica. It will be significantly important to create a dynamic, logistics framework for the CSEZ and the port of Kingston to maximize these two assets value. (Chapter 6)

5.4 The New SEZ Regime

To support the LHI and the SEZs in the country, the GoJ has developed a new SEZ regime that includes a new SEZ Act and new implementing regulations and creates the Jamaica Special Economic Authority (JSEZA). JSEZA is responsible for regulating and overseeing zone development in Jamaica. This regime supersedes the Free Zone (FZ) Act and allows the conversion of FZs in the country to SEZs within a four-year period – after the adoption of the SEZ Act. The intent of this new SEZ regime is multi-fold, to: i) make Jamaica more competitive in the regional and global markets, ii) allow Jamaica to target new forms of foreign direct investment (FDI), iii) attract new industry sectors and technologies, iv) encourage value added manufacturing and production, and v) increase transshipment and logistics opportunities in Jamaica.



Source. IDG/Google Earth
Figure 3-4. CEDA North Areas

6.0 Site Specific Assessment - CEDA North Area

6.1 CEDA North Area

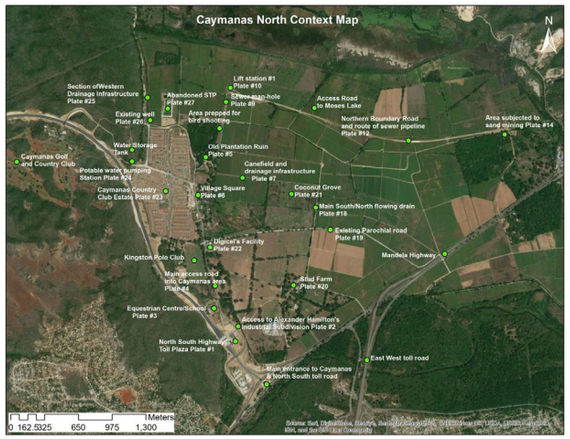
The total area examined by IDG for this site assessment was approximately 1,201-ha (2,968-acres). Of this area, approximately 776.5-ha (1,919.77-acres) of land within the CEDA are owned by UDC and Alexander Hamilton. UDC's lands are 388.62-ha (960.3-acres) in size, of which, 102-ha (252-acres) have restricted development permissions as they are designated as the CEDA storm water catchment area. With these parameters, the total lands available for the CEDA North area and the CSEZ are 286.62-ha (708.3-acres). At present, 81-ha (200.2-acres) have been earmarked for the FCJ, however since this is a government entity, these lands are being considered as part of the CSEZ. (Figure 3-4)

The CEDA North area is located on the southern end of the Rio Cobre Hydrological Basin and the Barnes Creek/Duhaney River Basin [2]. The property has two main geomorphological elements: i) the mountainous limestone hills on the northern edge of the site, which rise to an elevation of approximately 675-m (2,215-ft), and ii) flat lands, which are comprised of alluvial plains.

6.2 The CEDA North Area and Its Context: Photographs

To better understand the CEDA North area and its surrounding context, the following photographs provide an overview of the site's key physical characteristics, traits and attributes.

[2] SEZ 2010



Source. IDG

Figure 3-5. CEDA North Photo Context

Photographs

Top Row

L North South Highway Toll Plaza
M Proposed Entrance to Hamilton's Subdivision
R Equestrian Center/School

Bottom Row

L Main Access Road into CEDA
M An Old Plantation Ruin
R Potable Water Pumping Station








Photographs

Top Row

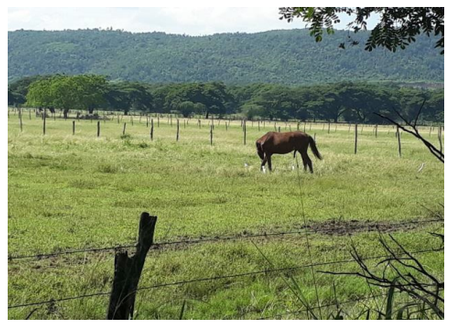
L Cane Fields with Irrigation Channels
LM Path of NWC Main Through Cane Fields
RM Sewer Manhole
R Sewage Lift Station #1

Bottom Row

L Constructed Drainage Calverts
LM Sewer Pipeline Along Drain Culvert
RM West/East Flowing Storm Water Eastern Drain
R Sand Mining







Photographs

Top Row
L Abandoned Sewage Treatment Ponds
LM CEDA Housing Typology
RM CEDA Housing Typology
R Caymanas Country Club

Bottom Row
L Central West/East Parohial Road
LM Hamilton's Stud Farm
RM Coconut Grove (Hamilton's Holdings)
R Digicel's Earth Station

6.3 A Snapshot of the CEDA North Area

The following is a snapshot overview of the key aspects of the CEDA North area. It includes an assessment of the existing conditions on the site and is broken into the following components: i) locational attributes, ii) access, iii) environmental and social impacts, iv) quality of life, and v) existing markets/demand.

Table 3-1. CEDA North Area Assessment Snapshot Overview

Assessment Factors	Key Assessment Results
Locational Attributes	
Total Size	- The total size of the northern portion of the CEDA is 776.5-ha (1,919.77-acres). Of these lands, 286.62-ha (708.3-acres) are available for the CSEZ.
Contiguous Expansion Available	- The CEDA North area could be expanded to have contiguous lands, however 225-ha (556-acres) would have to be purchased from Alexander Hamilton, who currently owns this property.
Land Ownership	- The CEDA North area is owned by UDC.
Location	- The CEDA North area is situated within the parish of St. Catherine. The eastern section sits on the St Catherine Parish boundary, which is shared with St Andrew. Although the site falls within St Catherine, jurisdiction and overall planning considerations reside with two Planning Authorities, - St. Catherine Municipal Corporation and Portmore Municipal Corporation.
Surrounding Context	- The CEDA north area is separated from the CEDA south site by the Mandela Highway. Therefore, it lies immediately north of the Mandela Highway and east of the North South link of Highway 2000 - The site is within close proximity to Portmore (south), Spanish Town (west), Cayamanas Bay (north) and the Ferry settlement and police station (east) - The area immediately to the south of the site (Caymanas south) is under sugar cultivation and is within close proximity to the Soapberry Wastewater Treatment Plant and the Riverton Solid Waste Facility.
Locational Vulnerability	- Moses Lake is located to the immediate north of this development block. This northern portion of land has a south to north drainage path, towards Moses Lake. In addition all of the upland areas north of the lake also drains the lake in a southerly direction. The

Table 3-1. CEDA North Area Assessment Snapshot Overview	
Assessment Factors	**Key Assessment Results**
	Ferry River runs along the northern boundary of the lake. - Parts of the CEDA North area are prone to flooding. Storm water drainage analysis done on behalf of the UDC established a 100-year average recurrence interval (ARI) for Moses Lake at 3- metres above mean sea level (AMSL). This study recommends a 'flood plain' immediately south of Moses Lake – referred to as the Storm Water Management Area (SWMA). The SWMA will negatively impact the area of land suitable for development on the northern site. - The CEDA is affected by smoke from either the burning of cane fields or from periods of sporadic combustions that occur at the Riverton City 'Landfill'. Whilst the incidents of smoke from the burning of sugar cane will over time be significantly reduced, smoke from the landfill will require inter-agency strategies and agitation for the facility to be properly operated, thus reducing the incidents of fire and smog.
Existing Land Use	- The CEDA North area is part of the CEDA, which has been proposed as an enterprise zone. - Currently the lands are being used for a number of purposes; agricultural (sugar cane), residential development and recreation.
Proposed Land Use	- The CEDA North areas' proposed land use is for mixed use development, within which, a SEZ may be developed. - Sub-land uses for the site are light industrial/mixed use/recreational/institutional sporting/agriculture/residential
Climatic Conditions	- The Kingston/St. Andrew/St. Catherine weather is subtropical with only slight variations in temperature and rainfall throughout the year. - Temperatures vary from 29.6 °C to 31.9 °C with a minimum between 22.3 °C and 25.6 °C. The hottest month is July and the coldest is February. - The rainy season is between April/May and October/November, with the rainiest month being October. - The dry season is between December and March. - Mean monthly rainfall in St. Catherine is 119mm.
Natural Hazards	- Jamaica, due to its geographical location is prone to tropical storms and hurricanes. As the climatic conditions change, brought on by increased global warming, there is a probability of increased hurricanes and at greater intensities.

Table 3-1. CEDA North Area Assessment Snapshot Overview	
Assessment Factors	**Key Assessment Results**
	- The CEDA by virtue of its geology, geography and geomorphology is prone to numerous hazards both manmade and natural. Its main threats include fire, smoke, flooding, drought, tsunami, hurricane, earthquakes and landslides (area such as Glade and Caymanas Bay). - The coastline around Greater Kingston is vulnerable and is at risk to tsunamis, storm surge hazards and sea level rise.
Earthquake Region	- Tectonically speaking, Jamaica is surrounded by the Caribbean Plate, which is adjacent to both the North American and South American Tectonic Plates. The Caribbean Plate is moving east-north at a rate of approximately 18-20mm/yr relative to the North American Plate. The Plate boundary zone in the vicinity of Jamaica is considered complex. - The CEDA North area has a number of faults traversing the site and scattered locations of earthquake epicentres of varying magnitude. - The CEDA North area has a fault line that runs horizontal to the southern boundary of Moses Lake and to the north of the existing Caymanas Country Club Estates housing development.
Topography	- The site is comprised of flat, alluvial plains that slope south towards Hunts Bay. - The CEDA North area contains a mix of vegetation; trees, low vegetation, sugar cane crops, rivers, swamps, wetlands and ponds due to poor drainage conditions. There are also signs of illegal (sand mining) excavations, in the section closer to the Mandela Highway and the Ferry Police Station.
Soil Conditions	- The two major soil types include Bonnygate Stony Loam soils (well drained soils) approximately 60% of the site (upland areas) and Caymanas Sandy Loam (moderately drained soils) which dominates most of the sugarcane estate. - The CEDA North area drains in a southeast direction and drainage is via first order intermittent streams, (usually dry gullies). Water on the plain flows in various direction via (canal, earth drains, farm roads, etc.), to the Fresh River. Surface water flows south beneath the Mandela Highway then toward the Duhaney River which discharges to Hunts Bay.
Access	
Access to Major Highway	- The CEDA North area has direct access to the Mandela Highway; a primary arterial road and the Highway 2000 North South link. It is in close proximity to the Highway 2000

Table 3-1. CEDA North Area Assessment Snapshot Overview	
Assessment Factors	**Key Assessment Results**
	Toll Road.
Access to Rail	- The railway corridor (right-of-way) is located at the southern boundary of the site. The rail line has deteriorated in many areas. - The railway corridor is linked to the Port of Kingston and although expensive, it can potentially be reconstructed. - The railway is owned by the Jamaica Railway Corporation (JRC). The railway opened in 1845 and closed in 1992. - The railways main line was Kingston to Montego Bay. Branch lines were from: i) Spanish Town to Ewarton, ii) Bog Walk to Port Antonio, and iii) May Pen to Frankfield.
Distance to Norman Manley International Airport	- The CEDA North area is 21 miles (33 km) to the Norman Manley International Airport via Dyke Road, Port Kingston Causeway, Highway A4 and Norman Manley Boulevard
Distance to Port of Kingston	- The CEDA North area is 6-8 miles (10-13 km) to the Port of Kingston via Mandela Highway to Spanish Town Road or Mandela Highway to Dyke Road and Port Kingston Causeway
Distance to Downtown Kingston	- The CEDA North area is 7.5 miles (12 km) to downtown Kingston via Mandela Highway and Spanish Town Road
Distance to Downtown Portmore	- The CEDA North area is 7 miles (11.5 km) to downtown Portmore via Mandela Highway to Dyke Road and George Lee Blvd
Distance to Downtown Spanish Town	- The CEDA North area is 4.5 miles (8 km) to downtown Spanish Town via Mandela Highway and Main Road
Distance to Vernamfield Aerodrome	- The CEDA North area is 38 miles (61 km) to Vernamfield Aerodrome via Highway T1, A2 and Foga Road
Distance to Goat Island	- The CEDA North area is 30 miles (48 km) to the potential Goat Island project
Infrastructure	
Existing On-Site Infrastructure	- The CEDA North site has paved roads from Mandela Highway to the Caymanas Country Club Estates housing development site. The site is not connected to the NWC network. The UDC, through the Caymanas Development Company, holds the licence for the provision of the potable water to the CEDA. Wells are expected to be developed within

Table 3-1. CEDA North Area Assessment Snapshot Overview	
Assessment Factors	**Key Assessment Results**
	the Caymans wellfield and it's is anticipated that the CEDA will be self-sufficient in its water needs. The redevelopment of the Caymanas limestone wellfield is expected to adequately suffice the water demand of the existing and the UDC's planned developments at Caymanas. - The NEH housing development is now connected to the Soapberry Sewerage Plant, via pipelines and pump stations. There is a Digicel telecom tower on the site.
Existing Off-Site Power	- There are two existing electrical substations within close proximity to the site, Duhaney and Tredegar.
Existing Off-Site Gas	- There is no existing gas connection to this site, although New Fortress3 has expressed an interest in providing a captive power plant (Liquefied Natural Gas (LNG)) and a distribution network to the SEZ under a concession agreement. - LNG would be a less expensive energy alternative to electricity and would improve the value proposition of the zone.
Existing Off-Site Water	- NWC pipelines traverse the Caymanas lands taking water from the Rio Cobre system into Kingston and Portmore, of which there are easements that will be mapped and illustrated in the IDG's Infrastructure Assessment Report. - The redevelopment of the Caymanas limestone wellfield is expected to adequately suffice the water demand of the UDC's planned developments and will also provide surplus to the National Water Commission (NWC).
Existing Off-Site Drainage	- The site's principal drainage direction is to the southeast and drainage is by several first order intermittent streams. - The natural drainage pattern for storm water is north away from Mandela Highway towards Moses Lake.
Existing Off-Site Telecom	- A full package of telecom services (landlines, mobile, internet, broadband – currently being implemented, fiber optics, fax and VoIP) are available at the CEDA North site. - Digicel is housed within the CEDA. - The Ministry of Science, Technology, Energy and Mining is planning the installation of

[3] New Fortress Energy and JPS have signed an agreement to develop a LNG terminal combined with a 120-megawatt (MW) power plant that would provide power for Jamaica and export power to become a regional LNG Hub.

Table 3-1. CEDA North Area Assessment Snapshot Overview	
Assessment Factors	**Key Assessment Results**
	internet exchange points (IXP) into CEDA. This will create a backbone and switch to further support the CSEZ and its investor's requirements.
Existing Off-Site Water Treatment Plant	- The Soapberry Wastewater Treatment Plant is situated to the south of the site and connections of the northern site was recently implemented. - The Soapberry sewage treatment plan comprises 3 phases of which only phase 2 will be constructed within the Caymanas Estates Development Boundary. Approximately 74.7-ha (183-acres) of land has been earmarked for expansion of the Soapberry Sewage Facility. - All wastewater from developments within the CSEZ is expected to be conveyed to the treatment plant.
Existing Off-Site Soil Waste Facilities	- The CEDA falls within the Riverton Waste shed, which serves the parishes of St. Catherine, Clarendon, St. Thomas, Kingston and St. Andrew. - Riverton Solid Waste facility is south east of the north site. This is the major solid waste disposal facility in Kingston and St Andrew. - The CEDA north site is often affected by smoke from the Riverton Facility. The air quality of the site is also affected due to regular and often illegal and uncontrolled burning of waste on the site.
Environmental and Social Impacts	
Environment Impacts	- Seismic vulnerability/risk needs to be more thoroughly examined. Pre- to post-development runoff changes were considered significant – a comprehensive drainage plan which takes the final landscape of the full build out of the development into account will be needed to mitigate against adverse flooding. - Loss of cultural significance, as well as aesthetics and ecological benefits (such as carbon sequestration and re-emission) from removal of large trees such as the Guango. - Reduction in green space and secondary forest in the most practical and ecologically viable areas. Loss of native trees to concrete structures and/or non-native and potentially invasive species. - Loss of natural buffers for noise and air pollution throughout the development and against the highway. - Displacement of avifauna, insects and other organisms which favour the forested areas and open pasturelands.

Table 3-1. CEDA North Area Assessment Snapshot Overview	
Assessment Factors	**Key Assessment Results**
	- Potential increased crocodile access to the development via open drains. - Increased probability of crocodile capture and slaughter – the importance as protected species and one which aids in maintaining healthy fish stock as well as removing other sick/ailing animals from the ecosystem, should not be overlooked, particularly as it relates to human consumption of fish, birds, etc. - Termites are an issue in the area, especially around the area zones as a mixed-use village. - A fire escape/ emergency route needs to be outlined for the area that changes as the infrastructure is rolled out.
Social Impacts/Resettlement	- There is no resettlement required within the CEDA North area.
Loss of Livelihoods	- The existing sugar cane farmers will lose their livelihood from this development project.
Historic/Religious/Cultural Landmarks/Buildings On-Site	- There are no historic/religious/cultural landmarks on the CEDA North area, though the greater CEDA area (northern portion) contains some pre and post Colombian ruins. In addition, the greater northern site, has potential Taino sites and post 1494 heritage features.
Flora/Fauna On-Site	- The surrounding Terrestrial Highland habitats – dominated by Tall Open Forests (open natural woodland or forest with Deciduous/Semi-deciduous trees) is known to host over 50 endemic plant species and over 28 endemic birds. These are outlined in the Environmental and Social Review chapter.
Sensitive/Protected Animal Species On/Close to the Site	- There are a number of animal species that reside on or close to the site but none are sensitive or protected, except for the American Crocodile, which is common to this area. Approximately 16 crocodiles have been seen in the CEDA in the past.
Climate Change Impacts	- Specific impacts of the climate change phenomenon within the CEDA were not assessed. However, generally Jamaica is expected to be affected by ocean warming, SLR, increased air temperature, increased variability in rainfall patterns, increased frequency of extreme weather events and reduced quantity and quality of water. - Saline intrusion is already a concern within the CEDA, and this will affect freshwater availability. - The loss of coastal wetlands; such as those around the Kingston Harbour; by sea-reclamation, also reduce protection from storm surges and strong weather systems.

Table 3-1. CEDA North Area Assessment Snapshot Overview	
Assessment Factors	**Key Assessment Results**
Quality of Life	
Existing International Housing	- International housing is available in the Greater Kingston Region. This type of housing is often found in gated communities. Some of the most coveted neighborhoods around the CEDA south site are Cherry Gardens, Norbrook, Jacks Hill, Manor Park, Millsborough, Stony Hill, and Beverly Hills.
Existing International Hotels/Restaurants	- There are a number of international level large, small and boutique hotels in the Greater Kingston Region such as the Marriott Courtyard, Pegasus, Terra Nova, Strawberry Hill, Spanish Court, and Courtleigh Suites and Hotel. - There are also a large number of international and local restaurants in the Greater Kingston Region that serve a wide variety of cuisines from gourmet to fast food.
Existing International Schools/Hospitals	- Jamaica has 3 international schools: i) the American International School (Kingston) for preschool through grade 12, ii) the Hillel Academy (Kingston) for preschool, high school and preparatory school and iii) Belair School (Mandeville) for pre-kindergarten to high school. - Although international hospitals have been planned in Portmore and Negril, they have not been constructed yet. - The hospitals that provide expat care and are in close proximity to the CEDA south site are the Tony Thwaites Wing at the University Hospital of the West Indies Andrews Memorial Hospital, Nuttall Memorial Hospital, Medical Associates Hospital, and Gynae Associates Hospital. For international medical facilities patients fly to the USA.
Existing International Social Amenities/Parks/Open Space	- There are a wide range of markets, shops and malls in Greater Kingston ranging from the Jubilee Market, Things Jamaican, New Kingston Shopping Center to the Shops at Devon House. - There are a large number of parks, beaches and historical places to visit in Greater Kingston, including the Blue and John Crow Mountains National Parks, Castleton Gardens, Hope Gardens, Fort Clarence Beach, Bob Marley Museum, and Devon House. In addition, there are numerous resort towns in Jamaica such as Ocho Rios, Port Antonio, Montego Bay and Negril, which offer a wide range of tourist attractions, activities, cruise options and resort hotels and facilities.
Existing Security Issues	- Security is taken seriously throughout Jamaica. Violent crimes are known to be a problem

Table 3-1. CEDA North Area Assessment Snapshot Overview	
Assessment Factors	**Key Assessment Results**
	in Kingston and Montego Bay. Police and security guards are poised throughout the country. Most residential and commercial real estate ventures utilize multiple security measures (security fences, gated communities, security guards, CCTV, and electronic locks etc.) - The closest police station to the CEDA south site is in Ferry Police Station.
Existing Markets/Demand	
Existing Markets/Industry Clusters in Close Proximity	- The closest industrial cluster is in close proximity (1 mile/1.6 km) to the site, where Nestles, Wisynco and China Harbor Engineering Corporation (CHEC) have factories/plants. - There are a number of automotive, metals, agro-business, manufacturing/warehousing clusters along Spanish Town Road and at the Six Mile Junction. - Industry clusters are also found in Portmore and Spanish Town, Kingston, and St. Andrew.
Number of Existing Free Zones	- There are 21 existing and new free zones/SEZ in Jamaica and 12 are located in the Greater Kingston Region. Note: There are a number of single entity free zones throughout the country as well. The main, larger zones are Kingston Free Zone, Garmex Free Zone, Hayes Free Zone, Spanish Town Free Zone, Montego Bay Free Zone, and Cazoumar Free Zone.
Existing Labor Force	- There is a large labor pool (male and female) in Kingston/St. Andrew, Portmore and Spanish Town with a variety of skillsets such as professionals, technicians, managers, and skilled and unskilled labor.

6.4 Overview of The CEDA North Area - Key Strengths, Weakness, and Threats

From the above site assessment, the following were determined to be the CEDA North area's key strengths, weaknesses and threats.

Table 3-2. CEDA North Area's Key Strengths, Weaknesses, and Threats
Key Strengths
- The CEDA North area is a large, 'greenfield' site, which is relatively flat. - The CEDA North area is owned by UDC and under single ownership. - The site is a part of the larger CEDA, allowing the CEDA North area to be comprehensively designed to bring the most value to the project. - The CEDA North area has land use permissions to allow it to be planned and constructed as an integrated multi-use development. - A total of 245-ha (99-acres) has already been earmarked for light industrial development. - The lands are comprised of low-lying vegetation, tress and sugar cane crops. - The CEDA North area is currently being used for agricultural purposes. - It is in close proximity to the Port of Kingston via Highway 2000 (Portmore branch). - The CEDA North area is located adjacent three (3) major population centres – Spanish Town, Portmore and the Greater Kingston Area - with a combined working force population of approximately 100,000. - The CEDA North area has direct access and exit points to the East/West and North/South highways, which links directly to Kingston, Portmore, Spanish Town, Central Village and the Highway 2000/North-South Highway, which leads to Ocho Rios, Montego Bay, Negril, and Port Antonio. The Mandela Highway also flows directly into other main road corridors/arterials to access key national infrastructure assets such as the Port of Kingston, Tinson Pen, Norman Manley International Airport, and Vernamfield all within the Greater Kington Region. - The Mandela Highway is currently being expanded from four to six lanes. - The existing Caymanas Golf and Country Club, Kingston Polo Club and the Equestrian Centre are valuable recreational amenities that increase the value of the CEDA North area for the CSEZ. - Moses Lake and the Ferry River could be used as an environmental attraction and an amenity for the CSEZ. - The CEDA has water resources, which are currently being explored for potable water utilization. - NWC water pipelines serving Kingston and Portmore traverses the site, to allow for easy connections to the CSEZ. - UDC has recently constructed a sewage transmission force main to the Soapberry Sewage Treatment Plant. The conveyance line traverses the CEDA North area. - UDC has already prepared a Caymanas Infrastructure Report (2012), which outlines the primary infrastructure services requirements for the area.

Table 3-2. CEDA North Area's Key Strengths, Weaknesses, and Threats
- There are existing industrial clusters within a radius of 2 – 10 km (1-5 miles) from the site.
Key Weaknesses
- A portion of the CEDA North area is under sugar cane cultivation, via Worthy Park Estates Limited, which operates on the lands through a year-to-year lease with UDC. This lease will need to be ended. - The build-out of the CEDA North area will need to take into consideration the hydrology and drainage issues within the larger CEDA. - 102-ha of land south of Moses Lake is reserved for storm water management and cannot be built upon. - The CEDA North area is subjected to the negative impacts and air pollution from fires from the Riverton Solid Waste Facility. - There are sections of the CEDA North area, which may have high ground water levels.
Key Threats
- CHEC is in discussions with the GoJ to acquire 243-ha (600-acres) of land in the CEDA including the CEDA North area. This would threaten the success of the CSEZ project and limit the planning/development concept prepared in this study - There are a number of SEZs and industrial projects in the planning stage or being implemented. These must be curtailed to preserve the market demand for the CSEZ. - Jamaica lies within a seismic and hurricane region. The CEDA and the CEDA North area is situated on a fault line making the general area susceptible to seismic activity. - Moses Lake may host crocodiles. - The off-site infrastructure and utility requirements needed to improve the greater northern CEDA for development, may be expensive and will require further detailed studies. - A direct link to the Port of Kingston may not be developed/viable, which would eliminate a dedicated connection to the port.

6.5 Key Development Opportunities

It is important to understand the specific development opportunities of the CEDA North area, if it is to be the 'preferred' location for the CSEZ. They are outlined below:

Table 3-3. CEDA North Area
Key Development Opportunities
- The CEDA North area allows the CSEZ to be developed as the focus/anchor of the CEDA development program and hence, brings instant value to new investors. As the starting point within the CEDA development project, it will spur comprehensive planning of the CEDA, strengthen the value proposition for supporting activities and amenities and rapidly attract developers and investors alike. This location would also allow important synergies and linkages to be developed in order to create greater value for the project, as a whole. It would put Jamaica on the map as a cohesive live, work, play environment and a regional destination for business. It could also incorporate Moses Lake, the Ferry River, the Caymanas Golf Course, the Equestrial Center, the stud farm, and the pre/post Colombian ruins into an environmental playground for residents and visitor, making it a regional draw for leisure and wellness tourists. - The CSEZ on this site will spur new investments in residential, institutional, commercial and retail uses, which can be directly connected to the CSEZ. These projects can be tailored and phased to bring greater value to the CSEZ. - There is an opportunity to make the CEDA North site a multi-modal logistics platform, linking it to the port and other national assets such as the Mandela Highway, the port, Vernamfield, Norman Manley International Airport and Tinson Pen. - The CEDA North area is also linked via the national highway network to Port Antonio, Ocho Rios, Montego Bay, Negril and smaller towns and villages throughout Jamaica. - The site is a 'greenfield' development location, making it easier to develop than a 'brownfield' location. - The site is in a location where investors want to locate, by evidence of the numerous, new industrial projects in the immediate vicinity. - An environmental commitment can be given to the CSEZ and maintained on this site as it is the location is farther away from problematic entities such as the Soapberry Wastewater Treatment Plant and the Riverton Solid Waste Facility. - There is the ability to provide green technology, modern infrastructure and reliable, consistent utilities to the site as per industry sector requirements and demand. - The master plan for the site can be a flexible design to support a variety of investments over the short, medium and long-term. - The site can be secured, which will both help attract both domestic and foreign investors to the location and reduce their individual security costs. - The location is surrounding by a large labor pool from Greater Kingston, Portmore and Spanish Town.

6.6 Key Development Issues and Challenges

In addition to the strengths, weaknesses, opportunities and threats of the CEDA North area, it is imperative to understand the specific development issues and constraints of this site if it is selected for the CSEZ. As such, the following is a list of key development challenges for the CEDA North location:

Ownership of CEDA lands. Although 286.62-ha (708.3-acres) of land is owned by UDC and earmarked for a possible CSEZ project, if the GoJ wishes to expand the CSEZ and its activities, additional lands would have to be acquired at market value from Alexander Hamilton. It should be noted that the lands promised to the FCJ must be fully incorporated into the CSEZ project and could be part of the first phase of development. The FCJ project should not be implemented as a competing project to the CSEZ.

A comprehensive design for the CEDA. The CEDA lands (north and south sides) must be comprehensively designed to maximize the development potential and benefits of the project. The CSEZ on the CEDA North area should be the first development and it should be phased according to demand, which is outlined in Chapter 8. The lands surrounding the CSEZ should be programmed for commercial, retail, entertainment, institutional, and residential uses and linked with the CSEZ, so it can act as the stimulator for further development. The CEDA should also be phased to ensure a cohesive development program for the area. The comprehensive plan should be imbedded into the regional plans for the Greater Kingston region and approved by the St. Catherine and Portmore Municipal Corporations, as they are the planning approval jurisdiction for any project within the CEDA.

Connectivity to/from the CEDA North area. The CEDA is well connected to Jamaica's national infrastructure networks and assets, and the CEDA North area is adjacent the Mandela Highway. To ensure easy access to the CSEZ on this site, the intersection of the Mandela Highway at the entrance to the CSEZ will need to be redesigned to allow for trucks and vehicles access. A transportation study will be required to design the highway improvement.

Dedicated road linkages. Although the existing roads and highways currently link the CEDA North area to the port, a new, dedicated road utilizing the JRC right-of-way could be created to provide seamless connectivity from the CSEZ to the port. Although in the short-term, this road may not be required, it would be an attractive feature for the SEZ, so a transportation study should be undertaken to determine viability and proposed costs.

Hydrology issues must be mitigated. Because the CEDA lands are in a basin and portions of the lands are currently utilized as water catchment areas, the drainage of the entire CEDA will be the most critical aspect of this project. Currently Moses Lake, 102-ha of land south of the lake and the Ferry River are used to manage storm water for the CEDA north of the Mandela Highway. The CSEZ on the CEDA North areas can be designed with appropriate drainage and storm water solutions, but it will be the off-site drainage network that will need to be upgraded/improved to ensure that the CSEZ is not negatively affected by runoff from the surrounding lands. Although preliminary recommendations are outlined in Chapter 5, additional studies will need to be undertaken to identify a comprehensive hydrology and drainage solution for the CEDA, as a whole. A piecemeal solution will significantly reduce the CEDA and the CSEZ's success.

Internal road networks. The CSEZ will require an internal road network. This should be designed and implemented to international standards, which will most likely exceed the minimum road widths in Jamaica. Traditionally, roads within an SEZ are 40-m, 30-m and 20-m wide and this is what is recommended for the CSEZ.

Power. At present, there is not enough power in the St. Catherine parish to support the CSEZ. The two existing electrical substations in the area – Duhaney and Tredegar – are currently operating at capacity but could be upgraded to support the zone. The CSEZ will require either a dedicated line from these substations, or the CSEZ will have to develop a captive power plant within its facilities. To further support the CSEZ's and the GoJ's environmental mandate, IDG in Phase II will examine alternative energy sources for the CSEZ. That said, the most important factor for a successful SEZ is the availability of clean, stable, reliable power, so a viable power solution must be identified. If a dedicated power line is required for the CSEZ, the GoJ must provide a guarantee that this will be achieved.

Water. UDC, through the Caymanas Development Company, holds the licence to provide potable water to the CEDA. The current plans is to construct wells within the CEDA to support the future water demand for the area. If the CEDA is to be comprehensively planned for a large-scale, mixed use project with increased densities, UDC and the National Water Commission (NWC) may want to re-evaluate the current water infrastructure. A project like what is being proposed for the CEDA would require a fully functional, modern piped water network, capable of supporting both standard and industrial requirements.

Telecommunications. A full range of telecommunication services will be required for the CSEZ on the CEDA North area. This will include a telecom backbone system and switching station. Currently, landlines and fiber optics run parallel to the Mandela Highway and mobile and voice over internet protocol (VoIP) services can be provided through Digicel and Flow. In addition, broadband is being expanded throughout the country. Telecommunications will be important to the CSEZ to support the Information and Communication Technology (ICT), Business Process Outsourcing (BPO), and Logistics sectors, e-business, investor requirements, and real-time transmission of Customs information for clearances. In order for telecommunication services to be available for the CSEZ, discussions with telecom providers must begin soon.

Wastewater. UDC, through the Caymanas Development Company, holds the licence to provide sewage services within the CEDA. If the CSEZ is developed on any of the CEDA lands, an additional conveyance system to Soapberry will be required. It is anticipated that the CSEZ will pre-treatment its wastewater.

An eco-friendly commitment. To make the CSEZ an attractive investment destination for investors, it must have a strong commitment to the environment and impose high environmental standards. In accordance to the GoJ's environmental policies (climate change, reduction of GHG emissions, and sustainability), any SEZ's in the country must be designed and constructed to be low-carbon and eco-friendly, utilizing green technology wherever possible. This mandate should be one of the guiding principles of the CSEZ.

Maintaining Moses Lakes. Moses Lake is located at the northern boundary of the CEDA North area. It is a man-made reservoir. Today, Moses Lake is an environmentally sensitive area with an abundance of wildlife, including fish, birds, flora, fauna, and crocodiles. (It also serves as a catchment area for storm water run-off.) If the CSEZ is constructed on the CEDA North area, Moses Lake and the Ferry River should be used as areas of interest as well as open space to support the CSEZ. A variety of passive and active environments should be woven into the design of the CSEZ, and these should include Moses Lake.

Riverton Solid Waste Facility. Although located away from the CEDA North area, the Riverton Solid Waste Facility still negatively impacts the proposed lands for the CSEZ. This happens when a fire is started at the waste facility. Depending upon the prevailing winds, the smoke from the fire can hang over the CEDA North area for a significant period of time - 1 hour to 1 week, on average. If the Riverton Solid Waste Facility is not upgraded in the short-term, it will seriously undermine the CSEZs environmental commitment and deter companies from investing in the SEZ.

An environmental impact assessment (EIA). The CSEZ project will require an EIA. It is recommended that the seismic risk within the area be thoroughly examined. The pre to post development runoff changes are considered significant and should be carefully assessed, especially with the current upgrading of the Mandela Highway. There are a number of important species to protect as well as their ecosystems.

Highway frontage is required for branding. The CSEZ on the CEDA North area must have highway frontage. This will be part of the CSEZ's branding and will add value to the project. In fact, companies buildings visible from the highway are often charged higher lease rates and have a stronger presence in the SEZ.

Security. Security is an important aspect of any project. The Ministry of National Security, in hand with other relevant MDAs and representatives from private security companies should partner in ensuring that a strategy is developed to protect the investment in the CSEZ.

Market Competition. The major market competitor to the CSEZ will be CHEC and FCJ, as they are both planning to develop competing projects of similar scope on these lands. The GoJ should not allow this to happen. The CHEC project should be reconsidered in this location and the FCJ's project should be incorporated into the demand for the CSEZ. If the government is committed to the success of the CSEZ as its national flagship project, it should be given every opportunity to thrive.

Communication and Stakeholder Consultation Plan. A communication plan and stakeholder strategy should be prepared for the CSEZ. This should be geared towards ensuring that the project is well received within the surrounding communities and also on a national level. Community leaders to champion the CSEZ project are required to effectively drive the project forward and their involvement at the initial stages of planning the project is essential.

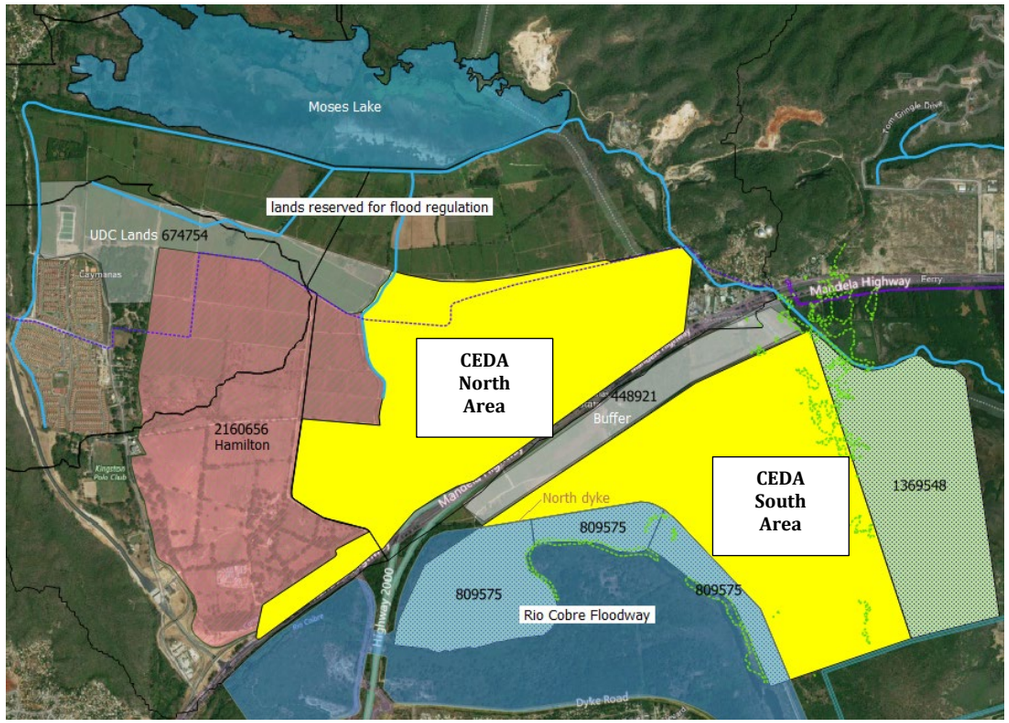
Source. IDG/Google Earth

Figure 3-6. CEDA South Areas

7.0 Site Specific Assessment – CEDA South Area

7.1 CEDA South Area

The CEDA lands south of the Mandela Highway are 425-ha (1,050-acres) in size. These lands are in the sole ownership of UDC. Because this site contains a flood plain adjacent the Rio Cobre (B), wetlands along the Fresh River (E), and requires setbacks from the Mandela Highway (A), the Soapberry Wastewater Treatment Plant (C), the JRC Rail right-of-way (D), and the Riverton Solid Waste Facility (F), the developable land parcel is reduced to approximately 236-ha (583-acres). It is this 236-ha (583-acres), which constitutes the CEDA South area. (Figure 3-6 and Figure 3-7)

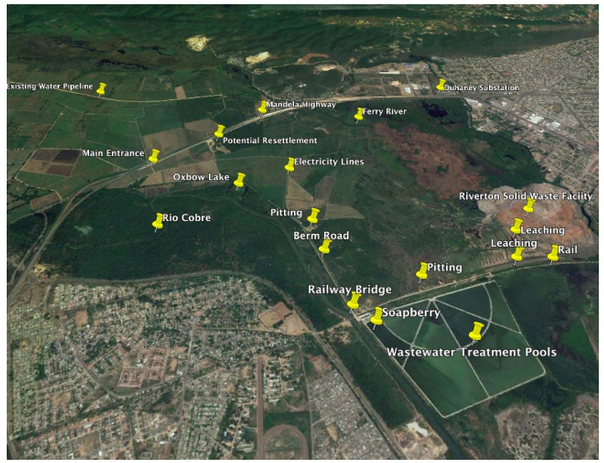


Source. IDG/Google Maps

Figure 3-7. CSEZ South Site Development Parcel

7.2 The CEDA South Area and Its Surrounding Context: Photographs

The following photographs show the key physical characteristics, traits and attributes of the CEDA South area and its surrounding context. Figure 3-8 locates the photographs within the larger context.



Source. IDG
Figure 3-8. Photo Context

Photographs

Top Row
L Mandela Highway Before Upgrade
M Mandela Highway During Upgrade
R CSEZ Main Entrance Off Mandela Highway

Bottom Row
L Berm Road
M Oxbow Along Rio Cobre
R Elevation Change Through Site








Photographs

Top Row
L Minor Resettlement
LM Rio Cobre
RM Mix of Vegetation and Trees
R Upper Portion of the South Site

Bottom Row
L Electrical Lines Through the Site
LM South Site Lowlands and Pooling of Water
RM Lower Portion of the South Site Near Boundary
R JRC Rail Corridor and Old Bridge








Photographs

Top Row
L Riverton Solid Waste Facility in the Background
LM Trees on Lower Portion of the Site
RM Sugar Cane Field and Workers
R Sand Pitting on Southern End of Site

Bottom Row
L View of Kingston from Soapberry Plant
LM Soapberry Wastewater Treatment Plant
RM JRC Rail Easement Southern Boundary of the Site
R Duhaney Sub-Station

7.3 A Snapshot of the CEDA South Area

The following is a snapshot overview of the key aspects of the CEDA South area. Table 3-4 below examines: i) locational attributes, ii) access, iii) infrastructure, iv) environmental and social impacts, v) quality of life factors and vi) existing market/demand for the CEDA South area.

Table 3-4. CEDA South Area Assessment Snapshot Overview

Assessment Factors	Key Assessment Results
Locational Attributes	
Total Size	- The southern portion of the CEDA lands are 425-ha (1,050-acres) in size. The CEDA South area is 236-ha (583-acres).
Contiguous Expansion Available	- There are no contiguous expansion lands available on the south side of CEDA.
Land Ownership	- The CEDA South area is in single ownership. - The area is owned by UDC.
Location	- The area is situated within the St. Catherine Parish.
Surrounding Context	- The site is adjacent to the CEDA North area (north), Kingston and St. Andrew (east), the Portmore (west), and Hunts Bay (south). - At present, the immediate lands surrounding the site are undeveloped, except for the Soapberry Wastewater Treatment Plant and the Riverton Solid Waste facility. - In the northern portion of the CEDA, there is the Caymanas Country Club Estate development, the Caymanas Polo Club, the New Era Housing project, local communities, sugar cane fields and lands owned by Alexander Hamilton.
Locational Vulnerability	- The CEDA South area has some locational vulnerabilities such as being an alluvial plain, containing flood plains adjacent the Rio Cobre, wetlands along the Fresh River, hydrology issues (flooding, sheet flows, ponding, tidal surges from Hunts Bay, a water catchment for the CEDA North area, poor soil quality, and low lands within the site requiring infill), the Soapberry Wastewater Treatment Plant, and the Riverton Solid Waste Facility.
Existing Land Use	- The CEDA South area is part of the Caymanas Estate Development Area and has been designated as an enterprise zone. - Currently the lands are being leased for agricultural purposes (sugar cane farming.)

Proposed Land Use	- The CEDA South area's proposed land use is for SEZ development. - Sub-land uses for the site are light industrial/mixed use/logistics.
Climatic Conditions	- The Kingston/St. Andrew/St. Catherine weather is subtropical with only slight variations in temperature and rainfall throughout the year. - Temperatures vary from 29.6 °C to 31.9 °C with a minimum between 22.3 °C and 25.6 °C. The hottest month is July and the coldest is February. - The rainy season is between April/May and October/November, with the rainiest month being October. - The dry season is between December and March. - Mean monthly rainfall in St. Catherine is 119mm.
Natural Hazards	- Jamaica has a propensity for tropical storms and hurricanes. It is a Zone 4 on the Saffir-Simpson Scale (210-249 km/h) with a probability to exceed 10% in 10 years. - Jamaica also has an occurrence of landslides, flooding and sediment-water floods. - The coastline around Greater Kingston is vulnerable to tsunamis and storm surge hazards.
Earthquake Region	- Tectonically speaking, Jamaica is surrounded by the Caribbean Plate, which is adjacent both the North American and South American Tectonic Plates. The Caribbean Plate is moving east-north at a rate of approximately 18-20mm/yr relative to the North American Plate. The Plate boundary zone in the vicinity of Jamaica is considered complex. - Jamaica is an earthquake region with a Zone 3 to 4 designation. This has a probable maximum intensity of MMVII-IX on the Modified Mercalli Intensity Scale, with an exceedance probability of 10% in 50 years for medium subsoil conditions. See Appendix A.
Topography	- The CEDA South site is situated on the southern portion of the Rio Cobre Hydrology Basin and sub-basins from the Ferry-Duhaney Rivers. - The site is comprised of flat, alluvial plains that slope south towards Hunts Bay. - The site contains a mix of vegetation such as trees, low vegetation, sugar cane crops, rivers, swamps, wetlands and ponds due to poor drainage conditions. The site is also pitted from illegal excavations.
Soil Conditions	- The CEDA South area is a mix of Ferry Silty Clay, Mangrove Clays, and Caymanas Sandy Loam, with components of compressed peat and other organic matter. The soil has been classified as Type C and D by the WRA for drainage capacity. - Due to seismic activity and poor soil quality, a full soil investigation/borehole testing is required for this site, if it is to be used as the SEZ location. This soil assessment can occur either before or after the master plan has been developed.
Access	

Access to Major Highway	- The CEDA South area has direct access to the Mandela Highway, Highway 2000 Toll Road, the North South Highway (in the future), T1 (east-west leg), A1 (Kingston to Lucea), A2 (Spanish Town to Savanna-la-Mar), A3 (Kingston to Saint Ann's Bay), A4 (Kingston to Annotto Bay), B1 (Cross Roads to Buff Bay), B2 (Bog Walk to White Hall), and B3 (May Pen to Runaway Bay).
Access to Rail	- The railway corridor (right-of-way) is located at the southern boundary of the site. The rail line has deteriorated in many areas. - The railway corridor is linked to the Port of Kingston and although expensive, it can potentially be reconstructed. - The railway is owned by the Jamaica Railway Corporation (JRC). The railway opened in 1845 and closed in 1992. - The railways main line was Kingston to Montego Bay. Branch lines were from: i) Spanish Town to Ewarton, ii) Bog Walk to Port Antonio, and iii) May Pen to Frankfield.
Distance to Norman Manley International Airport	- The CEDA South area is 21 miles (33 km) to the Norman Manley International Airport via Dyke Road, Port Kingston Causeway, Highway A4 and Norman Manley Boulevard
Distance to Port of Kingston	- The CEDA South area is 6-8 miles (10-13 km) to the Port of Kingston via Mandela Highway to Spanish Town Road or Mandela Highway to Dyke Road and Port Kingston Causeway
Distance to Downtown Kingston	- The CEDA South area is 7.5 miles (12 km) to downtown Kingston via Mandela Highway and Spanish Town Road
Distance to Downtown Portmore	- The CEDA South area is 7 miles (11.5 km) to downtown Portmore via Mandela Highway to Dyke Road and George Lee Blvd
Distance to Downtown Spanish Town	- The CEDA South area is 4.5 miles (8 km) to downtown Spanish Town via Mandela Highway and Main Road
Distance to Vernamfield Aerodrome	- The CEDA South area is 38 miles (61 km) to Vernamfield Aerodrome via Highway T1, A2 and Foga Road
Distance to Goat Island	- The CEDA South area is 30 miles (48 km) to the potential Goat Island project
Infrastructure	
Existing On-Site Infrastructure	- The CEDA South area contains no paved roads and is not connected to water, drainage, telecom or wastewater networks. - There are 2 high voltage electrical lines running through the site connected to the Duhaney sub-station. (The CSEZ either requires a dedicated, low-voltage power connection or a captive power plant within the zone.)

	- There is a telecom tower on the site.
Existing Off-Site Power	- There are 2 electrical sub-stations within the immediate vicinity of the CEDA South site – Duhaney and Tredegar. These sub-stations are both operated by the Jamaica Public Service (JPS). The Duhaney sub-station is the larger sub-station of the two, with 280 Megavolt Ampere (MVA), and a 24 Kilovolt (KV) interbus capacity with a peak power flow of 150 MegaWatts (MW). The Tredegar sub-station operates with a 230 MVA interbus capacity with 50-60 MVAs available during peak operating hours. From discussions with JPS, there is currently not enough power available at either of these two locations to support the CSEZ. Additional power will be required. - It would be possible to upgrade one of the two substations to support the CSEZ if a dedicated transition line to the zone could be guaranteed. - Electricity in Jamaica is quite expensive[4] though JPS has offered discounted rates for the CSEZ. Additionally, other private power suppliers to JPS (New Fortress and Jamaica Private Power) have also stated their interest in setting up a captive power plant within the CSEZ, through a concession agreement.
Existing Off-Site Gas	- There is no existing gas connection to this site, although New Fortress[5] has expressed an interest in providing a captive power plant (Liquefied Natural Gas (LNG)) and a distribution network to the SEZ under a concession agreement. - LNG would be a less expensive energy alternative to electricity and would improve the value proposition of the zone.
Existing Off-Site Water	- There is a water network and existing water pipelines[6] in close proximity to the CEDA South site[7]. However, at present, there is not enough water capacity from this network to support the CSEZ. - The National Water Commission (NWC) has confirmed that new water projects are currently being implemented in the Greater Kingston Region, which will be able to provide the CSEZ project with its water requirements. - The use of water wells within the CSEZ is not recommended. The CSEZ must be a modern facility, able to provide piped potable and grey water to investors at international standards.

[4] Electricity, gas and water rates will be benchmarked within the Market Assessment.
[5] New Fortress Energy and JPS have signed an agreement to develop a LNG terminal combined with a 120-megawatt (MW) power plant that would provide power for Jamaica and export power to become a regional LNG Hub.
[6] Existing pipelines in the CEDA have the capacity to handle 29 million imperial gallons of water per day or 131,837 cubic meters.
[7] Water pipelines are located in the CEDA north site.

	- WRA is currently not issuing licenses for wells in CEDA.
Existing Off-Site Drainage	- There is a new off-site drainage system being constructed as part of the Mandela Highway upgrade. That said, water run-off from the CEDA north of Mandela Highway may not be adequately addressed, as a new bridge at the Mandela Highway/Fresh River crossing may require additional control measures[8] for the CEDA South site. (Detailed drainage and hydrology issues will be outlined in the Hydrology report.) - Because the hydrology issues are considerable on the CEDA South site, drainage mitigation will be required.
Existing Off-Site Telecom	- A full package of telecom services (landlines, mobile, internet, broadband – currently being implemented, fiber optics, fax and VoIP) are available at the CEDA South site. - Telecom towers are near, and, on the site, which are used by Digicel and Flow. - The Ministry of Science, Technology, Energy and Mining is planning the installation of internet exchange points (IXP) into CEDA. This will create a backbone and switch to further support the CSEZ and its investor's requirements.
Existing Off-Site Water Treatment Plant	- The Soapberry Wastewater Treatment Plant is situated south of the CEDA South area. - Soapberry currently runs at 90% and has no surplus capacity. (The existing facility now cleans the Greater Kingston Region's wastewater.) - Soapberry wastewater pipes run through the CEDA south area, but these cannot be tapped for the CSEZ project. - An independent connection to the Soapberry facility will be required. The connection of the CSEZ should be part of upcoming negotiations when the GoJ discusses Soapberry's expansion plans. - Soapberry is to expand its site towards the CSEZ. This is problematic for the branding of the zone. - Expansion plans for Soapberry should be done in a comprehensive manner so that the total size of the facility is known. This way the design the CSEZ can appropriately mitigate any short and long-term issues.
Existing Off-Site Soil Waste Facilities	- Riverton Solid Waste facility is east of this site, which supports approximately 60% of Jamaica's waste. - A number of critical issues arise from the CSEZ's adjacency to the garbage facility that must be mitigated. The main concern is air quality and ensuring impromptu fires do not occur, as this creates smoke within the CEDA south site and limits the CSEZ's ability to have a clean environment.

[8] This will be addressed in more detail in the Hydrology report.

Environmental and Social Impacts	
Environment Impacts	- There are a number of environmental impacts to the site mainly from its adjacencies with the Soapberry Wastewater Treatment Plant and the Riverton Solid Waste facility. The Soapberry Plant attracts vultures, bats and birds. The Riverton facility is not run as a sanitary landfill, and as such, there is soil contamination (leaching) from the eroding garbage, unpleasant odors and impromptu fires from the site. This is well documented in the Environmental Impact Assessment (EISA) prepared for the Riverton Facility by Environmental Solutions Ltd. - A full environmental impact assessment (EIA) is required for the CSEZ project.
Social Impacts/Resettlement	- There may be some resettlement required on this site, as there are a few immovable structures on the lands. Ownership of these buildings must be determined. - The development of the CSEZ will bring increased economic growth and job creation to the surrounding communities. - A communication plan should be prepared in parallel with the CSEZ project to ensure community buy-in and support.
Loss of Livelihoods	- The existing sugar cane farmers will lose their livelihood from this development project.
Historic/Religious/Cultural Landmarks/Buildings On-Site	- There are no historic, religious, cultural or landmark buildings on the site.
Flora/Fauna On-Site	- There are a number of flora and fauna on this site but none require protection. The full list of flora and fauna within the CEDA is provided in IDG's supporting environmental review report.
Sensitive/Protected Animal Species On/Close to the Site	- There are a number of animal species that reside on or close to the site, as outlined in the environmental review. However, only a few of these animals are sensitive or protected, such as the American Crocodile and the Caribbean Endemic West Indian Whistling Duck, which are common to this area. Approximately 16 crocodiles have been seen in the CEDA in the past.
Sensitive/Protected Areas Close to the Site	- The closest Protected Area from the site is the Portland Bight Protected Area (PBPA). The PBPA is 724 sq. miles (1,876 sq. km) and is Jamaica's largest protected area. It contains dry limestone forest, wetlands, seagrass beds and coral reefs. It is inhabited by birds, iguanas, crocodiles, manatees, marine turtles, and fish. It has a population of 50,000 and contains ports, sugar estates, fish farms, a bauxite-alumina plant, a feed mill, power plants and industrial and commercial activities.

Quality of Life	
Existing International Housing	- International housing is available in the Greater Kingston Region. This type of housing is often found in gated communities. Some of the most coveted neighborhoods around the CEDA south site are Cherry Gardens, Norbrook, Jacks Hill, Manor Park, Millsborough, Stony Hill, and Beverly Hills.
Existing International Hotels/Restaurants	- There are a number of international level large, small and boutique hotels in the Greater Kingston Region such as the Marriott Courtyard, Pegasus, Terra Nova, Strawberry Hill, Spanish Court, and Courtleigh Suites and Hotel. - There are also a large number of international and local restaurants in the Greater Kingston Region that serve a wide variety of cuisines from gourmet to fast food.
Existing International Schools/Hospitals	- Jamaica has 3 international schools: i) the American International School (Kingston) for preschool through grade 12, ii) the Hillel Academy (Kingston) for preschool, high school and preparatory school and iii) Belair School (Mandeville) for pre-kindergarten to high school. - Although international hospitals have been planned in Portmore and Negril, they have not been constructed yet. - The hospitals that provide expat care and are in close proximity to the CEDA south site are the Tony Thwaites Wing at the University Hospital of the West Indies Andrews Memorial Hospital, Nuttall Memorial Hospital, Medical Associates Hospital, and Gynae Associates Hospital. For international medical facilities patients fly to the USA.
Existing International Social Amenities/Parks/Open Space	- There are a wide range of markets, shops and malls in Greater Kingston ranging from the Jubilee Market, Things Jamaican, New Kingston Shopping Center to the Shops at Devon House. - There are a large number of parks, beaches and historical places to visit in Greater Kingston, including the Blue and John Crow Mountains National Parks, Castleton Gardens, Hope Gardens, Fort Clarence Beach, Bob Marley Museum, and Devon House. In addition, there are numerous resort towns in Jamaica such as Ocho Rios, Port Antonio, Montego Bay and Negril, which offer a wide range of tourist attractions, activities, cruise options and resort hotels and facilities.
Existing Security Issues	- Security is taken seriously throughout Jamaica. Violent crimes are known to be a problem in Kingston and Montego Bay. Police and security guards are poised throughout the country. Most residential and commercial real estate ventures utilize multiple security measures (security fences, gated communities, security guards, CCTV, and electronic locks etc.) - The closest police station to the CEDA south site is in Ferry Police Station.
Existing Markets/Demand	

Existing Markets/Industry Clusters in Close Proximity	- The closest industrial cluster is in close proximity (1 mile/1.6 km) to the site, where Nestles, Wisynco and China Harbor Engineering Corporation (CHEC) have factories/plants. - There are a number of automotive, metals, agro-business, manufacturing/warehousing clusters along Spanish Town Road and at the Six Mile Junction. - Industry clusters are also found in Portmore and Spanish Town, Kingston, and St. Andrew.
Number of Existing Free Zones	- There are 21 existing and new free zones/SEZ in Jamaica and 12 are located in the Greater Kingston Region. Note: There are a number of single entity free zones throughout the country as well. The main, larger zones are Kingston Free Zone, Garmex Free Zone, Hayes Free Zone, Spanish Town Free Zone, Montego Bay Free Zone, and Cazoumar Free Zone.
Existing Labor Force	- There is a large labor pool (male and female) in Kingston/St. Andrew, Portmore and Spanish Town with a variety of skillsets such as professionals, technicians, managers, and skilled and unskilled labor.

7.4 Overview of The CEDA South Area: Key Strengths, Weakness, and Threats

From the above site assessment, the following were determined to be the CEDA South area's key strengths, weaknesses and threats.

Table 3-5. CEDA South Area's Key Strengths, Weaknesses, and Threats
Key Strengths
- The CEDA South area is a large, flat, relatively unencumbered, 'greenfield' location. - The site is owned by UDC, and under single ownership. - The CEDA South area is part of the larger CEDA, though somewhat isolated being south of the Mandela Highway. - The lands are comprised of low-lying vegetation, trees and sugar cane crops. - The CEDA South area has the ability to be seamlessly connected to the Port of Kingston by rail or via a secured road through an existing rail right-of-way. - The existing railway corridor can potentially link the site to Vernamfield and to Montego Bay, as well as a number of key development locations along the way. - The lands are situated along the Mandela Highway, which links directly to Kingston, Portmore, Spanish Town, Central Village and the Highway 2000/North-South Highway, which leads to Ocho Rios, Montego Bay, Negril, and Port Antonio. - The Mandela Highway also flows directly into other main road corridors/arterials to access key national infrastructure assets such as the Port of Kingston, Tinson Pen, Norman Manley International Airport, and Vernamfield all within the Greater Kington Region. - A number of off-site infrastructure improvement projects are currently underway or projected for the near future such as the Mandela Highway upgrade. - There is an abundance of labor (professional/technical and skilled/unskilled) in close proximity to the site in Portmore, Spanish Town, and Kingston. - There are existing industrial clusters within 5-10 km of the site.
Key Weaknesses
- Due to flooding constraints and environmental issues, not all of the CEDA South area can be used for the CSEZ, if located on this site. - The CEDA South area is isolated from the remaining CEDA lands. The lands are separated by the Mandela Highway. - The CEDA South area is currently being farmed so this area will be lost to the agricultural community. - There is a small amount of resettlement (small houses and moveable property) required on these lands, which increases the cost of the project. - The CEDA South area is comprised of alluvial and flood plains, water catchment areas, wetlands, pitted areas, and low lands that experience tidal surges and must be raised.

Table 3-5. CEDA South Area's Key Strengths, Weaknesses, and Threats

- The weak soil composition may make the development of the CSEZ more expensive.
- The existing rail corridor was closed in 1992, has decayed and must be reconstructed to be viable.
- The Soapberry Wastewater Treatment Plant is directly adjacent to the site and has plans to expand closer to the CEDA south site.
- The Soapberry Plant provides wastewater treatment for the Greater Kingston Region and consists of open air containment ponds, which has an odor and attracts a variety of birds and scavengers.
- The Riverton Solid Waste facility, which supports the Greater Kingston Region is on the boundary of the lands.
- The Riverton facility is not a contained or modern waste facility, so the dump experiences impromptu fires, has an odor, experiences leaching, and attracts scavengers, vermin, birds, and animals.
- There are 2 electrical lines running through the center of the CEDA south site that supports the Greater Kingston/Portmore Regions. These will need to be relocated or buried.
- There is not enough power or water available within the existing power and water networks to support the SEZ, though there are alternative/new options coming on-stream in the near future.
- The cost of raising the land, improving the hydrology on the site, providing on-site infrastructure and utilities, and mitigating the negative impacts from the Soapberry Wastewater Treatment Plant and the Riverton Solid Waste facility will increase the development costs of the CSEZ project, as a whole.

Key Threats

- As per the rest of Jamaica, the CEDA South area is prone to earthquakes, cyclones and hurricanes. This may be perceived as a locational weakness by investors.
- Crocodiles, which are protected in Jamaica, have been seen on the CEDA North and South areas.
- Utilities such as power and water to support the CSEZ on this site, may not be available in time for Phase I of the project. It is imperative that the GoJ ensures the project has dedicated power and water at the required capacity.
- Other SEZs or similar projects in the Greater Kingston Region may be developed/implemented ahead of the CSEZ and as such, there will be limited/reduced demand for the CSEZ. Ie. Specifically, the FCOJ and the CHEC projects in the CEDA.
- CHEC is in discussions with the GoJ to acquire part of the CEDA South area adjacent the Mandela Highway. This should not be permitted because if the CSEZ is located on this site, to add value to the project, it needs to have a highway presence.
- A dedicated link to the Port of Kingston may not be economically viable.

7.5 Key Development Opportunities

It is important to understand the specific development opportunities of the CEDA South area, if it is to be the 'preferred' location for the CSEZ. They are outlined below:

Table 3-6. CEDA South Area
Key Development Opportunities
- The CEDA South area is strategically located between Kingston and Spanish Town. - There is an opportunity to make the CEDA South area a multi-modal logistics platform because of its advantageous location adjacent the Mandela Highway, close proximity to Norman Manley International Airport and Tinson Pen and its link via road or rail to the port of Kingston. - The CEDA South area is also linked via the national highway network to Port Antonio, Ocho Rios, Montego Bay, Negril and smaller towns and villages throughout Jamaica. - The site is a 'greenfield' development location. - The CEDA greater area is in a location where investors want to locate, by evidence of the numerous, new industrial projects in the immediate vicinity. - The entire CEDA can be comprehensively planned in a harmonious manner to support all land uses and create new synergies between designations. Unfortunately, though, this location is separated from the CEDA north lands by the Mandela Highway, which is a disadvantage. - There is the ability to provide green technology, modern infrastructure and reliable, consistent utilities to the CEDA South area as per industry sector requirements and demand. - The master plan for the CEDA South can be a flexible design to support a variety of investments over the short, medium and long-term, though it is constrained by the Rio Cobre, Ferry River, the Soapberry Wastewater Treatment Plant and the Riverton Solid Waste Facility. - The development of the CSEZ on this location should highlight and incorporate the natural landscape of the Rio Cobre, wetlands and Ferry Rivers. - The site can be secured, which will both help attract both domestic and foreign investors to the location and reduce their individual security costs. - The location is surrounding by a large labor pool from Greater Kingston, Portmore and Spanish Town.

7.6 Key Development Issues and Challenges

In addition to the strengths, weaknesses, opportunities and threats of the CEDA South area, it is imperative to understand the specific development issues and constraints of this site, if it is selected for the CSEZ. As such, the following is a list of key development challenges for the CEDA South location:

The size of the CEDA South site. As identified above, the CEDA South area has a number of development constraints, which limits the amount of land available for the zone. The site is comprised of a flood plain adjacent the Rio Cobre and wetlands along the Ferry River and is bounded by the Mandela Highway to the north, Soapberry Wastewater Treatment Plant to the south, and Riverton Solid Waste facility on its east side. These elements naturally define the size of the CSEZ, making the usable land area approximately 236-ha (583-acres). On average, this leaves 157.7-ha (369.6-acres) of land for leasable plots within the zone, which according to the demand forecast in Chapter 8, will only support the base case demand scenario.

Contiguous expansion area. There are no contiguous expansion lands directly adjacent to the CEDA South area. This means that the CSEZ will have a development cap of 236-ha (583-acres). The CSEZ could expand to the CEDA North area in its later phases, however from lessons learnt, this is not advisable. Dividing a zone into two separate entities, increases development costs, duplicates services, and reduces the attractiveness of the project.

Resettlement. At present, there are a few structures within the boundaries of the CEDA South area, which require resettlement. These buildings will need to be removed before the CSEZ can be developed and before a developer for the project is selected. A more in-depth review of these buildings is required to determine the scope of resettlement.

A comprehensive and flexible design for the CEDA South area. The CEDA South area must be designed in a holistic manner. This will ensure that land uses are properly planned within the site, the leasable land is optimized, and the infrastructure requirements are minimized. This will in turn minimize development costs, mitigate/buffer conflicting adjacencies, and allow the project to be properly phased to meet market demand. (Phasing is critically important to the success of a zone. Additional phases should only begin when 70% of the existing phase is leased/sold to investors.) In addition, plot sizes within the CSEZ must be flexible to support changing demand of

investors over the short, medium and long-term. This means plots should be designed in a configuration that can easily be assembled or divided to meet investor requirements over time.

An integrated land use plan for CEDA. Because of the above issues, the CEDA must be comprehensively planned and the CSEZ (if on the south side), must be fully integrated into the land use plan for CEDA, as a whole. This will allow the CEDA (north and south sites) to optimize its development potential and value and will help ensure that both sides of the CEDA are properly linked. If the CSEZ is on the CEDA South site, then the northern portion of the CEDA should limit industrial activities in order to not compete with the CSEZ. This will be critically important if the CSEZ is to become the flagship SEZ in the country. To ensure that CEDA's comprehensive land use plan is followed in the long-term, it should be placed in the regional plan for Greater Kingston and adopted by the local municipalities, who have planning approval jurisdiction over the CEDA.

Connectivity to/from the CEDA south site. The CEDA South area has good linkages to Jamaica's national infrastructure networks and assets:

- **Highway connectivity.** The site is adjacent to the Mandela Highway, which links to the Port of Kingston, Norman Manley International Airport, Tinson Pen Aerodrome, the future Vernamfield Aerodrome and Highway 2000/North-South Highway network. Highway 2000/North-South Highway leads to Ocho Rios, Montego Bay, Negril and beyond via support roads. The Mandela Highway is currently undergoing an upgrade[9], which will significantly improve the transport corridor and will allow for increased traffic flows along the highway. Although the improvements will ease existing traffic congestion into and out of Kingston, the development of the CSEZ will most likely put an additional strain on the road infrastructure. The CSEZ should take this in consideration during its planning stage and should attempt to design the CSEZ to mitigate additional pressure on the highway. One of the ways this can be done is by seamlessly linking the CSEZ to the Port of Kingston through a dedicated road or with a rail line connecting these important locations.

- **Dedicated road linkages.** The CEDA South area allows for a 20-m (66-ft) wide, dedicated road link directly into the Port of Kingston. This road would utilize the JRC Rail-right-of way and could be fenced to make it a secured connection to the port. In order to make this a viable option, however, a bridge will need to be erected and the entrance to the port will have to be redesigned, which would increase off-site infrastructure costs for

[9] The Mandela Highway is a four-lane, dual carriageway, divided highway that is currently being upgraded to a six-lane highway by the National Works Agency (NWA).

the project. That said, the road could bring logistical benefits to both the port of Kingston and to the CSEZ. The one negative aspect of this transportation option would be that the fenced/secured road would physically dividing the Seaview Garden neighborhood.

- **Railway connectivity.** It may be possible to refurbish/reconstruct the JRC Rail line at the southern border of the site, which historically linked the CEDA South area with the port of Kingston and the north part of the island. Although this is an expensive infrastructure project, it may be advantageous if the GoJ plans to - in the long-term - utilize the existing rail corridor from Montego Bay to Vernamfield and onwards to the port of Kingston, as part of the LHI. This would make the CSEZ rail connection the first phase of this longer-term project.

- **Air connectivity.** Through the LHI and Jamaica's existing and proposed highway improvement program, the CSEZ is ideally located to have access to all of Jamaica's airport facilities. The GoJ should, however, be mindful that any new or proposed SEZ in the short term at Norman Manley International Airport, Sangster International Airport, Ian Fleming International Airport, Tinson Pen Aerodrome or Vernamfield Aerodrome will reduce the market demand for the CSEZ and may reduce the success of the zone.

- **Port connectivity.** It will be important for the CSEZ to have good linkages with the port of Kingston. As mentioned above, any new logistics/SEZ facilities at the port must be undertaken within the overall development strategy and design concept of the CSEZ in mind. If in the short term, the port of Kingston sets up its own logistics hub within the confines of its property, it must be done as a precursor to Phase 1 of the CSEZ, in order to not negatively impact the logistics potential and synergies with the CSEZ.

Adequate access to the site. Because the CEDA South area has direct access to the Mandela Highway, access points into/out of the CSEZ must be carefully considered. By comprehensively planning the CSEZ at the start of the project and introducing recessed entryways/exitways, all access points (the main custom and control gates, fire exits etc.) can be properly designed, managed and controlled to mitigate congestion and optimize truck, vehicle and pedestrian movements onto the Mandela Highway.

Highway frontage is required for branding. To create a solid brand for the CSEZ, the zone must have a strong visual presence and dominance along the Mandela Highway. This will be one of the CSEZ's calling cards. Visibility is important because passersby should know the CSEZ is there. In addition, the CSEZ's front gate should be

prominent and the buildings within the zone should be architecturally pleasing, which is easily accomplished with urban design guidelines for the CSEZ investors. The CSEZ's façade along the Mandela Highway should not be obstructed by vegetation or signage, nor should the zone be established too far from the property line. The purpose of this is to ensure that the CSEZ's brand is instantly recognizable.

Required infrastructure and utilities to international standards. The CSEZ will require consistent, stable and reliable infrastructure and utilities designed and constructed to international standards to make it attractive to investors and competitive in the region and throughout the world. This means providing roads, power, water, drainage, telecom, and wastewater treatment networks within the zone at levels required by investors.

- **Soil and hydrology issues.** The soil quality in the CEDA South area is poor, porous, pitted[10] and somewhat unstable due to the aquifers in the area. The site is also a flood and catchment area for the greater CEDA. The CEDA South site also suffers from hydrology and drainage issues. The area at the south-east border of the site is comprised of low-lying lands, which experience tidal surges during rainy or storm periods. To contain storm water runoff and limit tidal surges, a retaining pond and regulating gates must be constructed at the south portion of the site. This will involve earthworks. In addition, a 30-m (100-ft) wide channel is required on the CEDA South site to manage drainage flows. These hydrology and drainage issues and costs are examined in more detail in Chapter 5.

- **Roads.** The CSEZ will require a hierarchy of roads within its boundaries. Typically, an SEZ will need 30-40-meter-wide main arterials to aid traffic movement throughout the site and 20meter-wide feeder roads to access individual plots. Arterial roads should have planted medians, sidewalks and lighting. Feeder roads should have sidewalks and lighting. Roads should be constructed to international standards to withhold the weight of loaded trucks and heavy vehicles.

- **Power.** At present, there is not enough power in the St. Catherine parish to support the CSEZ. The two existing electrical substations in the area – Duhaney and Tredegar – are currently operating at capacity but

[10] Because the CEDA south site is not fenced, it has become victim to pitting activities. This is when the sand within the CSEZ is collected by unauthorized persons and illegally transported off the site and sold. This activity increases the development costs of the CSEZ because it means that additional soil must be purchased to fill in these holes and raise the lands.

could be upgraded to support the zone.[11] Any zone in Jamaica will require a guaranteed, dedicated power supply and backup generation system. (Power is critically important as it will make or break the success of any SEZ. Power must be consistent, stable and available 24/7.) If either the Duhaney or the Tredegar sub-stations are upgraded, or a new substation is constructed, the distribution lines to the CSEZ site will have to be paid for by the developer of the CSEZ. According to the National Energy Act, the installation of a captive power plant is legal if the power is for a single-user, otherwise power must be sold back to JPS. As per the existing rules, it may be more difficult to set up a captive power plant in the CSEZ and provide power to individual users, though IDG was told it was legal, under certain conditions. The construction of a Co-generation or LNG power plant within the CSEZ could reduce the power costs for investors within the zone, hence improving the value proposition for both developers and investors. (Both Jamaica Private Power Company (electricity) and New Fortress Energy (LNG) have shown interest in providing a captive LNG power plant within the zone. This could be negotiated through a concession agreement, if the developer was interested.)

- **Existing power lines.** There are two primary, high voltage power lines running through the center of the CEDA south site. These distribution lines provide the power to the Greater Kingston and St. Catherine regions. To optimize the land within the CEDA south site, the power lines must be relocated to the boundary of the site or buried.[12] If they remain above ground and in place, a 100-m setback is required.[13] The cost of relocation or burying electricity lines increases the development cost of the zone.

- **Water.** Both potable and grey water will be required for the CSEZ. Although there is an existing water pipeline on the CEDA North area, there is not enough water capacity in the system to support the CSEZ and its water requirements. From discussions with the NWC, however, a number of new water projects are coming online in the next 3-years, which will allow the CSEZ to have access to water at the quantities it will require. For a flagship project like the CSEZ, boreholes or wells should not be used to provide water for the site, though in this location, these are not an option.

[11] This information was confirmed by JPS in June 2017. The CSEZ's energy requirement however, would have to be incorporated into Jamaica's 5-year energy plan. Once approved and the sub-station is procured by JPS, it could take up to 2 years to construct the power plant.
[12] The costs associated with moving the power lines must be paid for by the developer.
[13] International standards have setbacks from power lines at 100 meters.

- **Telecommunications.** A full range of telecommunication services will be required for the CSEZ. Currently, landlines and fiber optics run parallel to the Mandela Highway and mobile and voice over internet protocol (VoIP) services can be provided through Digicel and Flow. In addition, broadband is being expanded throughout the country. Telecommunications will be important to the CSEZ to support the Information and Communication Technology (ICT), Business Process Outsourcing (BPO), and Logistics sectors, e-business, investor requirements, and real-time transmission of Customs information for clearances. At present, there is a telecom tower on the CEDA South site.

- **Wastewater.** Normally an SEZ has its own wastewater treatment facilities, though in Jamaica this is not permitted. Although wastewater pipes to the Soapberry Treatment Plant run through the CEDA South area, the zone will not be able to tap this existing system. The CSEZ will require an independent pipeline to Soapberry. Waste within the CSEZ should be pre-treated before it is sent to Soapberry in order to not over tax the wastewater treatment facility. The pre-treatment of wastewater should be monitored on an on-going basis when the CSEZ is operational to ensure it meets international standards.

An eco-friendly commitment. Today's SEZs must be eco-friendly to attract investors. Most foreign companies have strong environmental and social charters, which require them to search out zones with strict environmental controls and compliant health and safety measures to invest in. This should be a fundamental principle of the CSEZ. In addition, the CSEZ should incorporate green technology, water recycling, and energy saving measures, wherever possible.

Soapberry Wastewater Treatment Plant and its expansion. The Soapberry Wastewater Treatment Plant is located south of the site. Phase 2 of the wastewater facility[14] is currently being negotiated. It is expected that Phase II of the Soapberry facility will be approximately 74.7-ha (183-acres) and will occur north of the existing Soapberry location, hence coming closer to the boundary of the CEDA South site. To ensure that the conflicting adjacencies are minimized, a buffer zone of trees, vegetation, berms, or other landscaping mechanisms are required to mitigate any negative impacts from the wastewater treatment plant. In addition, Soapberry should be required to minimize

[14] The technology currently used and proposed for the expansion of the Soapberry facility are open ponds. A more modern and sympathetic facility with a reduced footprint, which will better mitigate the current water quality concerns in Greater Kingston is more appropriate for this site.

any other negative impacts[15] on the CSEZ. If possible, the Soapberry Phase II and III expansions should be east and south of its current facilities. In order to optimize the CSEZ's value proposition, the Soapberry Wastewater Treatment Plant should ideally be relocated.

Riverton Solid Waste Facility. The CEDA South area is also bounded to the southeast by the Riverton Solid Waste facility. Proximity to this facility will negatively impact the CSEZ and its branding. Because the CSEZ requires a clean and eco-friendly environment, it will be important for the Riverton facility to manage the leaching, impromptu fires (smoke), and odors from the dump as well as control bird, rodents, vermin and scavenger activity. IDG has had discussions with the National Solid Waste Management Agency (NSWMA) regarding these issues. The agency has informed IDG that there are currently no plans to relocate the dump or limit the waste going into that facility. That said, the IFC and WB are currently supporting a study to upgrade Riverton to a sanitary facility. They are also interested in funding an improvement project. It is imperative that the Riverton facility be immediately upgraded and a stronger waste management plan be implemented to limit the negative impacts – specifically smoke – from its facility if the CSEZ is to be constructed on the CEDA South site. In addition, the NSWMA must construct a wall or a buffer zone (tree, vegetation, berm etc.) between the CSEZ and its facility to reduce its visual impacts.

An environmental impact assessment. The CSEZ project requires an EIA. If an EIA is done on the CEDA South site, it will update the existing environmental information and statistics, which is presently limited and dated. It will also identify any existing or new constraints and/or environmental issues (flora, fauna, birds, animals, and biodiversity sensitivity, soil contamination, noise, water and/or air pollution, flooding/tidal surge issues and other health and safety concerns etc.) and lay out an environmental mitigation/mediation plan, a construction plan, and a health and safety plan for operation of the zone. All environmental issues must be mitigated to make the CSEZ, in this location, attractive to a developer and/or investor. The EIA must also be strictly followed to minimize any negative effects on the CEDA, the greater surrounding area and all local communities in close proximity to the site. An EIA could be undertaken by the GoJ after the feasibility study is completed or by the developer, after they have been awarded the project through a tender process.

Security. Security is an important aspect for all zones in the world. To make Jamaica a more attractive investment location, security and a full range of security measures should be fully integrated into the development and operations of the CSEZ. This will reduce investor's costs and make the project more innovative.

[15] Negative impacts include odors and open ponds, which attract birds and scavengers.

Market Competition. There are a number of investment projects[16] proposed within the Greater Kingston area, which will come on-stream in the near to medium term. The projects that will most impact the CSEZ in the short term will be the CEDA township by CHEC, the CEDA north industrial warehousing project by the FCJ, and the Port of Kingston's new logistics zone within the port area. These three projects as well as the numerous other projects planned will directly compete with the CSEZ, and as such, will affect the success of the CSEZ's first phase. (Any new industrial project will reduce the initial demand for the CSEZ.) To minimize this affect, the GoJ should develop a strategy to make these new projects become part of Phase I of the CSEZ.

Communication Plan. A communication plan should be prepared in parallel with this project. This would help keep the public and private sectors as well as civil society updated on the progress of the study and of the CSEZ project. It would also allow for public events to be properly planned and permit the community to provide their input into the project in a strategic manner. In addition, this would help identify and create local leaders and champions for the zone and make the project stronger. Local community support will be important to the success of the zone. Lastly, local residents should be given the first opportunity to construct and work within the CSEZ.

[16] A list of proposed investment projects will be presented in the Market Assessment chapter of the feasibility study.

Table 3-7. Comparative Ranking Matrix

Best Practice Locational Factors	CEDA North Area			CEDA South Area		
	High Score	Medium Score	Low Score	High Score	Medium Score	Low Score
Site Factors						
Site in Single Ownership	X			X		
Appropriate Size	X					X
Expansion Lands Available	X					X
Located on Periphery of Rural/Urban Area	X			X		
Greenfield Site	X			X		
No or Limited Resettlement	X				X	
Unencumbered Topography	X			X		
Few Hydrology Issues			X			X
Access Factors						
Access to National Infrastructure (port, airport, highway)	X			X		
Located Along a Highway	X			X		
Infrastructure/Utilities Factors						
Access to Required Off-Site Infrastructure and Utilities		X			X	
Off-Site Earthworks Required		X			X	
On-Site Earthworks Required		X			X	
Access to On-Site Power		X			X	
Access to On-Site Water		X			X	
Minimal Environmental and Social Issues		X				X
Operating Factors						
Can Facilitate Demand	X					X
Can Deliver an Eco-Friendly Environment	X					X
Existing Industrial Clusters Around Site	X			X		
Located Where Demand Is	X			X		
Available Labor Around Site	X			X		
Can Provide a Secured Environment	X			X		

8.0 The 'Preferred' Location for the CSEZ

The CEDA as a whole – north and south – is geographically similar in its locational and contextual profile. (IE. Distance and access from Kingston, Portmore, the Mandela Highway, the port of Kingston, and Manley International Airport etc.) However, when comparing the CEDA North and South areas in a ranking matrix, which uses the SEZ locational criteria - listed at the start of this chapter - to determine the 'preferred location' for the CSEZ, the following differences become evident. (Table 3-7)

The comparative ranking matrix shows that although there are no fatal flaws on either site, the CEDA South area does have some potential deal breakers:

- **The site is small and constrained.** Because of its location between the Mandela Highway (north), Rio Cobre (west), the Ferry/Duhaney Rivers (east), the Soapberry Wastewater Treatment Plant (south) and the Riverton Solid Waste Facility (south-east) and because the site is a storm water catchment area, the CEDA South area is left with a smaller land parcel available for the CSEZ.

- **The site cannot be contiguously expanded.** Because the CEDA South area has well-defined, physical boundaries, the CSEZ in this location is unable to expand in a contiguous manner. Later phases of the CSEZ could be constructed on the CEDA North area however, this would physically split the zone into two, which is not best practices, and this solution significantly increases development costs and duplicates services.

- **There is a small level of resettlement required.** Although only a few structures and some moveable property needs to be resettled on the CEDA South area, this does increase development timeframes and costs. To make the CEDA South area an attractive development parcel for a potential developer, resettlement should be undertaken by the GoJ.

- **The site has hydrology issues.** Although the CEDA as a whole has hydrology issues, the CEDA South area also has tidal surges on its southern boundary. To mitigate this problem, earthworks, a retention pond, and control gates are required, which could be designed into the CSEZ master plan but would further reduce the total leasable space within the CSEZ.

- **There are a number of environmental issues to mitigate.** If the GoJ is going to give the CSEZ a '**strong environmental brand**' to be competitive with top SEZ's around the world, the CSEZ cannot be located directly adjacent Kingston's waste facility and wastewater treatment plant. Although solutions to the environmental issues posed by these entities are available, they will take time to implement. The CSEZ is to be constructed in the next 3-4 years and the timeframes to mitigate the serious environmental issues from the Riverton Solid Waste Facility and Soapberry will be 5-7 years, if a decision was made today.

- **The site will not be able to support the potential demand for the project.** Without taking into account the land required for the retention pond, the CEDA South area has 236-ha (583-acres) of land available for the CSEZ. This amount of land will only be large enough to support the CSEZ's 20-year base case scenarios according to the Chapter 8 Demand Forecast. This limits the CSEZ investment program.

Hence, in the Phase I report the 'preferred location' for the CSEZ was the CEDA North area. The CEDA North site was selected because it: i) was large, flat, unencumbered, and a 'greenfield' location, ii) can be developed as a +250 ha/617-acre zone, iii) can be contiguously expanded, iv) has a contained hydrology solution for the CSEZ, though a CEDA solution is still required, v) has fewer environmental issues and no resettlement, vi) is in close proximity to existing infrastructure and utility networks, vii) is simpler to brand (better able to create an image that will attract a wider range of investors), and viii) is farther away from the Riverton Solid Waste Facility and the Soapberry Wastewater Treatment Plant making it easier to maintain as 'an eco-friendly environment' within the CSEZ, which is required in today's competitive environment. (Note: The CSEZ is relocated to the CEDA South area in Chapters 9-13.)

Chapter Four
Environmental and Social Review

1.0 Overview

This chapter contains an environmental and social review. It is a high-level examination of the key issues and considerations for the CEDA, with a focus on the CEDA South area. It was prepared using secondary information and materials and through site visits to the CEDA. This review is not meant to be an environmental impact assessment (EIA), although one will be necessary for the CSEZ project. As such, this chapter includes: i) a description of the physical environment of the CEDA South area, ii) a review of the area's biological environment, iii) a socio-economic profile of the CEDA, and iv) an overview of the legislation the CSEZ project will have to follow.

2.0 The CEDA

The CEDA is a consolidation of three historic sugar estates owned by: i) Ellis, ii) Taylor, and iii) Dawkins. The current CEDA is approximately 4,332-ha (10,703 acres) in size and the major land owners are Alexander Hamilton and the UDC. The CEDA is comprised of high limestone hills to the north and a flat, low-lying alluvial plain to the south dominated by sugar cane fields. The Fresh River, Moses Lake, and Ferry/Duhaney Rivers and wetlands are the dominant hydrological feature of CEDA.

3.0 The CEDA South Area

As described in the site assessment, the CEDA is divided by the Mandela Highway. This environmental and social review is focused on the south lands of CEDA. The northern portion of the CEDA South area nearest the highway is currently used for agricultural purposes, supporting commercially-grown sugar cane. The southern portion of the CEDA South area consists of dense shrubbery and tall grasses and is currently not utilized for agricultural purposes. There is evidence, however, of illegal sand mining in this portion of the site.

Source. IDG
Figure 4-1. Mandela Highway Expansion

Source. Jamaica Observer
Figure 4-2. Aerial of The Soapberry Wastewater Treatment Ponds Adjacent to the CEDA South area

3.1 Road Networks

The CEDA South area is situated adjacent to the Mandela Highway and Highway 2000, the new toll road in the country. These highways connect the CEDA South area to the Greater Kingston Region and with western Jamaica. The Mandela Highway is a four-lane, dual carriageway, divided highway. Currently, the Mandela Highway is being expanded to a 6-lane highway. CHEC is undertaking the Mandela Highway improvements via a concession from the NWA. (Figure 4-1)

Although there are no formal roads within the CEDA South, the area is traversed by several, internal, unpaved roads, which provide access to the cultivated plots. A berm road, however, runs along the south-west boundary of the lands, beginning at the Mandela Highway and ending at the Soapberry Wastewater Treatment Plant. This gravel road runs atop a dyke, which is elevated and is approximately 3-m (10-ft) higher than the surrounding lands. The berm acts as a flood barrier for the Rio Cobre.

3.2 Rivers, Wetlands and Flooding Problems

The CEDA South area is either surrounded or bordered by the following rivers and water bodies: Rio Cobre, the Fresh River, the Duhaney River, and Salt River, Oxbow Lake, Moses Lake and Hunts Bay. Although not all the rivers and water bodies are physically on the CEDA South area, their impact (flooding, wetlands, tidal surges, poor soil conditions, pooling and sheeting etc.) on the land, makes almost half of the site undevelopable.

3.3 Utilities on the CEDA South Area

There are two sets of power lines that run through the CEDA South area. They are the main transmission lines that support the Kingston and Portmore areas and they are connected to the substation at Duhaney. In addition, the lands contain a telecom tower used by Flow and Digicel.

3.4 Adjacent the CEDA South Area

There are two, large-scale facilities that will negatively impact the development of the CSEZ on this site – the Soapberry Wastewater Treatment Plant and the Riverton Solid Waste Depository. Both these projects may generate a ‘Not in my backyard (NIMBY)’ response among investors and developers, which will limit the CSEZ’s attractiveness and global appeal.

3.4.1 Soapberry Wastewater Treatment Plant

The first phase of the Soapberry Wastewater Treatment Plant began operations in 2008. It is the largest open stabilization pond in Jamaica, with a capacity of 75,000 cubic meters (Figure 4-2). The Soapberry Wastewater Treatment Plant is designed to treat domestic wastewater, which is collected from Greater Kingston and south-east St. Catherine (Portmore). It is currently running at capacity.

The Soapberry Wastewater Treatment Plant is operated by the Central Wastewater Treatment Company (CWTC) Limited. The company is in the process of negotiating with the GoJ an expansion of these facilities towards the CEDA South area. They are requesting 74.7-ha (183-acres) to facilitate Phase 2. A third phase is also planned in the future. (This proposed expansion requires lands that are also earmarked for the CSEZ.)

The Soapberry Wastewater Treatment Plant's proximity to the CEDA South area has both some environmental risks and negative impacts for the CSEZ. The treatment plant brings with it odours, vermin, rodents, and scavengers.

Source. IDG/Google Earth
Figure 4-3. Riverton Solid Waste

Photo by Bryan Cummings, Jamaica Observer
Figure 4-4. A Riverton City Waste Facility Fire

3.4.2 Riverton Solid Waste Facility

In Jamaica, solid waste collection, disposal and management poses serious environmental, social, and liability problems as well as public health risks. Improper solid waste management occurring from the Riverton facility, causes pollution of groundwater, rivers and marine environments and the threat of water born-borne disease.

The Riverton Solid Waste Facility (Figure 4-3) began its operation in 1983 and today, handles approximately 50 percent of Jamaica's municipal and hazardous waste[1]. It is located on 42.90-ha (106-acres) of land on the eastern boundary of the CEDA South area. The facility is operated by the National Solid Waste Management Authority (NSWMA).

The Riverton Solid Waste Facility is not a sanitary landfill and as such, has experienced typical problems as a result, including rodents and bird nuisance, littering, leaching, air and water pollution, soil contamination, and impromptu fires. In March 2015, the Riverton Solid Waste Facility experienced its largest fire to date (Figure 4-4.)[2]

Environmental Solutions Ltd examined the air and water quality around the solid waste facility in the EIA they prepared for the potential expansion of the Riverton facility. The testing showed that the total organic carbon (TOC), biochemical oxygen demand (BOD), chemical oxygen demand (COD), and total coliforms and fecal coliform numbers far exceeded Jamaica's national standards, indicating a high level of contamination on and around the site. Historical data for groundwater quality in the area was also examined and the results showed that there was a high level of microbiological contamination in the area. Other environmental tests indicated organic matter was present in the water and anaerobic conditions were present in the aquifer[3]. The total suspended particles (TSP) concentration in the air around the facility exceeded the Jamaican National Ambient Air Quality standards for the 24-hour average for TSP. At a minimum, these key issues will need to be mitigated and a buffer zone between the Riverton facility and the CSEZ will be required.

[1] In 2014, the facility handled 390,585 tons of municipal and hazardous waste.
[2] The fire was described as the "largest fire ever" at the Riverton facility. Schools, communities and businesses were severely affected. Many were rushed to hospitals from the effects of smoke inhalation. The Ministry of Health reported that more than 800 people were brought to the hospitals due to the fire. This incident significantly resulted in economic losses and severely impacted public health.
[3] Environmental Impact Assessment for the expansion of the Riverton Solid Waste facility by Environmental Solutions Ltd.

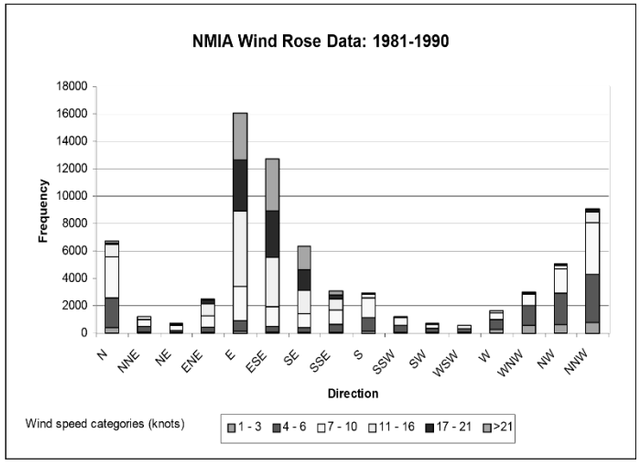
4.0 The Physical Environment

4.1 Climate: Rainfall

The CEDA South area's meteorological conditions are subtropical with only a slight variation in temperature and rainfall throughout the year. The area is typified by bi-modal rainfall, with its first peak in May and its second peak in October. During these rainfall peaks, soil moisture content within the site is high and consequently runoff is also high due to antecedent conditions. In the areas closest to the rivers and wetlands, the soil remains saturated all year round, and increases in size during the high rainfall periods in May and October. That said, the soil saturation levels within the wetlands and throughout the site are largely independent of precipitation and are mainly due to groundwater flows from the limestone aquifers that emerge from the boundary of the limestone hills and alluvial plain[4]. The CEDA South area is driest between December to March when the long-term average rainfall in St. Catherine rarely exceeds 100 mm. The long-term annual average rainfall as calculated from the Norman Manley Airport for the period 1951-1980 is 62.5 mm. The average monthly rainfall for St. Catherine Parish is 119 mm. Average totals range between a low of 50 mm and a high of 238 mm[5]. The parish monthly summary of April 2009 by the Meteorological Office of Jamaica recorded 88 mm, which was below the 30-year average for April (91 mm.)

With respect to temperatures in the area, historic data shows that the maximum daily temperature in St. Catherine ranges from 29.6 °C to 31.9 °C and the minimum from 22.3 °C to 25.6 °C, with the highest temperatures in July and August. This relatively narrow range in temperature change reflects the moderating influence of the sea by the CEDA South area.

[4] Strategic Environmental Assessment, Final Report, Caymanas Estates Development Area, October 2010
[5] Ibid



Source. Norman Manley International Airport 1981-1990

Figure 4-5. Wind Speed and Wind Direction Frequencies

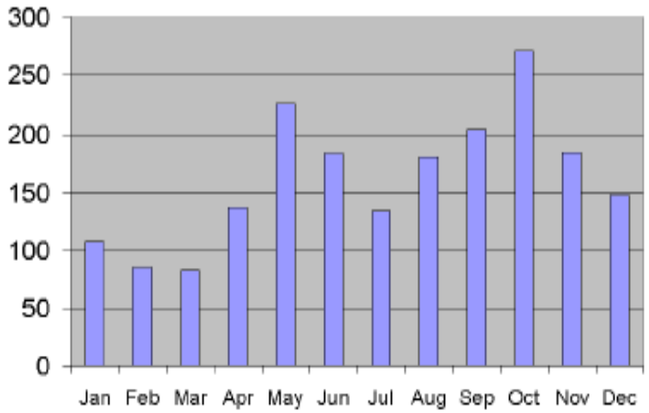
4.2 Wind

Wind data for the period 1981 to 1990 showed that the predominant wind directions were from the east and east/south-east (Figure 4-5). The mean wind speeds recorded during the 10-year period were 10.3 knots. Winds that came from the south had the highest wind speeds (-19.5 knots), followed by wind speed coming from the south/south-west. Winds from the east/south-east had the lowest average wind speeds. Calm winds were reported 14.7 percent of the time and wind speeds of 1 to 3 knots were recorded 4.2 percent of the time.

4.3 Climate Change – Introduction to Unpredictability

The effects of climate change have been felt in Jamaica. In the “State of Jamaican Climate 2012 Report (SJCR)”[6] (and in the updated version dated January 2016[7]), the impact of climate change on the country’s temperatures, rainfall, sea levels and cyclones has been verified and the report notes that climate change and its unpredictability has been experienced throughout the country. The report also states that all design and construction considerations in Jamaica should recognize climate change and its implications. To support this fact, a number of scientific climate studies have been undertaken in recent years and have all predicted that Jamaica will experience the full impact of climate change in the future. (Scientists have referred to this phenomenon as “climate departure” and it is defined as "the moment when the average temperatures, either in a specific location or worldwide, have become so impacted by climate change that the old climate is left behind.[8]” This moment is called the tipping point. A city or country experiences "climate departure" when the average temperature of its coolest year from then on is projected to be warmer than the average temperature of its hottest year between 1960 and 2005.)

[6] State of Jamaican Climate 2012, Climate Studies Group, Mona (CSGM) produced by Planning Institute of Jamaica
[7] Draft Report Jamaica: Future Climate Changes, Climate Studies Group, Mona, University of the West Indies, January 2016
[8] Fisher, Maz. 2013 ‘Map: These are the cities that climate change will hit first,’ Washington post.



Source. Environmental Solutions Ltd.
Figure 4-6: Jamaica's Rainfall Climatology in Millimeters

A study published in the prestigious, peer-reviewed, scientific journal *Nature*[9] supports climate change in Jamaica. The study predicts that the earth will reach "climate departure" in 2047 and identifies "climate departure" dates for all countries around the world based on the Global Circulations Models (GCMs) and Representative Concentration Pathways (RCPs). The study denotes that many of the world's most vulnerable countries and locations will be impacted first, with the Caribbean being amongst this initial group. According to the study, the "climate departure" date for Kingston and Jamaica in the GCM 8.5 and RCP 4.5 are 2023 and 2028 respectively.

4.4 Predicted Climate Change Impacts for Jamaica

The section below presents the SJCR's projections for rainfall, temperature, and sea level rise in Jamaica.

4.4.1 Rainfall Projections

Within Jamaica, the annual rainfall pattern is bi-modal resulting in a rainy season from April – November and a dry season from December to March. During the rainy season, there is a mid-summer dry season occurring from July through August and rainfall peaks from May – June and September to November. Historically, the annual rainfall in Jamaica reflects a similar pattern with most of the island's rainfall occurring in October and the driest month of the year being February (Figure 4-6[10]). This usually reliable pattern of rainfall has ordered the way in which major activities take place in several sectors.

In terms of the distribution of rainfall across the island, there are variations. The interior mountainous areas experience more than 1,700 mm of rainfall annually. The coastal areas are driers with the southern coastal plains being the driest (experiencing approximately 1,000 mm of rainfall or less annually.)

Historically, rainfall trends for the island, unlike temperature, experience inter-annual variability (year-to-year and decadal variations), which in part are explained by the El Nino/La Nina phenomenon. El Nino years have been observed since the 1970s and last from 3 to 5 years with increasing frequency and

[9] Mora, C.; Frazier, A.L., Longman, R.J. et al 2013 'The projected timing of climate departure from recent variabilities', *Nature* 502, pp183-187.
[10] Ibid

intensity. The El Nino phenomena produces drier and hotter than usual averages (rainfall and temperature), resulting in the meteorological droughts experienced in the Caribbean in 2010 and 2014. In the early rainfall periods following an El Nino event, the May to July periods tend to be wetter. Generally, La Nina phenomenon produces the opposite effects, that is, a wetter rainy season.

The SJCR has the following rainfall projections for Jamaica until the end of the century:

- Dry season rainfall generally shows small increases or no change in Jamaica. Mean increases in rainfall are consistently between 1-4 percent across all-time series examined. Given the small amounts of rainfall received at this time (2016), the increases are not enough to offset the overall drying pattern.

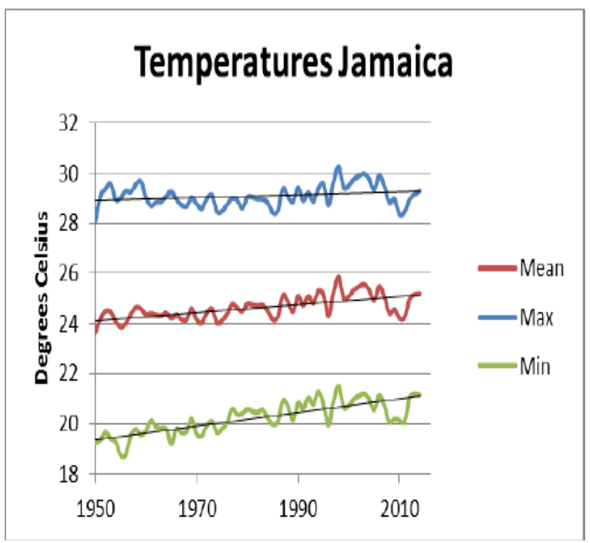
4.4.2 Temperatures Projections

The temperature climatology across Jamaica is a unimodal with peak temperatures in June to September and cooler temperatures from December to March. Monthly temperatures range from 24 ^{0}C to 28 ^{0}C with a mean maximum temperature of 33 ^{0}C in the warmers months and a mean minimum temperature of 19 ^{0}C during the cooler months.

Globally, the mean surface temperatures have increased by 0.85 ^{0}C between 1880-2012. In the case of the Caribbean, temperature increases have been in a similar range of 0.5 ^{0}C from 1900-1995. Figure 4-7 also shows a warming trend (minimums, maximums and mean temperatures) in Jamaica. However, based on calculations prepared over the period between 1950-2014, minimum temperatures are increasing at a faster rate than maximum temperatures. This is 0.27 ^{0}C/decade compared to 0.06 ^{0}C/decade. In general Jamaica's estimated temperature increases align with the global projections.

The SJCR has the following temperature projections:

- The major mean annual temperatures in Jamaica are projected to increase through the end of the century.



Source. Environmental Solutions Ltd.
Figure 4-7: Mean, Maximum, and Minimum Temperature Projections for Jamaica

4.4.3 Sea Levels Projections

Globally, mean sea levels in the region have been increasing since the 1900s by 0.19 ± 0.02 meters and are predicted to continue at this rate. This trend in sea level rise (SLR) is now accelerating across the world, although not in a uniform manner. There are large, regional differences. The upward trend in SLR from 1950-2010, however, ranged from 1.3 mm to 2.5 mm/year[11].

Over a period of approximately 18 years in Jamaica, the sea level data (measured at Port Royal) illustrated an estimated increase of 1.66 mm/year. The satellite altimetry data across Jamaica also confirmed that there has been a substantial rise in sea levels since the 1950s.

From the SJCR, the future SLR within Jamaica will not differ significantly from the global projections, as in Table 4-1[12].

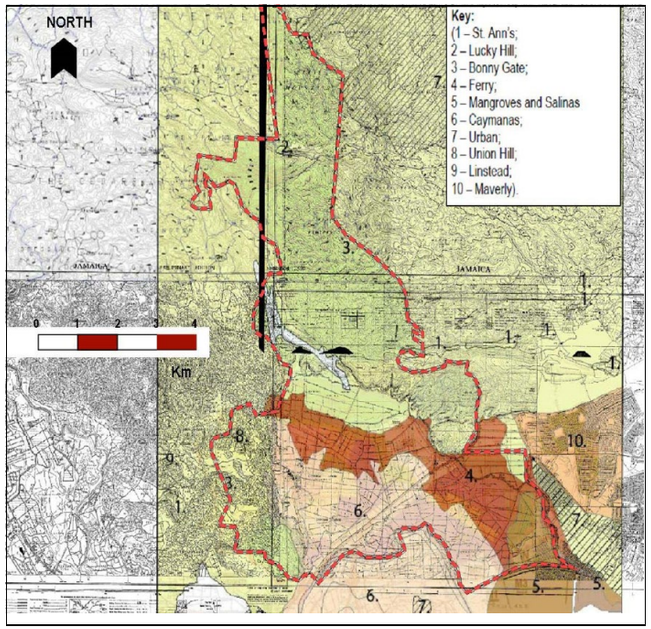
Table 4-1. Projected Global Increases in Sea Level Rise

	2046-2065		2081-2100	
Scenario	Mean	Likely Range	Mean	Likely Range
RCP 2.6	0.24	0.17-0.32	0.40	0.26-0.55
RCP 4.5	0.26	0.19-0.33	0.47	0.32-0.63
RCP 5.0	0.25	0.18-0.32	0.48	0.33-0.63
RCP 6.5	0.30	0.22-0.38	0.63	0.45-0.62

4.5 Topography

The CEDA South area lies on a strip of coastal flatlands at the southern end of an expansive alluvial plain, which extends to the coast of Hunts Bay. The CEDA South area's main geo-morphological element is the alluvial plain. The lands throughout the site are generally flat though gently sloping to the south, with the highest elevation towards the west. Elevations at this point are around 3.5-m. Elevations near Hunts Bay are below sea level.

[11] Ibid Page 63, Table 32.
[12] Ibid



Source. Soil Map: Soil and Survey Research Department, UWI, 1: 50,000, c1970; Survey Department 1:12, 500 topography maps, 1973 (Strategic Environmental Assessment, Final Report, Caymanas Estates Development Area, October 2010)

Figure 4-8. A Soil Map Overlain on the CEDA Map

4.6 Soils

Soil type is critically important in controlling the hydrology regime of a catchment area. (A soil type directly influences the rate of infiltration/percolation of rainfall into the subsurface.) As per Figure 4-8, the soil survey shows that the majority of the CEDA South area is a combination of: i) Caymanas Sandy Loam (25%), ii) Ferry Silty Clay (13%) and iii) Mangrove/Salinas Clays (less than 2%).

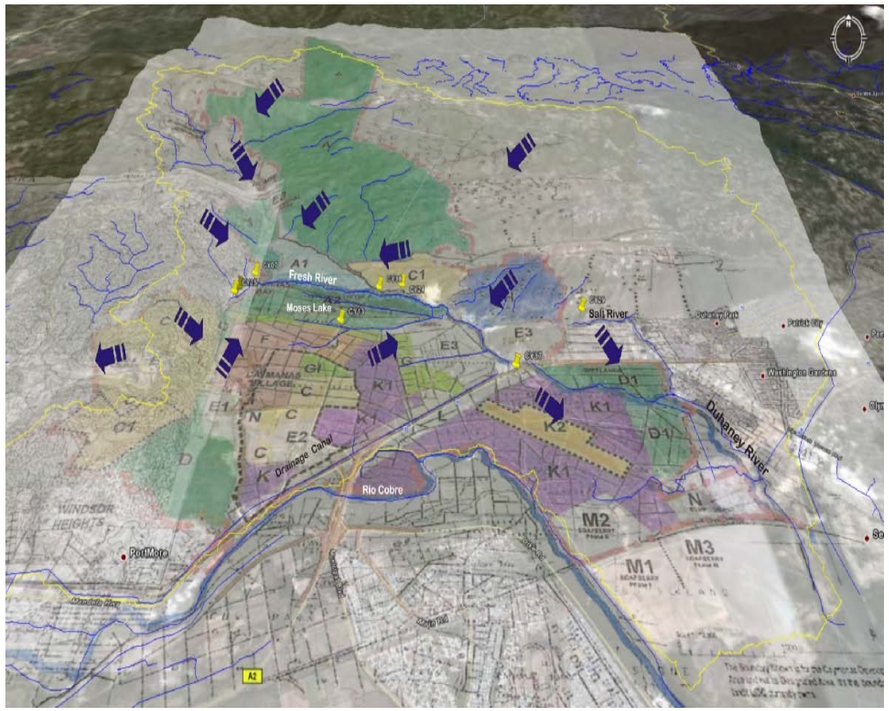
The Caymanas Sandy Loam is considered to have a moderate draining capacity and is classified as a "C" Type Hydrologic Soil by the Water Resource Authority (WRA). If it is comprised of a higher clay content, its classification is then modified to a Type "D". The Ferry Silty Clay has a very slow internal drainage capacity and is classified as a Type "D" Hydrologic Soil. Because the site has a mangrove forest south of the Mandela Highway, there is an increased probability that the area also has compressed peat, clays and other organic soils. Because of these types of soils, soil testing is required.

4.7 Surface Drainage Hydrology and Flooding Hazard

The CEDA South area is situated on the divide separating the Rio Cobre drainage basin and the smaller sub-basin of the Ferry-Duhaney Rivers. The Rio Cobre drains a watershed area of 580 km^2 located in north-east St. Catherine. The Rio Cobre flows in a southerly direction along the western boundary of the CEDA South area. Near the site, a 3-meter-high dyke has been built on the western and eastern banks to contain the flood flows within the channel. The mean discharge of the Rio Cobre is approximately 6.2 $m^3 s^{-1}$, but during flash floods the peak water flow may rise to 283 $m^3 s^{-1}$[13].

The surface drainage of the CEDA South area is determined by the regional topography and modifications, which have altered the local surface flow conditions. The alluvial plain's surface flow patterns, (south of the Mandela Highway), have been substantially modified over the past 200 years. Previously much of the area was covered in mangrove forests, salinas, salt ponds and "swampy grounds", however, there have been several major changes with the development of the Mandela Highway such as

[13] Water Resources Authority



Source. UDC
Figure 4-9. Drainage Patterns on the CEDA/CEDA South Area

drainage ditches, canals, river re-alignments and pump houses to drain the land for agricultural purposes[14].

Figure 4-9 illustrates the major realignment of the Rio Cobre. The channel adjustment, (obtained via the two raised dykes) along the Rio Cobre banks is responsible for the current "meander-less and quasi-linear course to its outfall at Hunts Bay." The Rio Cobre flows along the western boundary of the CEDA South area and has the potential to generate significant discharge during peak flows and flood periods. The flooding potential, in light of the unpredictability of climate change impact on the weather pattern, is a major issue of concern in terms of the hazard vulnerability of the site.

In addition, the generally low-lying, flat alluvial plain between the limestone hills to the north and the sea to the south has no other distinct drainage pattern. Hence, after long durations of intense rainfall, significant levels of sheet flow occur and flows to the south. As a result, significant ponding of water is experienced in large areas of the site. The CEDA South area receives this overland flow, which slowly accumulates in the Rio Cobre and in the Ferry and Duhaney Rivers and dissipates into the sea as slow moving overland flow or evaporates over time from the ponded areas. The estimated mean discharge of the Ferry River below the confluence with the Duhaney River is 2.8 m^3/sec[1].

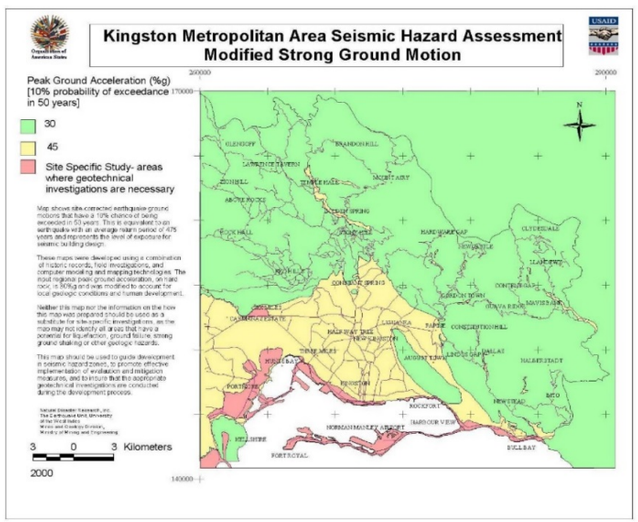
The Fresh and Duhaney river systems are also tidally influenced at their terminus. The difference in salinity between the two springs is possibly due to the dynamic circulation of groundwater towards the coast that is thought to induce entrainment of the underlying saline water resulting in saline water inflowing at depth, the mixing of this saline water with fresh groundwater, and the discharge of brackish water along the coast. Evidence for this is supported by the WRA Ferry Springs report, which

[14] Strategic Environmental Assessment, Final Report, Caymanas Estates Development Area, October, 2010

showed that salinity values increased in direct relationship to increasing discharge after rainfall events. This indicates that the more dynamic the outflow of freshwater, the greater the entrainment of saline water is which leads to higher salinities. This becomes an issue for the site design, considering the predications of sea level rise by the climate change models.

With regards to flooding, the relative flatness of the land surface and low elevation of the site makes it susceptible to flooding. The potential sources of flooding are from over bank flow from the Rio Cobre, Fresh and Duhaney Rivers and inundation from storm surges, as well as from overland sheet flow.

To date, the dyke constructed on both banks of the Rio Cobre to contain flood flows appears to be secure. The 100-year peak flows for the Rio Cobre are estimated at 2,500 m^3/sec. No significant flooding has been recorded in this area because of high flows in the Rio Cobre. The 2002 flood flows were thought to represent the 100-year discharge levels, however, no overtopping of the dykes near the south site occurred. That said, both global and local rainfall events are increasingly unpredictable and hence mitigating the flood potential should be a major concern for this site. An extensive storm water drainage system will be needed for this site.



Source. USAID
Figure 4-10. Seismic Hazard Areas

4.8 Seismic Activity

Jamaica is susceptible to seismic activity and is in an Earthquake Zone of 3-4. Data from the Earthquake Unit at the University of the West Indies indicates that the Kingston area has an average exposure rate of MMVII on the modified Mercali Intensity rating (MMI). (The MMI is the threshold for damage to ordinary structures.) Hence construction for earthquakes is mandatory.

Figure 4-10[15] also indicates that the CEDA South area lies close to an area that requires a site-specific ground motions study to determine the likely behavior of the existing soils to ground motion induced by earthquakes.

[15] Prepared by USAID

5.0 Biological Environment

The following section is based on data collected for a 1993 environmental study conducted by Environmental Solutions Limited[16], which was augmented by later field surveys undertaken by UDC. This section covers habitats, flora, and fauna in and around the CEDA South area.

5.1 Habitats

In 1993, three ecological habitats were identified. The habitats were: i) mangrove scrubs, ii) tidal mudflats, and iii) scrublands. (The data in the following section is taken from a secondary source, which will need to be verified in the environmental impact assessment.)

i) Mangrove Scrubs:

- Mangroves were identified lining the banks of the Rio Cobre (west), the Duhaney River (east), Hunts Bay (south) and the train tracks (north). The shoreline along the Duhaney River was less disturbed than that of the Rio Cobre, having low sloping grassy banks.

ii) Tidal Mudflats:

A large mudflat existed in the eastern half of the CEDA South area. This zone was divided into three sections:

- The northern section had muddy flats, scattered mangroves, ponds, and many mangrove stumps.
- Central section: landfill activities appeared to have been concentrated in the higher ground in the central region of the site. This area had a grassy belt, scattered *Acacia* sp. (Cassia) trees, scrubs, and coastal herbs (*Sesuvium* sp.). There were many ridges, depressions, sand patches and mounds, giving further evidence of landfill.
- The southern portion of the site was muddy with mangrove stumps. This area had the remains of several coal kilns, as coal burning was a major activity on the site, resulting in the loss of the dense coverage of mangroves that had existed prior to that time.

[16] Environmental Solutions Ltd. (1993). Kingston Harbour Environmental Project – Site Description of the Soapberry Lands, St. Catherine. Submitted to SENTAR CONSULTANTS LTD

iii) Scrublands

- The western side of the CEDA South area was densely vegetated with grass, shrubs, and trees. The area to the north of the railway line, was also covered with disturbed scrub vegetation. This area was dominated by the thorny scrub Acacia sp. with ruinate vegetation and mined out sand pits.

5.2 Flora

In 1993, Environmental Solutions Limited identified the following list of plants seen in Table 4-2 below. Many of these plants exhibited morphological adaptations due to the high light intensity and dryness of the area. Most plants were also typical for coastal areas.

Table 4-2. List of Flora Found on The CEDA South Area In 1993[17]

Family	Botanical Name	Common Name	Habit
Monocotyledones			
Arecaceae	Cocos nucifera	Coconut	Tree
Cyperaceae	Cladium jamaicense	Saw Grass	Herb
Liliaceae	Sanseviera metallica	Mother-in-law's Tongue	Herb
Poaceae	Andropogon sp.		Herb
Poaceae	Chloris barbata		Herb
Poaceae	Gynerium sagittatum	Wild Cane	Herb
Poaceae	Panicum maximum	Guinea Grass	Herb
Poaceae	Rhynchelytrum repens		Herb
Poaceae	Sporobolus pyramidatus		Herb
Family	**Botanical Name**	**Common Name**	**Habit**
Dicotyledones			
Aizoaceae	Sesuvium portulacastrum	Seaside Purselane	Herb
Amaranthaceae	Alternanthera halimifolia		Herb
Apocynaceae	Urechites lutea	Nightshade	Shrubby Vine
Asteraceae	Tridax procumbens		Herb
Asteraceae	Vernonia cineria		Herb
Avicenniaceae	Avicennia germinans	Black Mangrove	Shrub/ Tree
Bignoniaceae	Tecoma stans	Yellow Elder	Shrub
Boraginaceae	Cordia alba	Duppy Cherry	Shrub/ Tree

[17] Ibid

Table 4-2. List of Flora Found on The CEDA South Area In 1993[17]			
Family	**Botanical Name**	**Common Name**	**Habit**
Boraginaceae	Cordia sp.		Shrub/ Tree
Boraginaceae	Heliotropium angiospermum	Dog's Tail	Herb
Caesalpiniaceae	Cassia alata	King-of-the-Forest	Shrub
Caesalpiniaceae	Cassia emarginata	Yellow Canlewood	Shrub/ Tree
Capparaceae	Capparis flexuosa	Bottle-cod Root	Shrub
Combretaceae	Laguncularia racemosa	White Mangrove	Shrub/ Tree
Combretaceae	Terminalia catappa	West Indian Almond	Tree
Euphorbiaceae	Euphorbia blodgetti		Herb
Euphorbiaceae	Jatropa gossypifolia		Shrub
Fabaceae	Abrus precatorius	Crab's eye	Climber
Malavaceae	Sida aggregata		Undershrub
Malvaceae	Thespesia populnea	Seaside Mahoe	Tree
Mimosaceae	Acacia farnesiana		Tree
Mimosaceae	Leucaena leucocephala	Lead Tree	Shrub
Mimosaceae	Pithecellobium unguis- cati	Bread-and-Cheese	Tree
Portulaccaceae	Talinum triangulare		Herb
Zygophyllaceae	Tribulus cistoides	Kingston Buttercup	Herb

5.3 Fauna

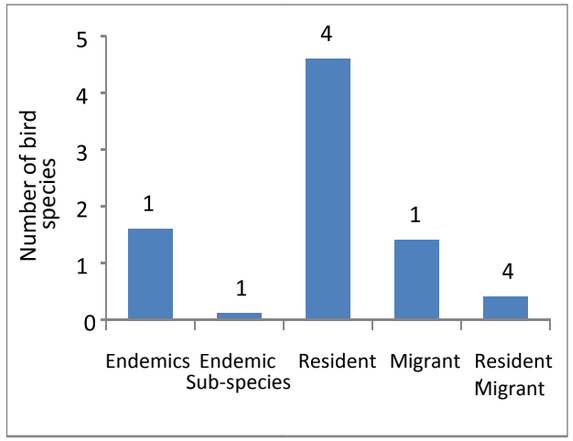
5.3.1 Birds

The list of birds identified in 1993 is given in Table 4-3 below. Because the study was conducted toward the end of the summer, several migratory and over-wintering species were reported.

Table 4-3. List of Birds Identified on The CEDA South Area In 1993[18]

Scientific Name	Common Name	Status
Cathartes Aura	Turkey Vulture	Common Resident
Fregata Magificens	Magnificent Frigate Bird	Common Resident
Pelecanus Occidentalis	Brown Pelican	Common Resident
Arenaria Interpres	Ruddy Turnstone	Common Winter Visitor
Himantopus Mexicanus	Common Stilt	Common Resident
Ardea Herodias	Great White (Blue) Heron	Common Winter Visitor
Butorides Virescens	Green Backed	Common Resident
Nycticorax Nycticorax	Black Crowned Night Heron	Fairly Common Resident
Nycticorax Violaceus	Yellow Crowned Night Heron	Common Resident
Egretta Caerulea	Little Blue Heron	Common Resident
Egretta Tricolor	Tricoloured Heron	Fairly Common Resident
Egretta Thula	Snowy Egret	Common Resident
Larus Atricella	Laughing Gull	Common Resident
Gallinula Chloropus	Common Moorhen	Very Common Resident
Sterna Antillarum.	Least Tern	Common Summer Resident
Calidris sp.	Sandpiper	Six Species of Sandpipers occurring in Jamaica: 2 fairly common winter visitors; 1 common winter visitor; and 3 uncommon winter visitors
Charadrius sp.	Plover	Common Winter Visitor and Fairly Common
Charadrius Vodiferus	Killdeer	Common Resident
Eudocimus Albus	White Ibis	Uncommon Resident in Mangroves
Ralllus Longirostris	Clapper Rail	Uncommon Resident
Zenaida Aurita	Zenaida Dove	Locally Common Resident
Columbina Passerina	Ground Dove	Very Common and Widespread Resident
Tyrannus Caudifasciatus	Loggerhead Kingbird	Common and Widespread

[18] Ibid



Source. Environmental Solutions Ltd.

Figure 4-11. The Overall Avifaunal Species Composition Found Within the CEDA South Area in 2012

Table 4-3. List of Birds Identified on The CEDA South Area In 1993[18]

Scientific Name	Common Name	Status
Dendroica Discolor	Praire Warbler	Common Winter Visitor
Dendroica Petechia	Yellow Warbler	Common Resident
Helmitheros Vermivorus	Worm Eating Warbler	Uncommon Transient and Winter Visitor
Crotophaga Ani	Smooth Billed Ani	Common resident
Saurothera Vetula	Jamaican Lizard Cuckoo	Resident, less common than the Chestnut-Bellied
Chordeiles Gundlachii	Antillean Nighthawk	Common Summer Resident
Falco Sparverius	American Kestrel	Very Common Resident
Loxigilla Violacea	Greater Antillean Bullfinch	Common Resident
Tachornis Phoenicobia	Antillean Palm Swift	Very Common Resident
Setophaga Ruticilla	American Redstart	Common Winter Visitor

Note: Identification and status based on Downer and Sutton, 1990; Bull and Farrand, Jr, 1977; Bond, 1985[19]

In 2012, field studies by the UDC[20] found 85 species of birds within the CEDA boundaries (Figure 4-11). Most of the species observed were resident birds, followed by the endemics and a few migrants. Sixteen of the island's 28 endemic birds were identified during the assessment. Fifteen migrant species were observed, and none of them were migrant warblers. There were also two introduced species.

5.3.2 Butterflies

In 1993, nine species of butterflies were observed only within the scrubland and mangrove areas of the site. See Table 4-4 below for more details.

Table 4-4. List of Butterflies Reported Within the CEDA South Area in 1993

Common Name	Scientific Name	Distribution
Julia	*Dryas iulia delila*	Islandwide
Antillean Great White	*Ascia monuste eubotea*	Islandwide
Buckeye	*Precis evarete zonalis*	Islandwide
Maerula	*Anteos maerula maerula*	Islandwide
Cloudless orange	*Phoebis agarithe cubana*	Islandwide
Statira	*Aphrisa statira cubana*	Islandwide
Sulphur	*Eurema sp.*	Islandwide
Antillean malachite	*Siproeta stelens stelens*	Islandwide

[19] Brown, F.M. and B. Heineman. Jamaica and its Butterflies. 1972. E.W. Classey limited, London.
[20] Natural Resources Assessment of the Caymanas Estates Development Area, January 2012, UDC

5.3.3 Crocodiles

The American Crocodile (*Crocodylus Acutus*) is indigenous to Jamaica, living in wetland areas where there is brackish water and adequate food. Crocodile populations in Jamaica are primarily found along the south coast of the island from St. Thomas to Westmoreland, and on the north coast in Hanover and Trelawny. The species is threatened by the destruction of wetlands, the construction of coastal developments, aquatic pollution, and the hunting and killing of crocodiles. The *Crocodylus acutus* is protected by both national and international legislation, and it is illegal to kill or to have in ones' possession any part of this animal.

In 2011, from August to September, a 3-day crocodile assessment was undertaken on the CEDA north site. It was conducted by a multi-agency team from the Natural Resources Management and Environmental Planning Department (NRMEP-UDC), NEPA, the Jamaica Constabulary Force (JCF) and the JDF. While this assessment was not on the proposed CSEZ site, crocodiles were found in the Fresh River, which traverses from the north to the south of the site. This river is a conduit for these reptiles. Table 4-5 below shows the results of the survey.

Table 4-5. Number of Crocodile Recorded During The 2011 Assessment.

Water Body	Wednesday		Thursday		Friday	
	Walking	Boat	Walking	Boat	Walking	Boat
Ferry River	5*	4*				
Moses Lake (East)			1	0	0	
Moses Lake			0		0	0
Canal			4		2	
Caymanas Bay					0	
Total = 16						

* It is possible that the walking team and boat team counts overlapped

6.0 Socio-Economic Profile

There are a number of communities surrounding the CEDA South area including: i) Spanish Town, ii) Portmore, iii) Riverton City, Riverton Meadows, Callaloo Mews and Seaview Gardens, iv) New Haven, and v) CEDA.

6.1 The Parish and Surrounding Communities

6.1.1 St. Catherine

St. Catherine is one of Jamaica's largest and most economically valued parishes. It lays adjacent to the parishes of Kingston and St. Andrew. Between 1991 and 2001, the parish of St. Catherine grew by 26.3 percent, nearly three times the rate observed for the rest of the country. The 2011 Census identified a population of 516,218 in St. Catherine, second only to the KMA. Of this population, 48.50 percent or 250,358 residents were males. Additionally, 31.71 percent of the male population was between 20-40 years and 90,561 or 34.06 percent of the female population was in the same age band. Of this population, 55.25 percent of the males were educated from secondary to tertiary levels, while the figure for females was 59.87 percent.

6.1.2 Spanish Town

Spanish Town is the capital and the largest town in the parish of St. Catherine, Middlesex County. It was the Spanish and British capital of Jamaica from 1534 until 1872. In 2001, Spanish Town had a population of 131,515[21], which grew to 160,000 by 2009. Since this period, Spanish Town has grown rapidly.

6.1.3 Portmore

In 2002, Portmore received Municipal status though it is still considered by many as a linked urban settlement to the KMA. As a planned residential community, Portmore is helping meet the housing demand for the KMA and Spanish Town areas. The municipality is comprised of Portmore with a population of 101,122, Hellshire (7,033), and Greater Portmore (58,690).

[21] Statin 2001

6.1.4 Riverton City, Riverton Meadows, Callaloo Mews and Seaview Gardens

Riverton Meadows, Callaloo Mews, and Seaview Gardens are part of the larger Riverton Community, and lies south of Riverton City. The surrounding areas are comprised of approximately 12,000 residents living in low-income housing. Approximately 70 percent of the housing units in these areas can be categorized as poor to extremely poor; standards, sanitation and water supply within the areas are sub-standard.

6.1.5 New Haven

New Haven is located at Six Miles along the Mandela Highway. It is comprised of a planned residential community, which is increasingly being encroached upon by unplanned housing. The core of New Haven is mainly a lower to middle-class community.

6.1.6 The Caymanas Estates

The main settlement pattern on the Caymanas Estate has a low density: historically linked housing estates comprising of low income housing structures and related trading services typical of such settlements. The CEDA is not a homogeneous community but rather a group of different social, cultural, and economic environments. These communities are centered on and embedded in the historical and current land use of the development area. The main communities are: i) Ferry, ii) Caymanas Bay, iii) Caymanas Estates, iv) Caymanas Glade, v) Caymanas Village, vi) Windsor Heights, vii) Sudbury Grove.[22] The total population of these communities is approximately 4,050.

[22] Strategic Environmental Assessment, Final Report, Caymanas Estates Development Area, October, 2010

6.2 Socio-Cultural Attributes

There are a number of youth clubs, churches, development organizations, foundations, schools, social development commissions and political party organizational headquarters in the surrounding aforementioned communities of the CEDA South area. These facilities provide education, welfare, and security within the region and promote economic and social development.

6.3 Industrial and Commercial Areas

Spanish Town and Portmore both have evolving industrial and commercial areas, which are growing as Kingston and St. Andrew are becoming more and more congested. There are also pockets of new industrial development along the Mandela Highway as well as around Six Miles and along Spanish Town Road. The Port of Jamaica and Kingston Wharves are economic generators in the area and these facilities are within 6 to 8-miles (10-13 km) from the CEDA South area.

7.0 Environmental Legislative Framework

The CSEZ project will require an environmental impact assessment. The following is a list of applicable laws relevant to the project's approval process:

7.1 National Legislation

Town and Country Planning Authority's Town and Country Planning Act (TCP Act), 1958 (Amended 1987). This Act provides the statutory requirements for the orderly development of land (planning) as well guidelines for the preparation of Development Orders, stipulations for Advertisement Control Regulations, Petrol Filling Stations and Tree Preservation Orders. It establishes the Town and Country Planning Authority, which in conjunction with the Local Planning Authorities (Parish Councils) are responsible for land use zoning and planning regulations as described in their local Development Orders. The Town and Country Planning Act is administered by the National Environment and Planning Agency.

The Urban Development Corporation Act (1968). This Act mandates the UDC authority to designate development areas, prepare development plans, set planning guidelines and carry out development in accordance with approved development plans.

Local Improvements Act (1914). The Local Improvements Act is the primary statue that controls the subdivision of land.

The Parish Council Act (1901 Amended 2007). Under the Parish Council Act, each Local Planning Authority may revoke or alter regulations concerning the construction of buildings and related restrictions on the elevation, size and design of buildings built with the approval of the relevant Minister. It may also make regulations concerning the installation of sewers on premises.

Land Acquisition Act (1947). The Land Acquisition Act was passed in 1947. As stipulated under Section 3 of this Act, any officer authorized by the Minister may enter and survey land in any locality that may be needed for any public purpose. This may also involve:

- Digging or boring into the sub-soil;
- Cutting down and clearing away any standing crop, fence, bush or woodland;
- Carrying out other acts necessary to ascertain that the land is suitable for the required purpose.

The Minister is authorized to make a public declaration under his signature if land is required for a public purpose, provided that the compensation to be awarded for the land is to be paid out of the Consolidated Fund or loan funds from the Government or funds from any Parish Council, the Kingston and St. Andrew Corporation, or the National Water Commission.

Once the Commissioner enters into possession of any land under the provisions of this Act, the land is vested in the Commissioner of Lands and is held in trust for the Government of Jamaica in keeping with the details stated in Section 16. The Commissioner shall provide the Registrar of Titles with a copy of every notice published, as well as a plan for the land. The Commissioner will also make an application to the Registrar of Titles in order to bring the title of the land under the operation of the Registration of Titles Act.

Land Development and Utilization Act (1966). This act specifies conditions pertaining to the development and utilization of land, dispossession of owners or occupiers, and the Land Development and Utilization Commission as

it pertains to agricultural and unused land. The Land Development and Utilization Act is administered by the National Environment and Planning Agency.

Registration of Titles Act (1989). The Registration of Titles Act was passed in 1989 and speaks to the legalities associated with land registration in Jamaica.

The Main Roads Act (1932). The Main Roads Act of 1932 details the legal basis pertaining to main roads and specifically looks at management, laying out of roads, taking of lands, encroachments, offences, lights and carriages, power to arrest and other legalities. In section 5 of this Act, it states that the Minister has the power to declare other roads or parts thereof to be main roads and to also declare that a main road is no longer such. The Chief Technical Director (with permanent staff), under the directive of the Minister, is responsible for the laying out, making, repairing, widening, altering, deviating, maintaining, superintending and managing main roads, and controlling the expenditure of allotted moneys.

Jamaica National Heritage Trust Act (1985). The Jamaica National Heritage Trust Act has been in operation since 1985 with the main goal of preserving and protecting the country's national heritage. This Act established the Jamaica National Heritage Trust (JNHT) whose functions are outlined in Section 4 of the Act as follows:

- Promote the preservation of national monuments and anything designated as protected national heritage for the benefit of the Island.
- Conduct such research as it thinks necessary or desirable for the purposes of the performance of its functions under this Act.
- Carry out such development as it considers necessary for the preservation of any national monument or anything designated as protected national heritage.
- Record any precious objects or works of art to be preserved and identify and record any species of botanical or animal life to be protected.

The Act also states the following offences are liable to a fine and/or imprisonment:

- Willfully defacing, damaging or destroying any national monument or protected national heritage;
- Willfully defacing, destroying, concealing or removing any mark affixed or connected to a national monument or protected national heritage;

- Altering any national monument or marking without the written permission of the Trust; and
- Removing any national monument or protected national heritage to a place outside of Jamaica.

Quarries Control Act (1983). The Quarries Control Act is administered by the Mines and Geology Division. It regulates the extraction of material such as sand, marl, gypsum, and limestone for construction purposes. Quarry zones and licenses, quarry tax, enforcement, safety, Quarry Advisory Committee, fines for illicit quarrying and bonds for restoration are addressed in this act.

Under this act, the Quarries Advisory Committee, which advises the Minister on general policy relating to quarries as well as on applications for licenses, was established. On the recommendation of the Quarries Advisory Committee, the Minister may declare an area in which quarry zones are to be established and establish quarry zones within any such specified area.

A license is required for establishing or operating a quarry, unless the Minister decides to waive this requirement based on the volume of material to be extracted (if the mineral to be extracted is less than 100 cubic meters, a license may not be required).

7.2 Environmental Conservation

Natural Resources Conservation Authority Act (1991). The Natural Resources Conservation Act may be considered Jamaica's umbrella environmental law. The purpose of the Act is to provide for the management, conservation and protection of the natural resources of Jamaica. This Act was passed in the Jamaican Parliament in 1991 and subsequent to this, the Natural Resources Conservation Authority (NRCA) was established with the function of taking necessary steps to ensure the sustainable development of Jamaica through the protection and management of Jamaica’s physical environment. The NRCA Act, under Sections 9 and 10 specifies that an Environmental Impact Assessment is required from an applicant for a permit for undertaking any new construction, enterprise or development.

Under the Act, the NRCA has a number of powers including:

- Issuing of permits to persons responsible for undertaking any construction, enterprise or development of a prescribed category in a prescribed area, including power generation facilities;

- Requesting an Environmental Impact Assessment from an applicant for a permit or the person responsible for undertaking any construction, enterprise or development; and
- Revoking or suspending permits.

The Act also gave the power of enforcement of a number of environmental laws to the NRCA, namely the Beach Control Act, Watershed Act and the Wild Life Protection Act.

The Natural Resources (Prescribed Areas) (Prohibition of Categories of Enterprise, Construction and Development) Order (1996). Section 9 of the NRCA Act declares the entire island and the territorial sea as 'prescribed area', in which specified activities require a permit, and for which activities an environmental impact assessment may be required. The Natural Resources (Prescribed Areas) (Prohibition of Categories of Enterprise, Construction and Development) Order (1996) and the Permits and Licensing Regulations was passed as a result of section 9 of the NRCA Act.

Wild Life Protection Act (1945). The Wild Life Protection Act of 1945 is mainly concerned with the protection of specified faunal species. Under this Act, the removal, sale or possession of protected animals; use of dynamite, poisons or other noxious material to kill or injure fish; and the discharge of trade effluent or industrial waste into harbors, lagoons, estuaries and streams are prohibited. In addition, this Act protects several rare and endangered faunal species including six species of sea turtle, one land mammal, one butterfly, three reptiles and a number of game birds. The establishment of Game Sanctuaries and Reserves is authorized under this Act.

The Endangered Species Act (2000). The Endangered Species (Protection, Conservation and Regulation of Trade) Act was created in 2000 in order to ensure the codification of Jamaica's obligations under the Convention for the International Trade in Endangered Species of Wild Fauna and Flora. This Act governs international and domestic trade in endangered species in and from Jamaica. Under this act, the functions of NEPA include the grant of permits and certificates for the purpose of international trade, the determination of national quotas and the monitoring of the trade in endangered species. Sea turtles, in addition, to yellow snakes and parrots are often traded illegal internationally and are endangered.

Water Resources Act (1995). The Water Resources Act (1995) was promulgated in the Jamaican Parliament in September 1995 and ratified in April 1996. This Act established the WRA, which is authorized to regulate, allocate, conserve and manage the water resources of the island. The WRA is also responsible for water quality control. As stipulated under Section 4 of the Act, the WRA is responsible for providing any department or agency of

Government, technical assistance for any projects, programs or activities relating to development, conservation and the use of water resources.

Section 25 advises that a proposed user must obtain planning permission, if this is a requirement, under the Town and Country Planning Act. In addition, under Section 21 it states that if the water to be used will result in the discharge of effluents, an application for a license to discharge effluents will have to be made to the Natural Resources Conservation Authority or any other relevant body as indicated by the Minister.

The Flood Water Control Act (1958). The Flood Water Control Act of 1958 is administered by the National Works Agency and designates specific personnel with the responsibility and the required power to ensure compliance with the legislation.

Any Government department/agency or any statutory body or authority appointed by the Minister may enter land in flood-water control area to:

- Survey, measure, alter or regulate watercourses, maintain or build tools required to undertake works;
- Clean watercourse or banks of such and deposit, where required; and
- Construct, improve, repair or maintain floodwater control works.

Willfully or maliciously blocking, obstructing, encroaching on or damaging any watercourse, pipes or appliances used to execute works under the Act is an offence.

7.3 Public Health & Waste Management

The Natural Resources Conservation Authority (Air Quality) Regulations (2002). Under section 38 of the NRCA Act, regulations pertaining to air quality in Jamaica are stipulated. The National standards, known as the National Ambient Air Quality Standards (NAAQS), are categorized into two groups. In one group, there are the primary standards, designed to protect human health and in the other, there are the secondary standards designed to protect the environment and limit property damage.

Part I of the NRCA Air Quality Regulations (2002) instructs on license requirements and indicates that every owner of a major or significant facility shall apply for an air pollutant discharge license. Part II makes reference to the stack emission targets, standards and guidelines.

Water Quality Standards. The NRCA has primary responsibility for control of water pollution in Jamaica. National Standards for industrial and sewage discharge into rivers and streams, in addition to standards for ambient freshwater exist. For drinking water, WHO Standards are utilized, and these are regulated by the National Water Commission.

Noise Abatement Act (1997). The Noise Abatement Act of 1997 was created in order to regulate noise caused by amplified sound and other specified equipment. This act has been said to address "some concerns but is too narrow in scope and relies on a subjective criterion" (McTavish 2). Given this, McTavish conducted a study to recommend wider and more objective criteria in accordance with international trends and standards but tailored to Jamaica's conditions and culture. To date, apart from the Noise Abetment Act (1997), Jamaica has no other National legislation for noise.

The National Solid Waste Management Authority Act (2001). The National Solid Waste Management Authority Act of 2001 is "an act to provide for the regulation and management of solid waste; to establish a body to be called the National Solid Waste Management Authority and for matters connected therewith or incidental thereto". The National Solid Waste Management Authority was established in April 2002 as a result of this Act to effectively manage and regulate the collection and disposal of solid waste in Jamaica. As such, the NSWMA aims to safeguard public health and the environment by ensuring that domestic waste is collected, sorted, transported, recycled, reused or disposed of in an environmentally sound manner. In addition, public awareness and education is a part of their responsibilities.

Public Health Act (1985). The Public Health Act is administered by the Ministry of Health through Local Boards, namely the Kingston and St. Andrew Council and the parish councils for the other parishes.

The Public Health (Nuisance) Regulations (1995) aims to control, reduce or prevent air, soil and water pollution in all forms. Under the regulations:

- No individual or organization is allowed to emit, deposit, issue or discharge into the environment from any source;

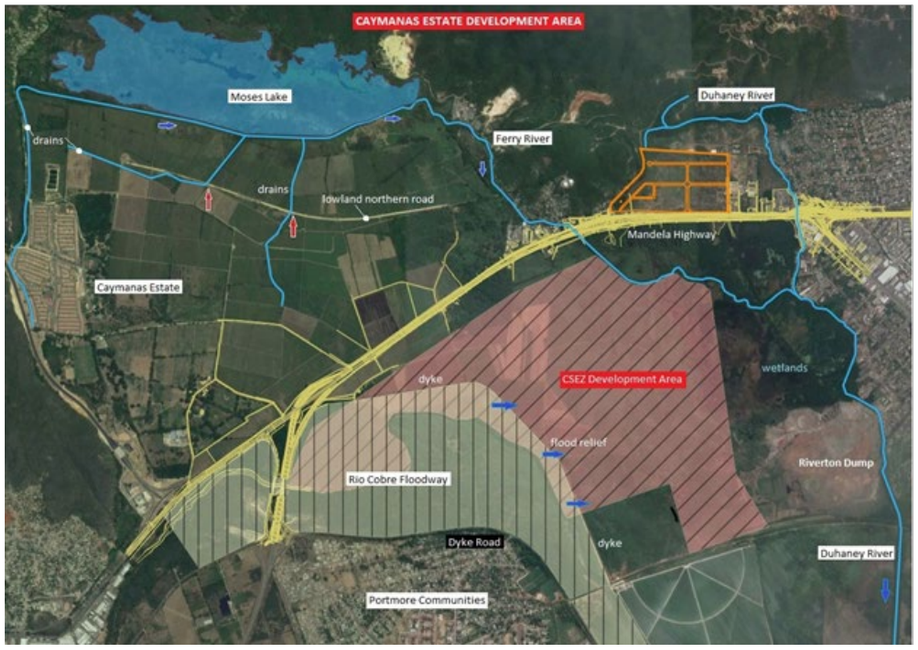
- Whoever is responsible for the accidental presence in the environment of any contaminant must advise the Environmental Control Division of the Ministry of Health and Environmental Control, without delay;
- Any person or organization that conducts activities which release air contaminants such as dust and other particulates is required to institute measures to reduce or eliminate the presence of such contaminants; and
- No industrial waste should be discharged into any water body, which will result in the deterioration of the quality of the water.

The Clean Air Act. The Clean Air Act (1964) refers to premises on which there are industrial works, the operation of which is, in the opinion of an inspector, likely to result in the discharge of smoke, fumes, gases or dust in the air. An inspector may enter any affected premise to examine, make enquiries, conduct tests and take samples of any substance, smoke, fumes, gas or dust that may be considered necessary or proper for the performance of his/her duties.

Trade Effluent Standards. Since 1996, Jamaica has had draft regulations governing the quality of the effluent discharged from facilities to public sewers and surface water systems. These draft guidelines require the facility to meet certain basic water quality standards for trade effluent including sewage.

Chapter Five

Hydrology and Drainage Study



Source. IDG/FSE

Figure 5-1. Location Plan of the Proposed Development Sites and Surrounding Context

1.0 Overview

This chapter provides an overview of the hydrology and drainage issues for the CEDA North and South areas in accordance to IDG's original TOR. The chapter contains: i) a review of previous drainage reports undertaken for the CEDA North with a specific focus on the recently constructed drainage infrastructure by UDC and the GoJ under the Mandela Highway improvement works, ii) an overview of the assumptions, components, and inputs, which comprise the hydrology and drainage modeling, and iii) analysis, findings and approximate costs for storm/drainage designs in the CEDA areas.

2.0 The Caymanas Estates Development Area – CEDA North and South

IDG/FSE modelled both the CEDA North and South areas for this hydrology and drainage study and prepared an initial drainage strategy for these lands. This is presented in the following sections.

For the purpose of this hydrology and drainage study, IDG/FSE utilized the following guidelines and assumptions for all drainage provisions related to development areas within the CEDA North/South areas:

- Lots will discharge surface flows to the roads or directly to the drainage channels. Secondary drainage channels and roads will accommodate storm flows for T5 (1:5-year storm) to freeboard levels and a minimum of T2 (1:2-year storm) to the crown of the road respectively, as is appropriate.

- Primary subdivision drainage channels will be designed to accommodate storms to T25 (1:25-year storm) with a freeboard provision of 25% depth of flow. Alternately, the channels will provide capacity for the T100 (1:100-year storm) design storm at top bank levels.

- Where required, flood peak discharge attenuation techniques will be employed to limit the discharge of urban runoff where downstream interests outside of the project site might be affected.

- The capacity of drainage channels and structures through, which storm waters will be discharged from the development, will be checked to ensure that flows for a 1:100-year storm event from both the subdivision and other contributing areas can be conveyed adequately.

3.0 A Review of the Hydrology and Drainage for the CEDA North Area

3.1 Drainage Overview

Proposed development of the CEDA North area will significantly impact the existing natural drainage features and infrastructure and potentially increase the storm runoff (volume and peak flows) due to the change in land use from agricultural and forests to a variety of urban land uses. This urbanization will establish large impervious areas within the CEDA North area and require drainage systems that will need to collect surface runoff more efficiently than for the pre-development condition of the lands. Reduced infiltration of ground water storage will also likely be established, especially in association with sections of the proposed development area with high natural permeability.

Source. IDG/FSE

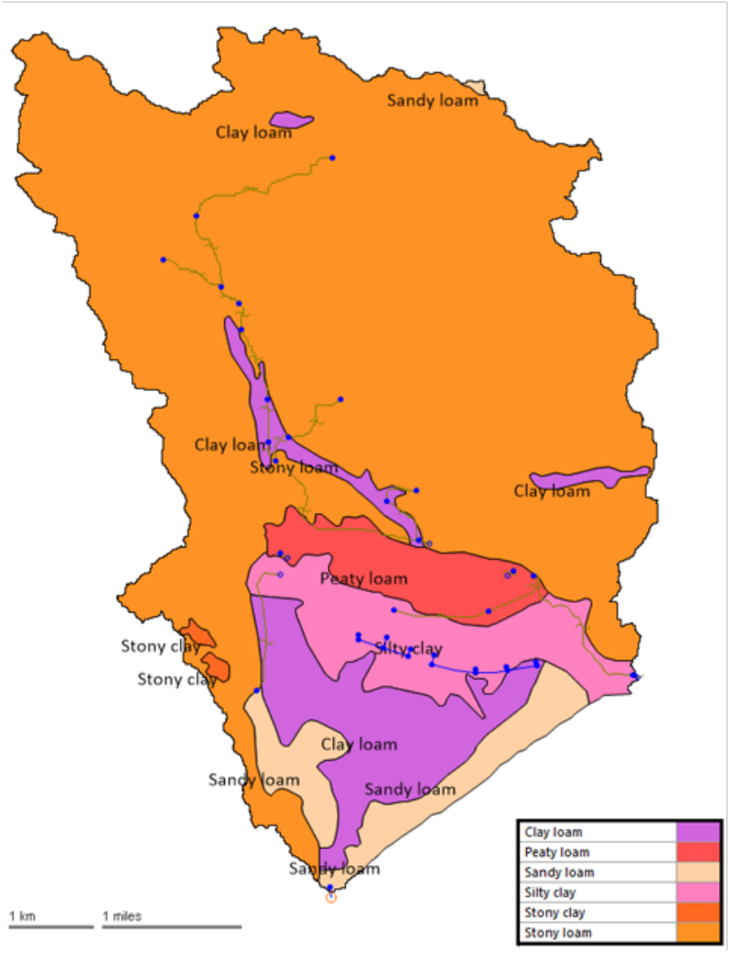
Figure 5-2. CEDA North Drainage Catchment Area

3.2 Hydrology Model for the CEDA North Drainage Area

To better understand the existing drainage situation on the CEDA North area, IDG/FSE prepared a hydrology model for the north catchment area in order to examine the flood risk potential and the influence of proposed development on downstream conditions. The drainage catchment area is defined in Figure 5-2. The catchment area for the CEDA North lands is 4,574-h (11,302-acres) in size. A substantial portion of this catchment area (over 3,175-ha/7,845-acres) is currently forested or comprised of cultivated crop lands, and at present is not urbanized. Table 5-1 below sets out the basic hydrologic parameters for the CEDA North catchment area used by the computer model to determine surface runoff and peak water discharges.

Table 5-1. Hydrology Parameters for the CEDA North Catchment Area

Sub-Catchment ID	Total Area (ha)	Curve Number	Slope (M/M)	Dimensions (M)	Time of Concentration TC (Minute)
104	350.269	42.67	0.044	1055.9	141.14
12	422.715	41.08	0.150	1160.1	80.12
1201e	144.312	83.73	0.003	677.8	86.82
1203a	144.414	68.08	0.0003	678.0	86.87
1203b	81.096	37.88	0.010	508.1	27.23
1301	44.251	38.31	0.010	375.4	22.71
1401	63.368	76.06	0.010	449.0	25.29
1500	97.572	83.00	0.0003	557.3	77.2
1501	123.250	55.21	0.010	625.5	216.28
1602	38.290	41.79	0.010	349.0	21.74
1702	121.027	36.75	0.010	620.7	30.71
1801a	124.877	93.91	0.0003	630.5	83.13
1801b	262.163	76.74	0.003	913.5	103.89
19	375.199	35.00	0.076	1092.8	109.25
30	582.639	43.08	0.075	1361.8	122.77
502	240.575	50.88	0.100	875.1	85.23
7	416.593	37.31	0.102	1151.4	96.8
Moses Lake	154.568	100.00	0.010	702.2	17.86
33	786.854	38.17	0.090	1582.6	120.82



Source. IDG/FSE

Figure 5-3. Soils with the CEDA North Area

3.3 Soils Characteristics

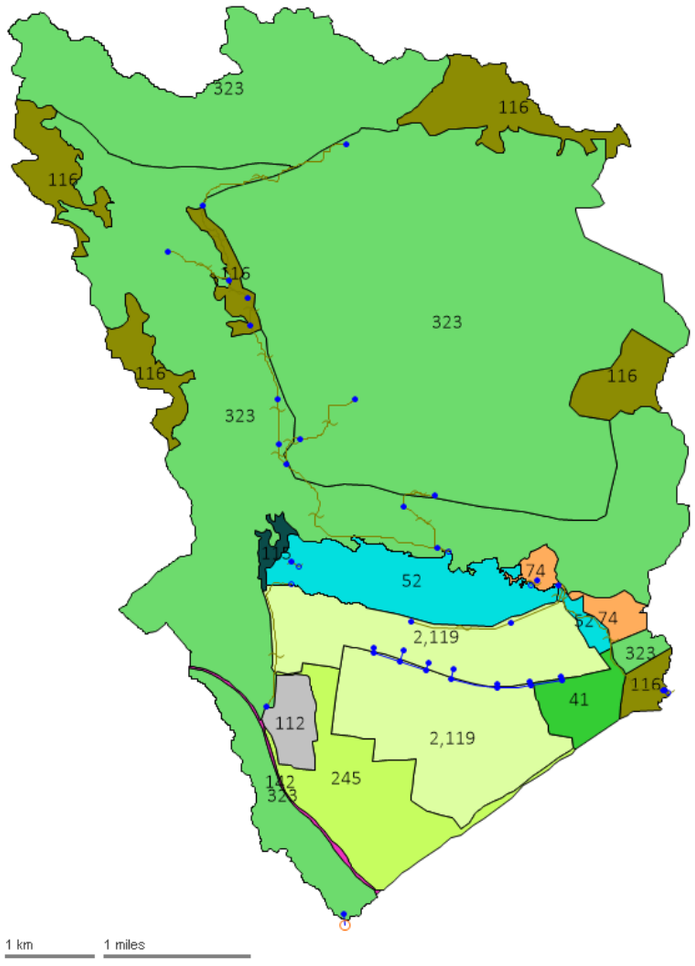
The soils found within the CEDA North area are shown in Figure 5-3. The soil textures have been classified into hydrologic soil groups. The underlying geology for the elevated areas of the CEDA North area is:

- weathered limestone outcrops, and
- alluvium deposits.

The CEDA North lends itself to rapid infiltration of surface flows. That said, the elevated areas of the CEDA North lands do not show many or significant gullies. Often gullies identify paths of very high-water flows that could be associated with surface runoff from high intensity rainfall events. In addition, SCS runoff curve numbers (see Table 5-1 Column 3) were calculated directly from the GIS data presented in this chapter. To set these values the following data was required:

- Sub-catchment boundaries properly defined in the network (Figure 5-2).
- A GIS file containing soil type data (Figure 5-3).
- A GIS file containing land data (Figure 5-4).
- A lookup table of curve number/runoff coefficients appropriate to a particular land use/soil type pair[1].

[1] The GIS data can be read directly from the file.



Source. IDG/FSE

Figure 5-4. Land Uses (Before Development) for the CEDA North Catchment Area, North of Mandela Highway

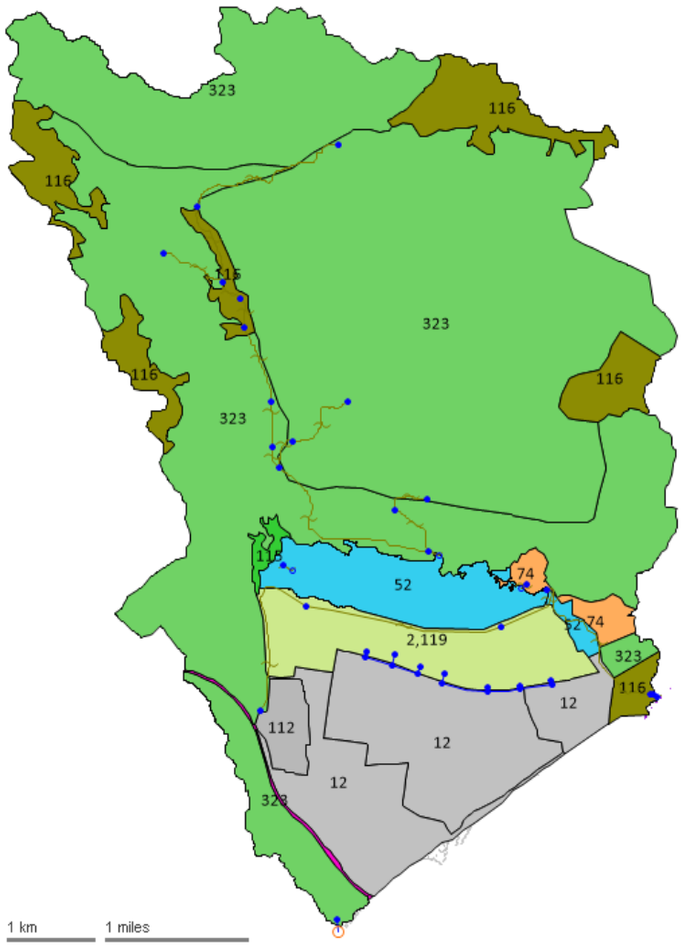
3.4 Land Uses

At present, the CEDA North area contains non-developed foothills, Moses Lake, agricultural lands, sagebrush areas, deciduous forests and a small urbanized area, where Digicel, Caymanas Estates housing development and additional smaller residential communities, the Polo Club and Caymanas breeding facilities are located.

IDG/FSE used the following land use parameters to define the CEDA North catchment area in order to determine the area's hydrology and drainage flows and runoff before development.

Table 5-2. Land Use Model Parameters North Catchment Area Before Development

Area (ha)	Description	Land Use
176.7	Lake	52
477.9	Sagebrush	323
14.5	Residential 1 Acre	115
1064.8	Sagebrush	323
278.2	Row Crops 65-75	2119
201.7	Meadow 55-75	245
1177.7	Sagebrush	323
229.3	Row Crops 65-75	2119
59.6	Deciduous Forest	41
14.8	Lake	52
15.9	Bare Rock	74
44.9	Residential ¼ Acre	112
24.9	Residential 2Acres	116
24.9	Bare Rock	74
17.3	Sagebrush	323
8.8	Street and Roads 98	142
1491.3	Sagebrush	323
66.4	Residential 2 Acres	116
49.9	Residential 2 Acres	116
30.2	Residential 2 Acres	116
60.3	Residential 2 Acres	116
103.2	Residential 2 Acres	116



Source. IDG

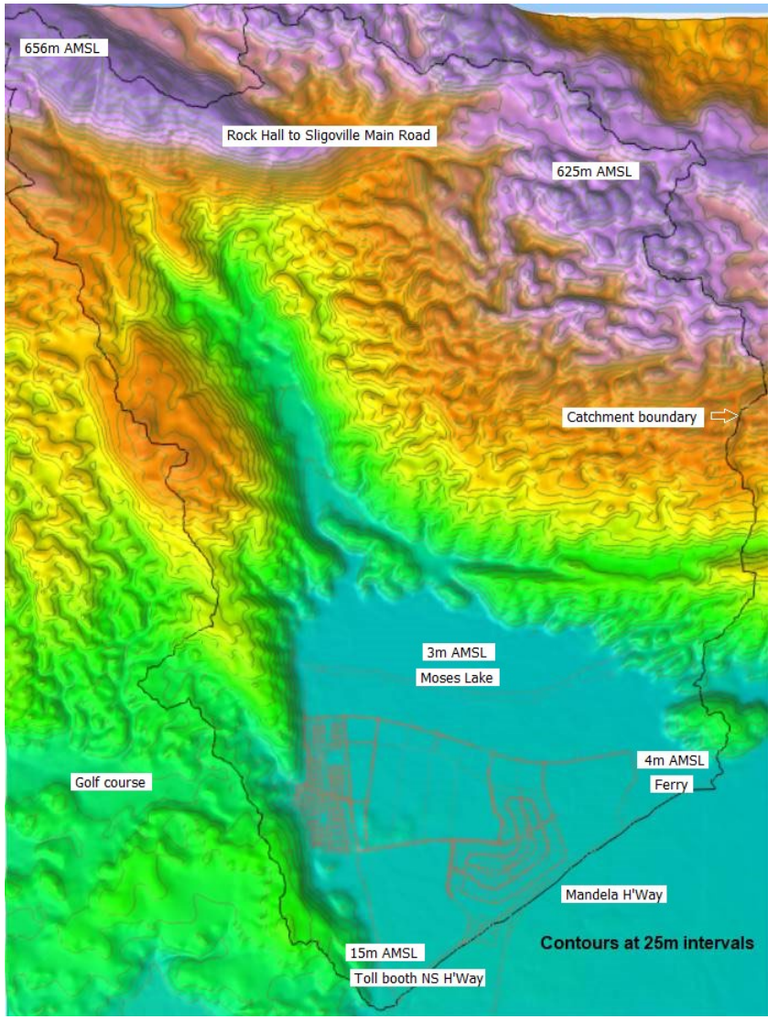
Figure 5-5. Land Uses (After Development) for the CEDA North Catchment Area

IDG/FSE used the following land use parameters to define the CEDA North catchment area after development in order to determine the area's hydrology and drainage flows and runoff.

Existing residential communities, Digicel, the Polo Club and the Stud Farm remain, however the areas utilized for agricultural lands were swapped for urban development. These areas are located adjacent the Mandela Highway north to Moses Lake, excluding the lowlands, which are required for a water catchment area for T25 and T100 floods.

Table 5-3. Land Use Parameters for the CEDA North Catchment Area After Development

Area (ha)	Description	Land Use
176.7	Lake	52
477.9	Sagebrush	323
14.5	Residential 1 Acre	115
1064.8	Sagebrush	323
278.2	Urban 85% Imperv	12
201.7	Urban 85% Imperv	12
1177.7	Sagebrush	323
229.3	Row Crops 65-75	2119
59.6	Urban 85% Imper	12
14.8	Lake	52
15.9	Bare Rock	74
44.9	Residential ¼ Acre	112
24.9	Residential 2Acres	116
24.9	Bare Rock	74
17.3	Sagebrush	323
8.8	Street and Roads 98	142
1491.3	Sagebrush	323
66.4	Residential 2 Acres	116
49.9	Residential 2 Acres	116
30.2	Residential 2 Acres	116
60.3	Residential 2 Acres	116
103.2	Residential 2 Acres	116



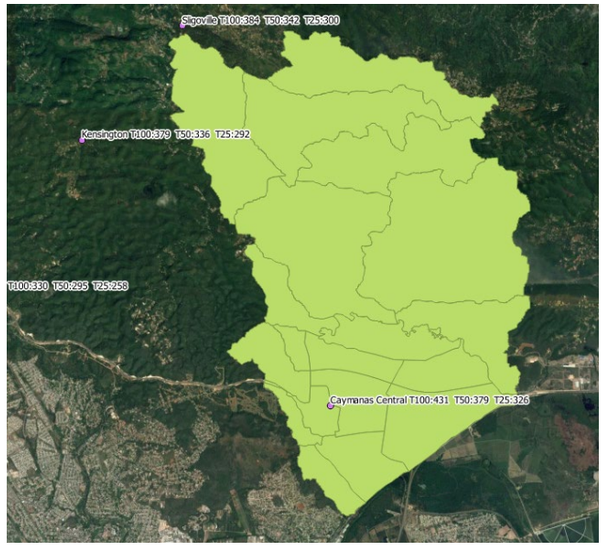
Source. FSE Topography Map

Figure 5-6. Topography for the CEDA North Catchment Area

3.5 Topographic Features

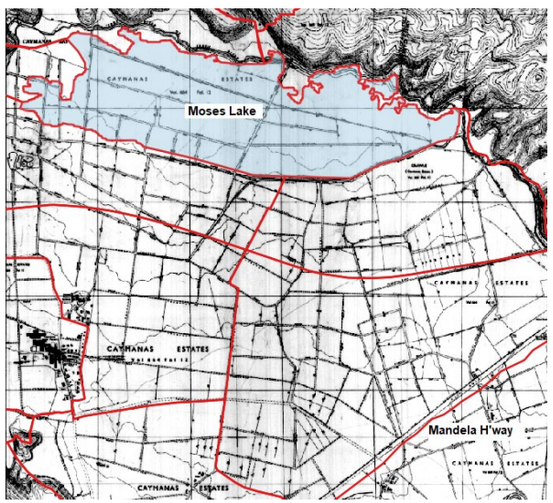
Topographic features in the CEDA North catchment area were used to determine the routing of precipitation, results in storm water runoff, and the time this runoff took to arrive at the main drainage channels. These parameters were calculated from the slope and flow path length within sub-catchments.

Sections of the eastern high land feature depressions, which yield no runoff as all precipitation is infiltrating. Significant sections feature circuitous runoff routes and it is therefore not surprising that there is no indication of main drainage channels conveying high peak flows that might otherwise be expected based on the size and relief of the eastern section of the catchment area.



Source. FSE/Google Earth

Figure 5-7. Location of Rain Gauge Stations for the CEDA



Source. Historic Maps of Kingston

Figure 5-8. CEDA North Historical Infrastructure

3.6 Precipitation

Understanding precipitation and rainfall conditions is critically important to determining drainage issues on a site. Hence, for the CEDA North area design storm the depth of precipitation within a 24-hour period for a T100 (1:100-years) with options for a T50 (1:50-years) and a T25 (1:25-years) were selected from the nearest gauges (Sligoville and Caymanas Central (SCS)) and averaged. Figure 5-7 identifies the locations of these stations.

The Jamaica Type “B” Distribution was used to apply the storm to the catchment surfaces. An antecedent Rainfall Condition 3 was used when applying the SCS analysis.

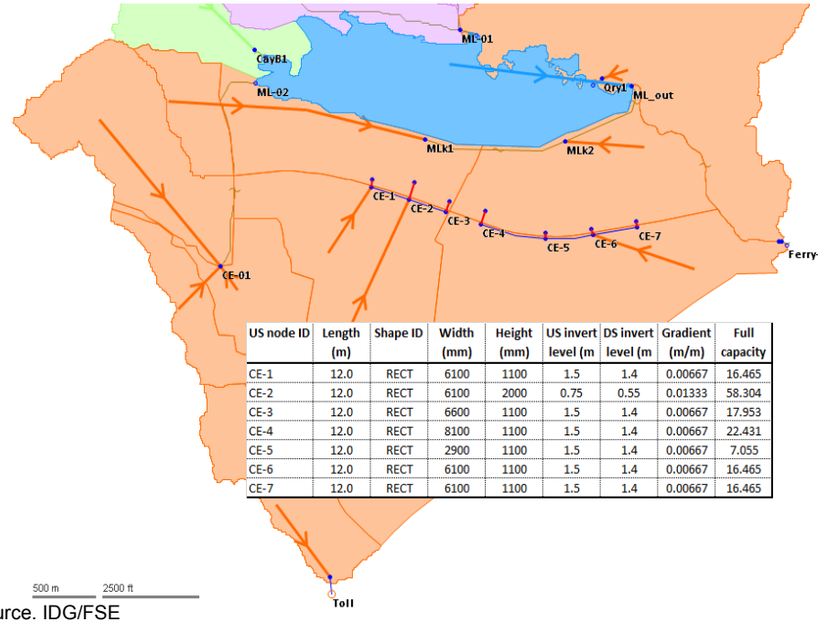
4.0 Design Methodology

For the computation of the design runoff for both the CEDA North and South areas, ‘The Soil Conservation Service Method (US CSC)’ was used applying the appropriate hydrologic soil groups and land use information to date, to determine the runoff characteristics of the site. The US CSC method is considered best practices.

5.0 Existing Drainage Infrastructure

5.1 Historical Context

Prior to 1985, the entire lowlands of the CEDA North area was in ‘agriculture land uses’ with limited utilization of the area adjacent the foothills, which is an area subject to regular flooding. The main drainage for the area followed the central interval north (just right of the ‘Moses Lake’ label) to the Fresh River where a bridge crossing existed. Collector drains fed the main drainage route running adjacent to the many intervals. The berm forming the lake was constructed in 1985, and a west to east flowing drain was constructed to intercept the main drainage and divert it in an eastward direction to the Fresh River, which runs parallel to the new berm and contour.



US node ID	Length (m)	Shape ID	Width (mm)	Height (mm)	US invert level (m	DS invert level (m	Gradient (m/m)	Full capacity
CE-1	12.0	RECT	6100	1100	1.5	1.4	0.00667	16.465
CE-2	12.0	RECT	6100	2000	0.75	0.55	0.01333	58.304
CE-3	12.0	RECT	6600	1100	1.5	1.4	0.00667	17.953
CE-4	12.0	RECT	8100	1100	1.5	1.4	0.00667	22.431
CE-5	12.0	RECT	2900	1100	1.5	1.4	0.00667	7.055
CE-6	12.0	RECT	6100	1100	1.5	1.4	0.00667	16.465
CE-7	12.0	RECT	6100	1100	1.5	1.4	0.00667	16.465

Source. IDG/FSE

Figure 5-9. CEDA North Area Recent Drainage Infrastructure

Source. IDG/FSE

Figure 5-10. Drainage Crossing at Ferry River for the New Highway, Construction Photo and Under the Bridge

5.2 Recent (Drainage) Infrastructure Construction

With the construction of the Caymanas Estate Housing Development, an interceptor earth drain flowing south to north was constructed adjacent to the western foothills. This drain was connected to the eastern flowing drain at Moses Lake.

More recently, as part of the larger CEDA development initiative (Figure 5-9), a west to east roadway was established for the northern boundary of the CEDA North lowland development area. Seven box culverts of varying sizes were constructed across this roadway to convey the storm water runoff from the proposed development lands to the interceptor drain adjacent Moses Lake and on to the Fresh River. While these culverts have significant theoretical capacity, of significance is their invert level relative to the ultimate discharge elevation. (I.E. The sea level at Hunts Bay some 9-kilometers away.)

The recent construction of a major 900-mm water main upstream and parallel to the new north road is a matter for consideration. This water main was constructed at a depth of approximately 1m and only recognizes the existing small pipe culvert crossings, providing only minimal clearance. This feature could very well become an impediment to the movement of storm flows across the wider CEDA North area, as intended.

The new highway crossing at the Ferry River is set to retain the old box culvert crossing of the original roadway ‘for the time being’. The new bridge has a provision for a relatively shallow channel that will need to meander between and under various structural elements. As shown in Figure 5-10, the invert of the channel below the new bridge is approximately 0.5-m (AMSL) and the base of the containing stonewall is approximately 1.0-m. The invert under the new bridge is much higher than that of the old box culvert and the approaching river. The flow cross section is however significantly greater. There is some concern that the limited clearance under the new bridge could lead to blockage from storm related debris (vegetation).

6.0 A Master Plan Review CEDA North Area – Using IDG/FSE's Integrated Catchment Modeling

6.1 Methodology

For this hydrology and drainage report, IDG/FSE used Integrated Catchment Modeling (ICM), a hydrologic and hydraulic modeling platform by Innovyze Software to calculate the surface runoff for the CEDA North/South areas, which is based on a statistical depth of rainfall for a particular return period estimate and a selected temporal distribution. The US SCS model is normally used as implemented within ICM for the computation of runoff volumes from sub-basins.

The US SCS (NRCS) method is a widely accepted model for predicting storm flow volumes from rural catchments. The method is used throughout the United States of America, France, Germany, Australia and parts of Africa. The method is described in detail in the NEH-4 (SCS 1985).

Traditionally, the overland runoff on catchment surfaces is represented by the 'kinematic wave equation.' The flow is routed using a 'unit hydrograph'. A 'unit hydrograph' for the sub-catchment area is determined from user-defined parameters, or from parameters calculated by one of six built in methods in the ICM suite. The 'unit hydrograph' is then used to calculate runoff resulting from the sub-catchment net rainfall.

Time of peak flows and total runoff times are calculated using appropriate empirical equations several of which are available in ICM. Initial losses are computed using the slope or the SCS methods.

6.2 A Master Plan Review of the CEDA North Area – Approach

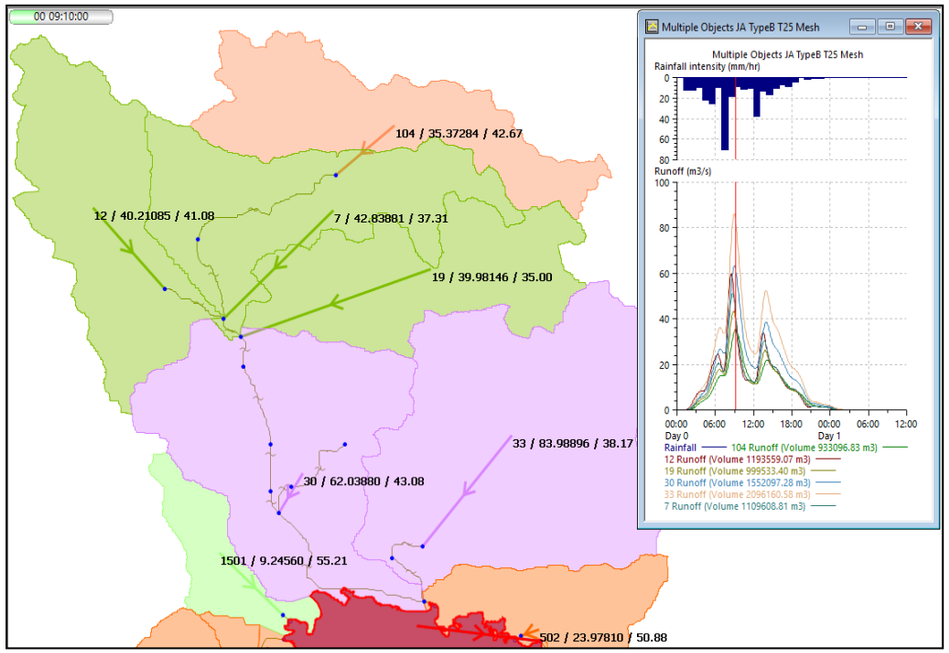
After undertaking due diligence, IDG/FSE determined that previous hydrology and drainage studies for the CEDA North area did not propose any final solutions for the relationship between: i) the surface runoff, ii) ground water flow, iii) storage regulation associated with changing water levels in Moses Lake, iv) storage regulation associated with the inundation of the low lands adjacent to Moses Lake and v) storm water flows that could be conveyed by the Ferry River to the Mandela Highway and beyond. (Resolutions for these issues are beyond the scope of this study.)

With the aid of the ICM however, IDG/FSE examined the possibility of regulating and transferring storm water flows from design storms associated with the CEDA North area. The concept is that if all the CEDA North area storm water flows from the interior hills and the western interception drains could be contained and then released in a regulated way from Moses Lake, so as not to coincide with storm flows from the lowland development area, then a solution for the CEDA North area is possible. If this was the case, there would be little addition to the peak flows associated with runoff from the lowlands, for a particular storm event.

Containing and regulating storm and normal stream flows in Moses Lake could be achieved in the future by improving the existing dykes and reservoir discharge structures. The improved discharge weir can be used to maintain enough water in the Lake so that the reeds do not dry out and become a fire hazard during dry periods. Ultimately, this is a possible solution that would require the collection of additional empirical data. What is for sure, is that the complex interplay between surface runoff, ground water flows, and storage regulation associated with changing water levels in Moses Lake will need to be resolved to allow the CEDA North area to be used for the CSEZ or any other development, in the future.

IDG/FSE's model was set up withholding the majority of flow from Moses Lake to the Ferry River and the lowlands were modelled to include new infrastructure and for T25 and T100 return period storm flows. The sub-catchments were modelled as point releases based on proposed urbanization and the culverts used to convey flows to a regulation zone between the northern road and Moses Lake. This was done by representing this area as a 2D surface, based on estimated topography and guided by available topographic data. The flows from the regulation area were conveyed to the Ferry River.

The Ferry River was modelled based on sectional surveys (carried out at two locations) and includes details of the original culvert at the old highway crossing that is being retained plus the channel under the new bridge. The analysis treats the discharge to the Ferry River beyond the highway as an outfall at the end of the channel near to Hunt's Bay. Coinciding with a 24-hour storm, a varying water level representing storm surges with standing water up to 2.0m AMSL was applied at the outfall.



Source. IDG/FSE

Figure 5-11. ID/Runoff /CN and Volumes from the Elevated Catchment (The Elevated Catchment for the Storage/Regulation T25)

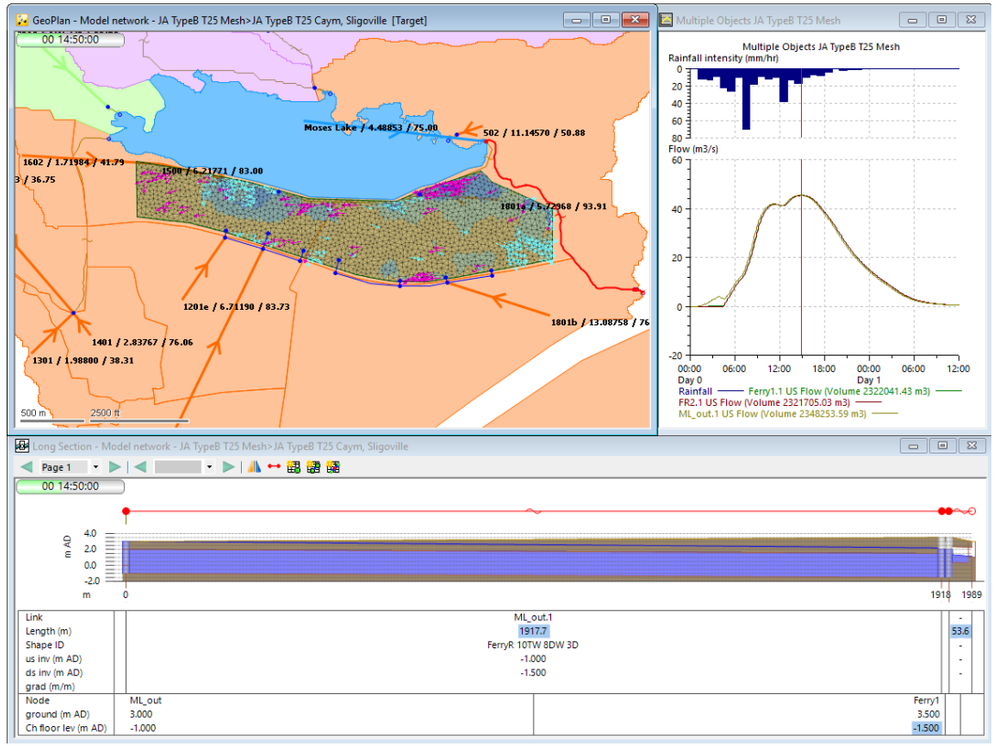
7.0 Discussion of Analysis and Findings - CEDA North Area

The IDG/FSE model indicates that approximately 7,000,000 cubic meters (m³) of runoff could be conveyed to Moses Lake for storage and regulation for the T25 design storm. This is from catchments with SCS-curved numbers of approximately 40-average. The indication is that there is a very large flow to ground water storage that will need to be determined empirically for model calibration. Putting this into context, the surface area of Moses Lake is at best 200-ha (484-acres), which would mean storing approximately 3.5-m depth of water at Moses Lake.

The IDG/FSE model indicates that for a T25 design storm, (a 1:25-year return period shown in Figure 5-11) a peak flow of approximately 47m³/second(s) is required to be conveyed by the Ferry River in order for water to be properly discharged. This indication is that the conveyance system, including the old box culvert and the new bridge, will just be able to contain this flow. For this discharge condition, inundation to 3.0-m AMSL results along the river channel.

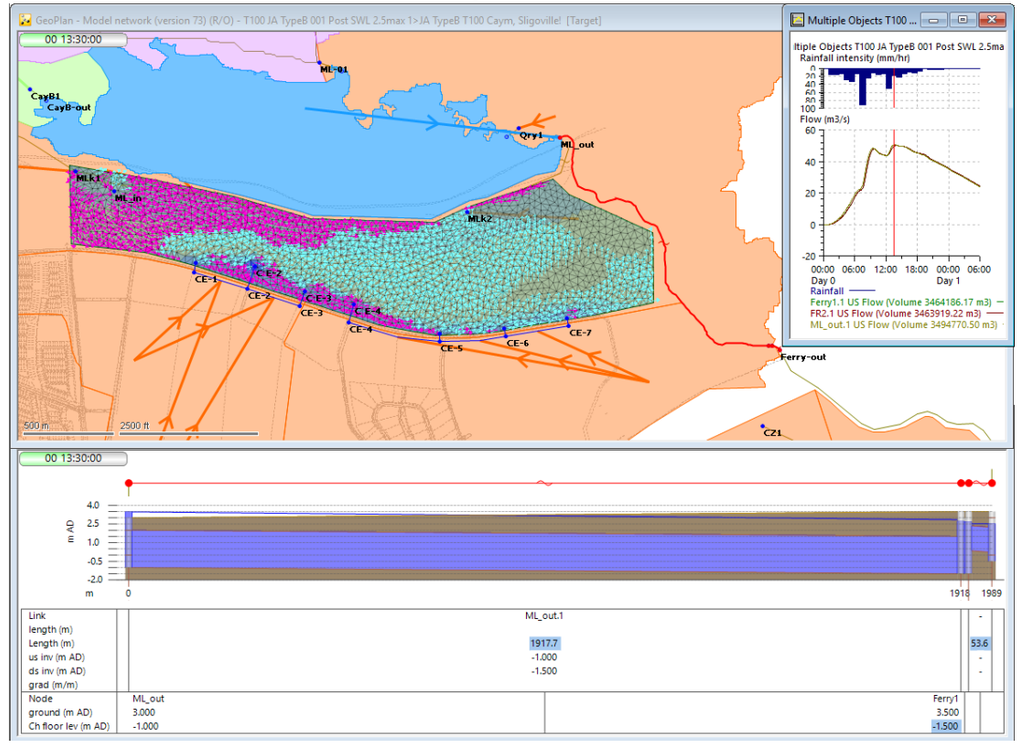
For a T100 design storm, (a 1:100-year return period shown in Figure 5-13) a peak flow of approximately 50m³/second (s) is conveyed by the Ferry River up to Mandela Highway. The indication is that the conveyance system, including the old box culvert and the new bridge, will experience some inundation at this flow. For this discharge condition, inundation to 3.5-m AMSL results along the river channel. At this level of inundation, lower lying areas at Ferry River will be flooded including the NWC facility and possibly including the Ferry Police Station. It can also be noted that the flood regulation zone between the CEDA lowlands north road and Moses Lake is substantially filled for the T100 storm with runoff approximately 50% greater for the T100 storm compared to the T25 storm. There is no provision for these scenarios for flow from Moses Lake and the CEDA high lands.

For the development of the flood regulation facilities between the CEDA North lowlands, the North Road and Moses Lake, an area of ~170-ha (420-acres) will need to be regraded. This will facilitate discharge from the newly constructed culverts and conveyance to the interception drain south of the Moses Lake berm. Earthworks for this are estimated at +/-J$750 million/US$6,000,000 to create flood storage, berms and a new channel.[2]



Source. IDG/FSE

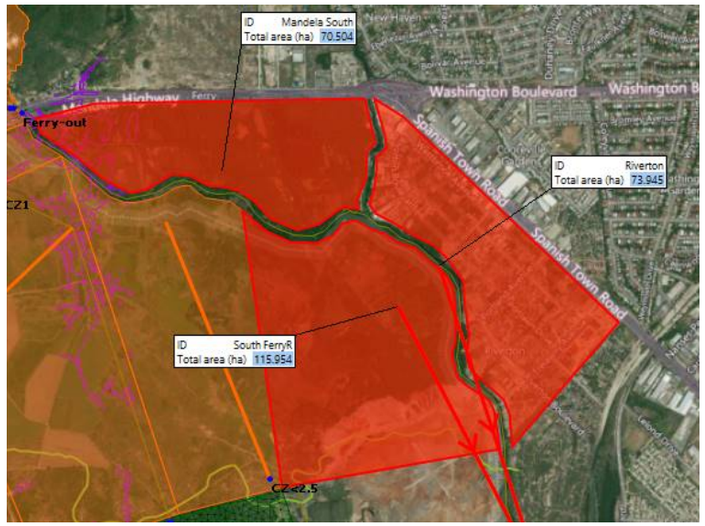
Figure 5-12. Runoff Peak Flows from the Lowland Development Area to the Ferry River T25



Source. IDG/FSE

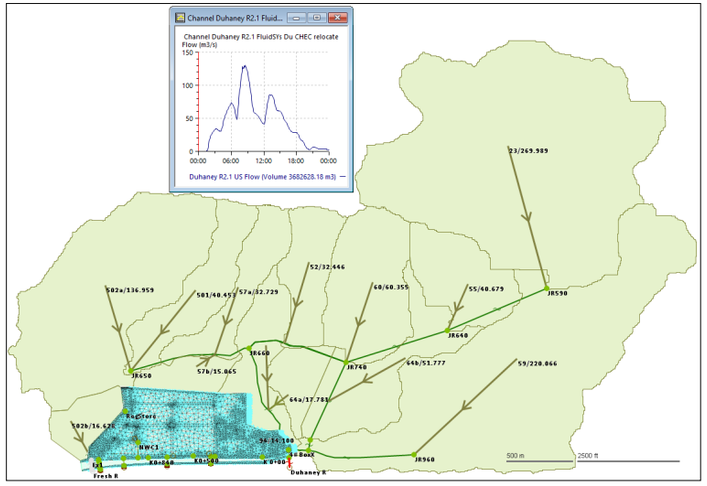
Figure 5-13. Runoff Peak Flows from the Lowland Development Area to the Ferry River T100

[2] Siltation has never been a problem with the Ferry River and the proposed development is unlikely to change this. There are no surface water channels leading from the highlands to Moses Lake that have an associated silt load. The Ferry River has very little grade change and velocities are low even during extreme storm events. This is also true for the proposed drainage scheme which will have flood regulation storage which will leave little if any opportunity for the transport of silt loads that might be deposited in the Ferry River. Quarries in the area can be easily isolated from the Ferry River, if they present any such risk. The real problem with siltation is the dumping of sand into the Ferry River by local residents who are interested in making commercial space along the river bank.



Source. IDG/FSE

Figure 5-14. Ferry River Drainage Sub-Catchment South of Mandela Highway



Source. IDG/FSE

Figure 5-15. Combined CEDA Catchment Areas for the Ferry and Duhaney Rivers

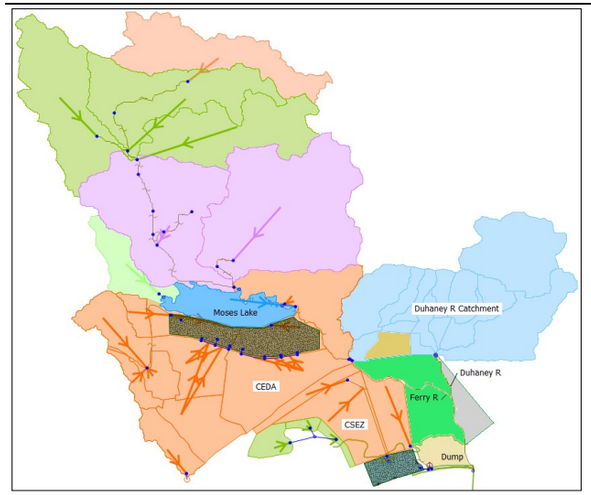
The ultimate drainage solution for the CEDA North area is not likely to be based on improving flows along the Ferry River to Hunt's Bay and beyond Mandela Highway. The Ferry River is required to drain an additional 270-ha (667-acres) east of the CEDA South area (unregulated discharge estimated at >50m³/s), along with all storm flows associated with the discharge from the Duhaney River, which produces T100 flows of 130m3/s and a total overall flow from the catchment for the T100 design storm of 150m3/s. (Figure 5-14).

The only other way to augment the drainage of the CEDA North area would be to construct a new bridge across the Mandela Highway and a new channel to Hunt's Bay between the CEDA South area and the Riverton Solid Waste Facility. This would involve clearing and upgrading approximately 1,200m of the Duhaney River south of the Mandela Highway, then building a new channel approximately 3,000m long starting at the confluence with the Duhaney River east of the designated CEDA South area. This channel would need to be at least 50m wide if CEDA high lands were to contribute to storm flows into the Ferry River. An all-weather access road along the entire route would be required for the maintenance of the channel.

8.0 A Review of the Hydrology and Drainage for the CEDA South Area

8.1 Drainage Overview

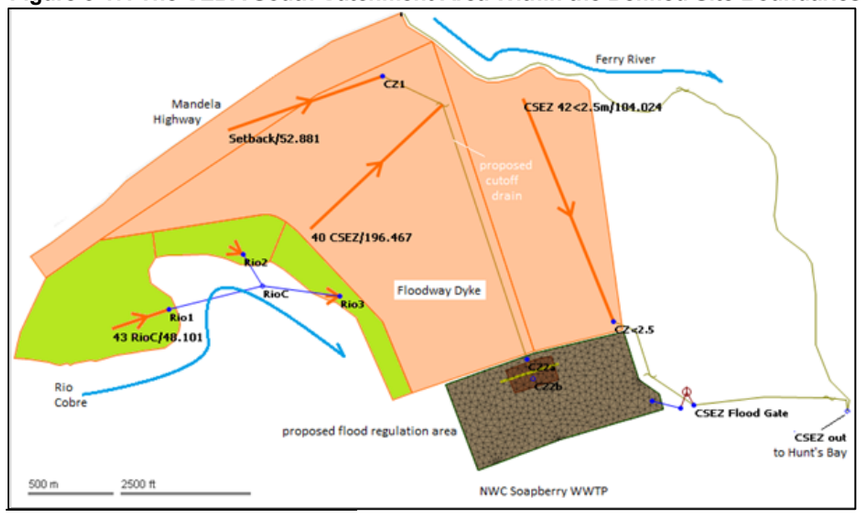
The development of the CSEZ on the CEDA South area will impact the existing natural drainage features of the south site by potentially increasing the storm runoff (volume and peak flow) due to the change in land use from 'agricultural' to primarily 'light industrial' with 'commercial' activities. This urbanization will establish large impervious areas on the site that will require new drainage systems that will need to collect the surface runoff more efficiently than for a pre-development condition of the land.



Source. IDG/FSE

Figure 5-16. Drainage Discharges for T100 Storm from the Ferry and Duhaney Rivers

Figure 5-17. The CEDA South Catchment Area Within the Defined Site Boundaries



Additionally, there are two areas of potential flooding risks, which were specifically assessed and where necessary provisions to mitigate such issues are required. These are the risk of flooding associated with the Ferry River east of the CSEZ and also the flooding associated with storm surges where drainage channels are inundated and unable to discharge storm runoff.

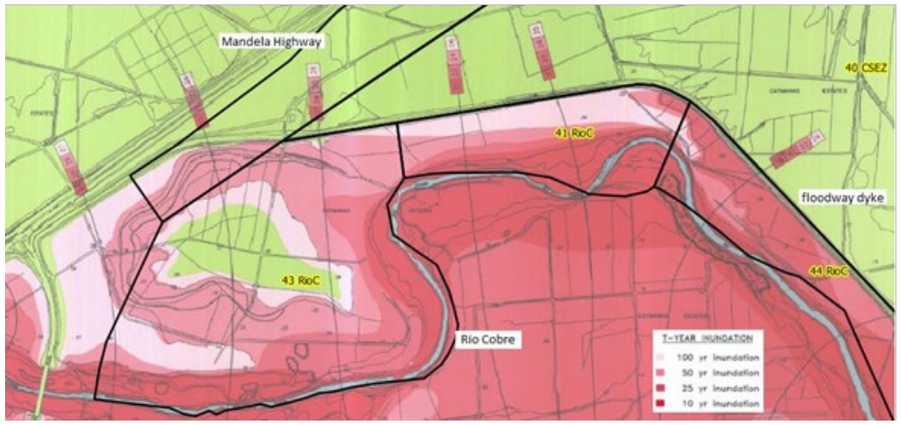
8.2 Hydrology Model for the CEDA South Drainage Area

In order to better understand the existing drainage situation, the flood risk potential, and the opportunities to effectively drain the CEDA South area, a hydrology model was prepared by IDG/FSE.

The entire CEDA South catchment area is shown in Figure 5-17. This area is 425-ha (1,050-acres) in size and a portion of the defined area (approximately 80-ha/197-acres) is located within the Rio Cobre Floodway. Because this area is a flood plain, IDG/FSE recommends that no development be planned for these lands as they are likely to be inundated during periods of significant rainfall[3]. If these 80-ha (197-acres) of land were to be developed as part of any future development project, only a simple drainage design would be required for the discharge of the storm flows to the river. No further hydrology or drainage study is required for this section of the CEDA South area at this stage. It is important that the dyke on the eastern bank of the Rio Cobre Floodway be maintained and not compromised in any way.

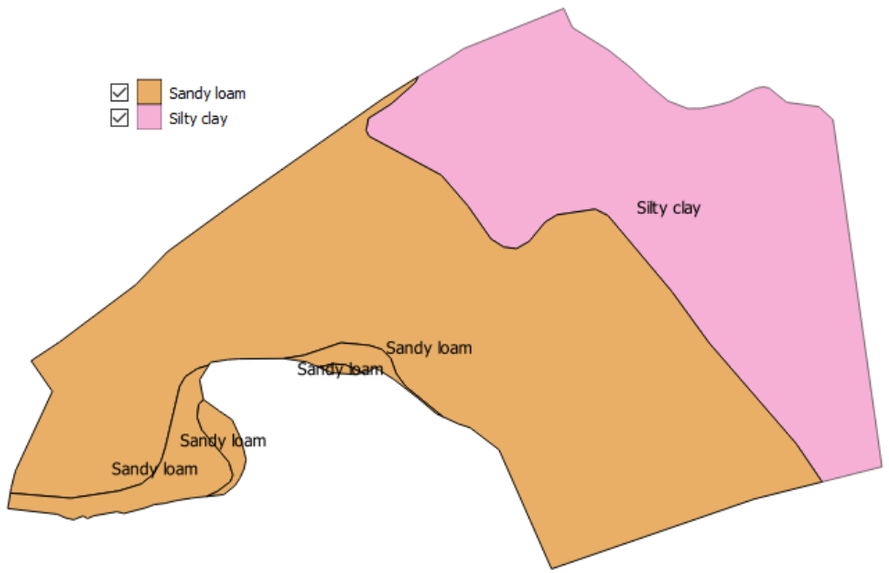
The CEDA South area also contains wetlands, which should remain undeveloped as they are environmentally sensitive and are home to significant varieties of flora, fauna and animals. Because of all these physical constraints, the CEDA South area has approximately 236-ha (583-acres) of developable land.

[3] The Rio Cobre floodway which is not a part of the hydrology/hydraulic study for CEDA or CSEZ continues to be a concern notwithstanding published flood mapping by the Water Resources Authority (WRA). It would be prudent for the Client to request a revisit of the provision of the floodway to determine that its expected performance is still consistent with the published mapping.



Source. WRA

Figure 5-18. Published Flooding Map for the Rio Cobre on the CEDA South Area



Source. IDG/FSE

Figure 5-19. Soils (HSG) for the CEDA South Defined Area

8.3 Flooding

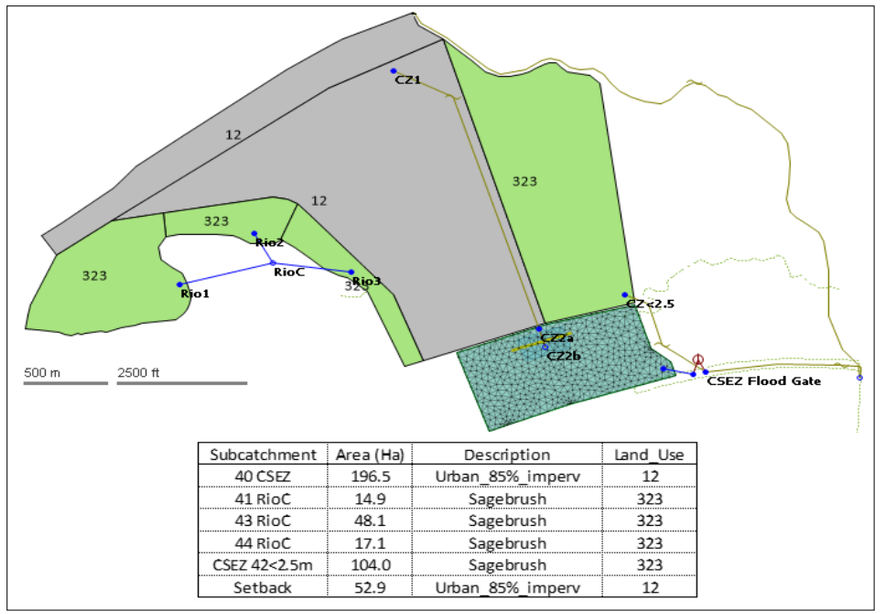
To better understand the flooding issues on the CEDA South area, IDG/FSE examined the WRA Flood Maps for the Rio Cobre. In dark to medium red are the areas, which are flooded during a T10-T50-year storm. The pink defines the T100 flood condition.

8.4 Soil Characteristics

The soils within the CEDA South catchment area are shown in Figure 5-19. The textures have been classified into the following hydrologic soil groups:

- Sandy loam and
- Silty clay

Both sandy loam and silty clay are soil categories, which may increase development costs as they are soft environments for building footings.



Subcatchment	Area (Ha)	Description	Land_Use
40 CSEZ	196.5	Urban_85%_imperv	12
41 RioC	14.9	Sagebrush	323
43 RioC	48.1	Sagebrush	323
44 RioC	17.1	Sagebrush	323
CSEZ 42<2.5m	104.0	Sagebrush	323
Setback	52.9	Urban_85%_imperv	12

Source. IDG/FSE

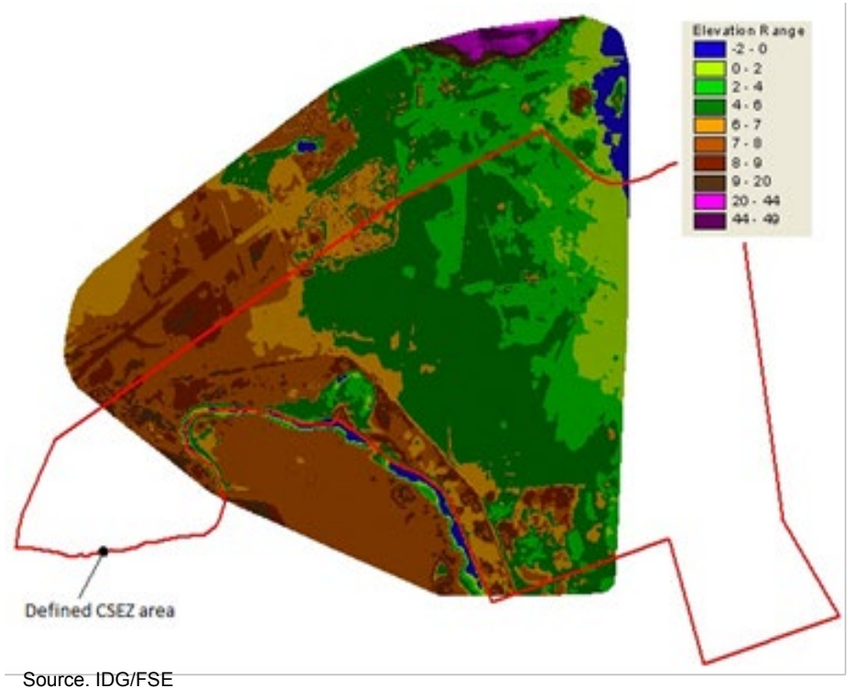
Figure 5-20. Land Uses for the CEDA South Defined Area

8.5 Land Uses

The following land uses were used for the CEDA South area to determine the design storm (Figure 5-20):

Table 5-4. Hydrology Parameters for the Modelling of the CEDA South Catchm

Sub-Catchment ID	Total Area (ha)	Curve Number	Slope (M/M)	Dimensions (M)	Time of Concentration TC (Minutes)
40 CSEZ	236	90.45	0.003	790.8	56.11
41 Rio C	14.9	89	0.0.03	218	10.8
CSEZ 42<2.5 m	104.0	93.63	00003	406.8	50.19
43 Rio C	48.1	89	0.03	391.3	15.34
44 Rio C	17.1	89	0.03	233	11.24
Setback	52.9	85	0.0003	410.3	37.85



Source. IDG/FSE

Figure 5-21. Topographic Features for the CEDA South Defined Area

Source. IDG/FSE/Google Earth

Figure 5-22. Published Rain Gauge Station

8.6 Topographic Features

As part of this feasibility study, IDG/FSE prepared a topographic survey for the CEDA South area. From this newly acquired information, the assessment was prepared.

Topographic features in the CEDA South catchment area were used to determine the routing of precipitation, which results in storm water runoff and the time this runoff takes to arrive at the main drainage channels. These parameters are calculated from the slope and flow path lengths within sub-catchment areas.

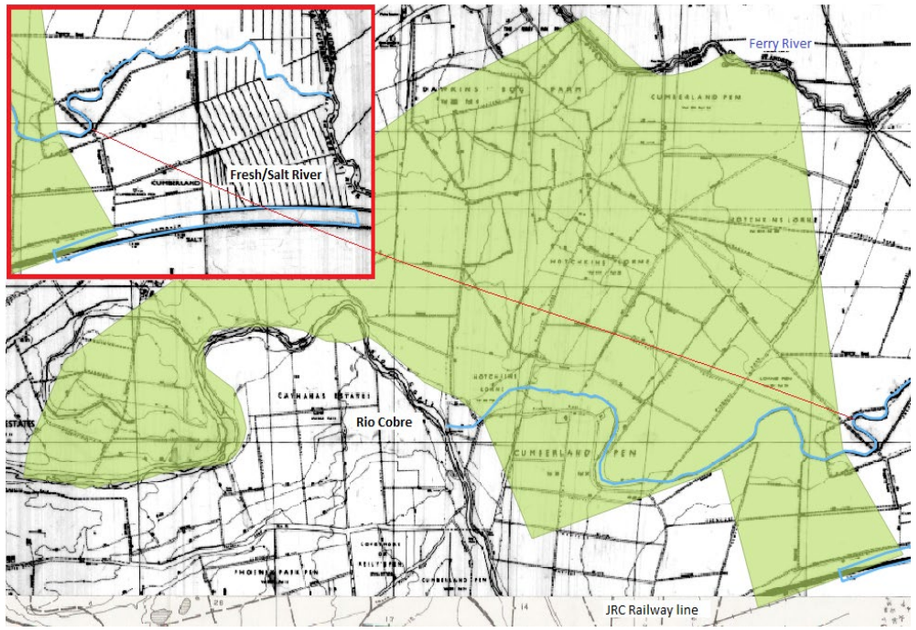
The topographic features of the CEDA South area is relatively flat, sloping from west approximately 7.5-m AMSL to east 2.0-m AMSL and below. Areas below 2.0-m AMSL will be subject to flooding from storm surges associated with T100 storm surge events. The Mandela Highway has an elevation of approximately 8.5-m AMSL at the intersection with the East-West Toll Road and falls to 3.5-m AMSl at Ferry.

The low-lying section of the CEDA South development site must be filled to a minimum elevation of 4.0-m AMSL.

8.7 Precipitation

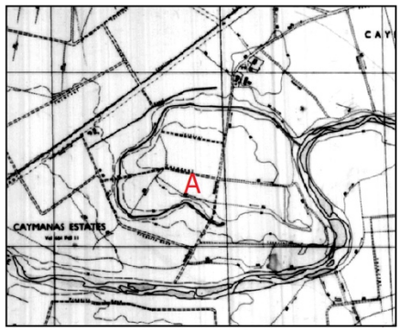
For the design storm applied to the CEDA South area, the depth of precipitation for a 24-hour period for a T100 with options for a T50 and a T25 were selected from the nearest gauging station, which is at Caymanas Central. (Figure 5-22)

The Jamaica Type “B” distribution was used to apply the storm to the catchment surfaces. An antecedent rainfall Condition 3 was used when applying the SCS analysis.



Source. Historic Maps

Figure 5-23 (above) and 5-24 (below). The CEDA South Area's Historical Infrastructure



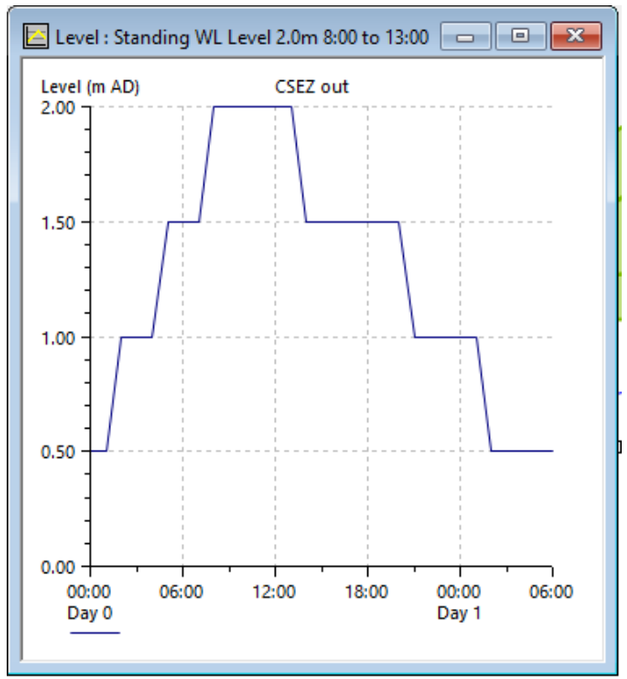
9.0 Existing Drainage Infrastructure

9.1 Historical Context

Currently, there are no significant historical drainage features associated with the CEDA South area. The lands were traditionally sugar cane fields, as they are now. The existing collector drains fed the main drainage route, running adjacent to the many intervals.

In the past, there was a 'waterway' flowing across the contours of the site from the Rio Cobre to the lower reach of the Fresh/Salt River (a 5m difference), which was possibly used for irrigation. This waterway was disrupted by the development of the Riverton Soil Waste Facility, and at some time after its completion, the flows to the Fresh/Salt River were re-established/formalized with the construction of a wide drainage channel immediately to the north and parallel to the Jamaican Railway Corporation's (JRC) railway line, south of the Riverton site.

In the mid 1960's when the Portmore communities were developed, 'the Rio Cobre Floodway' was constructed. Sections of the lands within the defined CEDA South area (the neck), which are now within the floodway, were historically cane fields. On closer inspection, it is clear that these lands were in the past, bounded by the Rio Cobre within a classic 'ox bow'. Figure 5-18 above shows these sections of the CSEZ overlaid on published flood maps and Figures 5-23 and 5-24 show the historical context of the 'ox bow' marked as location '**A**'.



Source. IDG/FSE

Figure 5-25. Stages of Storm Surge at Outfall Coinciding with Peak Flow of Design Storm

10.0 Hydrology and Drainage for the CEDA South Area - Approach

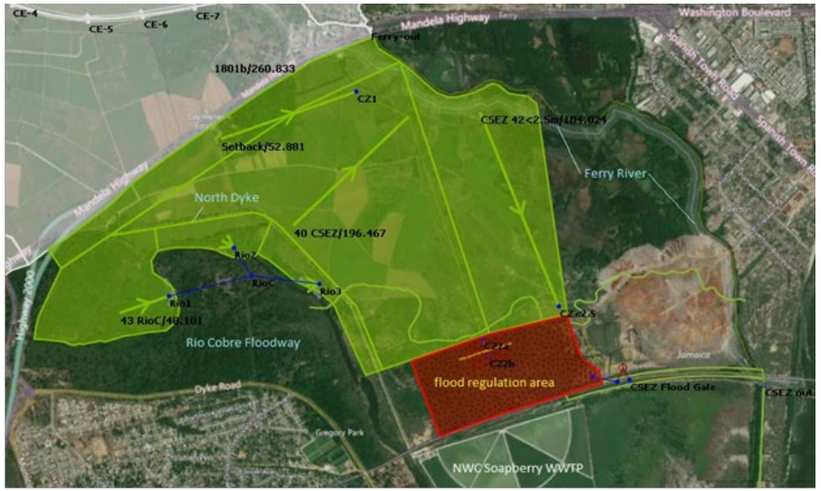
The general hydrology of the CEDA South area is relatively simple. The Rio Cobre Floodway protects the area to the west and the southern extent of the site is bounded by the JRC railway line embankment. The CSEZ South area is bounded to the north by the Mandela Highway, which happens to be a hydrologic divide or ridgeline. Opportunities for water to migrate into the CEDA South area are therefore limited to flooding from the east, related to the Fresh River when it is in spate or from the south-east at the connection to the Fresh/Salt River, where elevated water levels associated with storm surges are possible.

The strategy for the drainage of the CEDA South area is therefore to isolate the possible development area from the potential of floodwaters migrating into the lower eastern section of the site from the Fresh River. Drainage of the Fresh River has been compromised by the ongoing expansion of the Riverton Solid Waste Facility and this is not likely to be resolved in the near future.

It will also be necessary to keep in mind possible storm surges from the south. In this regard, the most reliable provision is to keep the ground levels at this point above the level of the designed return period surge. Other considerations could include storm surge isolations such as flood gates and/or storm water runoff holding areas in the adjacent lowlands to the south.

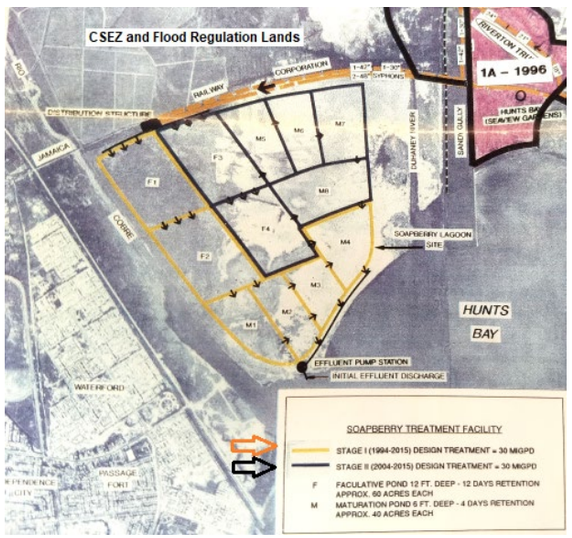
An ICM was setup for the CEDA South area to assess the drainage requirements at a preliminary planning level for design storms ranging from T25 and T100 years. The integrated hydrology and drainage model for the CEDA South catchment area and included the Duhaney River channel at the point of its crossing of the JRC railway easement. An outfall was modeled at this location representing the discharge of the entire drainage system to the Hunt's Bay.

For the duration of the modelling of a 24-hour T100 design storm, a varying water level was established at the outfall representing a coinciding storm surge up to a maximum height of 2.0-m AMSL. The stages considered by the ICM for storm surges is shown in Figure 5-25.



Source. IDG/FSE

Figure 5-26. Flood Regulation Area for CEDA South to Hold Runoff During Storm Surge

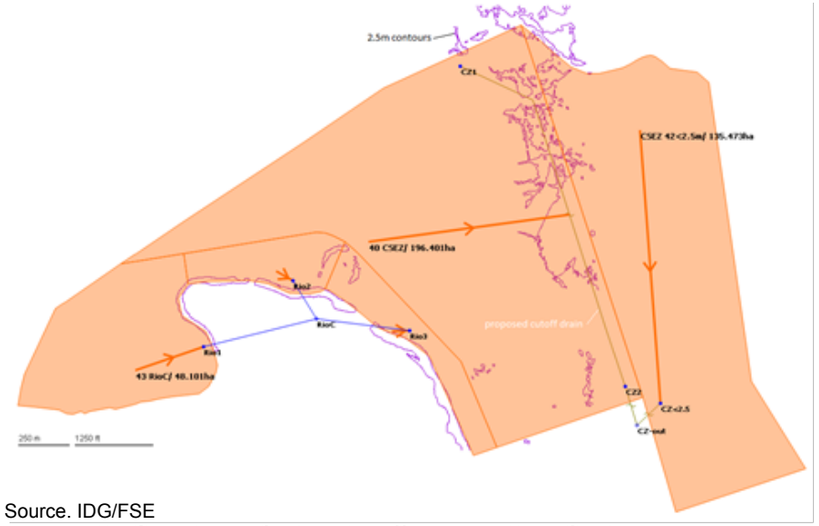


In order to protect the CEDA South area's southern boundary, a flood regulation area is required as shown in Figure 5-26. This area will require some earthworks such as regrading to create an invert area of ~0.75m AMSL. This area will be protected from storm surge inundations with the construction of berms from the regrading surplus to an elevation of 2.5-m AMSL running north to south, west of the Riverton Solid Waste Facility and intersecting with the JRC railway embankment.

At the meeting of the berm and the embankment, a flood gate must be established, which will prevent water from the storm surge inundating the flood regulation area. Water levels in the flood regulation area higher than the downstream water level will allow discharge across the flood gate downstream, to the confluence of the discharge channel and the Ferry River.

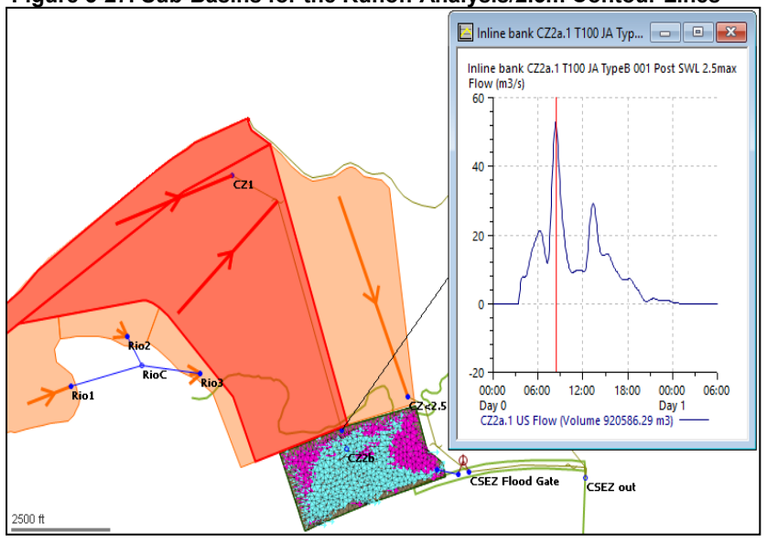
The lowlands below 2.5-m AMSL, which are not developed on the CEDA South area will drain to the downstream side of the flood gate and the protecting berm.

The site recommended for the construction of the flood regulation area (north of the railway line and the existing Soapberry Wastewater Treatment Plant), was also under consideration for use to expand the Soapberry Plant. The original land reserve for the Soapberry WWTP was to the south of the railway line (Sentar 1993). The proposal for the use of the lands to the north was opportunistic to avoid potential challenging soil conditions to the east of the existing plant. The current understanding is that the WWTP expansion will revert to the original lands reserve.



Source. IDG/FSE

Figure 5-27. Sub-Basins for the Runoff Analysis/2.5m Contour Lines



Source. IDG/FSE

Figure 5-28. Output of Hydrology and Drainage Model for CEDA South Area

11.0 Discussion of Analysis and Findings – CEDA South Area

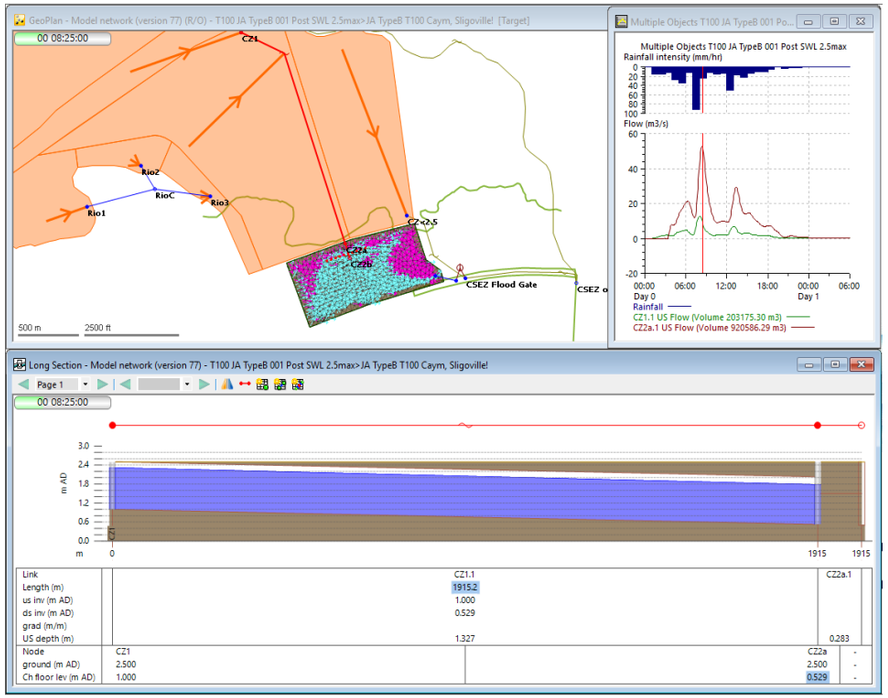
11.1 Runoff Volumes from the Sub Basins of the CEDA South Area

IDG/FSE prepared a hydrology model to identify potential runoff volumes for the CEDA South area. In order to manage water runoff volumes, the CEDA South area would require a main drainage channel. This channel would be aligned with the 2.5m contour lines to the east of the site. As such, the channel would run approximately 1,800-m in length, 1.5-m deep, and 30-m wide, at the lower end of the site, with a target depth of flow of 1.0-m. This would allow for a 0.5-m freeboard. The model indicates that approximately 920,600m³ of total runoff could be conveyed to the proposed flood regulation area at the south of the site for the T100 design storm.

The main drainage channel for the CEDA South area would be required to carry a peak flow of 51.6m³/s, based on our preliminary analysis. (See Chapter 10 for the infrastructure plans.) The maximum water level in the drainage channel is 2.3-m AMSL.

The land reserved for the flood regulation area is 55-ha and with the proposed containment berms will be quite adequate to contain the component of the runoff that is held during the period of the concurrent storm surge.

It should be noted that for both the T100 storm rainfall and the peak T100 storm surge (2.0-m AMSL) to coincide, the joint probability will exceed T100.



Source. IDG/FSE

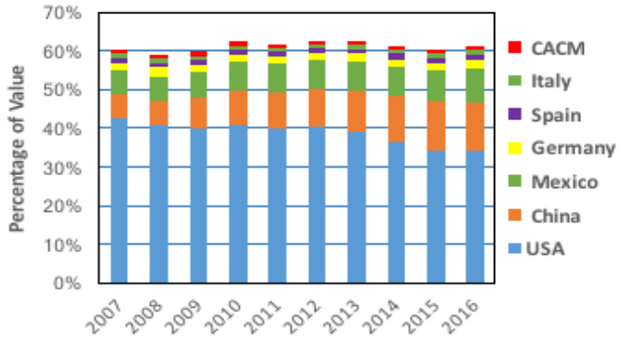
Figure 5-29. Main Drainage Channel for the CEDA South Development Area at Peak Discharge

The cost of the main drainage channel (a single feature in the overall drainage scheme for the development area) will be costly. It is assumed that the cost may be expensive, if constructed as a paved drain, which would be preferred for reasons of ease of maintenance and also necessary to make the site attractive to developers.

The cost of establishing the flood regulation area including the regrading of the site, construction of the berms to an elevation of 2.5-m AMSL, erosion protection of the berms and JRC railway embankment and construction of the flood gate is estimated in Chapter 10.

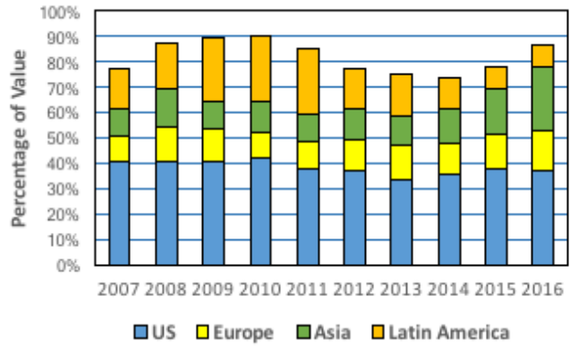
Chapter Six

Transportation Assessment



Source. Trademap

Figure 6-1. Source of Regional Containerizable Imports



Source. Trademap

Figure 6-2. Source of Regional Containerizable Imports from CARICOM

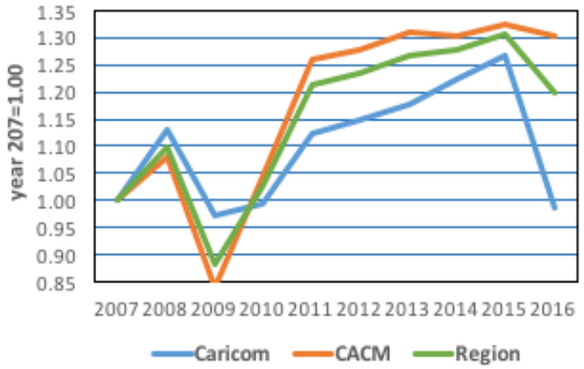
1.0 Overview

Over the past few years, significant work has gone into preparing a comprehensive logistics strategy for Jamaica. This chapter is intended to build upon Nathan's LHI reports and provide a more focused assessment of the transport and logistics issues related to the Port of Kingston and the CSEZ. As such, the chapter: i) examines the regional sea and air cargo flows, shipping patterns and inter-port competition in the region, and ii) presents a transport and logistics strategy for the CSEZ.

2.0 Growth in Container Traffic

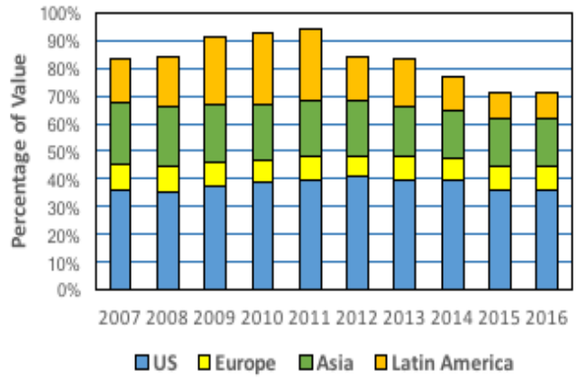
Growth of container traffic at the Port of Kingston is unlikely to result from the growth in regional trade, as the region has experienced very slow growth in the value of containerizable goods (Figure 6-1) over the past few years. In fact, there has been a slight decrease, when an adjustment is made for inflation. In terms of inter-regional trade, there has been an increase for both Caribbean (CARICOM) and Central American (CACM) countries, but this is partly due to an increase in re-exports from distribution hubs such as Colon. The share of the region's containerizable imports being shipped from the United States of America (USA) has declined, while those from China and Mexico have increased (Figure 6-2). The share of imports from Latin America[1] have also decreased for both groups (Figure 6-3 and 6-4). These trends suggest that any growth in traffic for Kingston will result from an increase in market share rather than from an increase in regional trade. This is consistent with the expectation that 'the period of rapid growth in global trade' is ending and future expansion will be much more closely linked to overall growth in the global economy. That said, any growth in market share will depend on the level of service provided to the shipping lines and to the suppliers of the imported goods.

[1] South America plus Panama, Mexico and Cuba.



Source.Trademap

Figure 6-3. Growth in Value of Imports



Source. Trademap

Figure 6-4. Source of Containerizable Imports for CACM

3.0 Changes in Shipping Patterns

The Nathan report provides an in-depth analysis of potential changes in shipping patterns as a result of the opening of the new Panama Canal lock, (which can handle much larger vessels), and the decision of CMA-CGM to establish its regional hub port in Kingston (Appendix A. Figure A.2). Some of the reports more important findings are:

- The current slump in the container shipping industry has significantly reduced the cost of chartering vessels, especially Panamax vessels. Lower charter rates combined with depressed bunker fuel prices, and the lack of substantial growth of trade within the Caribbean basin will discourage changes in shipping services based solely on the economies of Neo-Panamax vessels in the 5000-10,000 twenty-foot equivalent units (TEU) range.

- The introduction of the very large container vessels, 18,000 TEU and above on the major shipping routes has produced a cascade effect in which larger vessels are replacing smaller vessels on all the routes including feeder services. As a result, almost half the Neo-Panamax vessels transiting the canal are container vessels. More importantly the percentage of container vessels transiting the canal that are neo-Panamax has increased from approximately 12% during the last half of 2016 to more than 33% in the first half of fiscal year (FY) 2017 (Appendix A. Figure A.3). Most of these are in the 5000-10,000 TEU range which are readily available in contrast to the larger Neo-Panamax vessels up to 14,000 TEU which are primarily new buildings.

- The decision of the shipping lines to consolidate their transshipment activities at a single regional hub is driven by five objectives:

  – to improve coordination on interline movements, especially for eastbound services from Asia which have difficulty in meeting scheduled arrival dates due to delays both in Asia and en route to the US East Coast
  – to simplify the management of their container inventory
  – to adjust the interline connections to reduce the accumulated delay

  - to inform the consignees of the adjusted schedule so that they can adjust their plans. The transit time from a Caribbean hub to the USEC allows sufficient time for them to make the necessary arrangements.
  - To make the adjustments necessary so that the transfers to the feeder services can be made allowing them to maintain a day of-the-week schedule.

- The change in the alliance structure will have some impact on slot chartering arrangements and participation in joint services but is unlikely to lead to a change in the transshipment hubs used by the individual alliance members. The inherent instability of such alliances, the cost of restructuring networks and the value of maintaining existing operating relationships discourages such a move.

- The additional savings in transport cost for the all-water route through the Panama Canal (AWP) relative to the intermodal route for containers destined for the Eastern U.S. will produce a shift westward in the breakeven point (isoquant) for the AWP. However, the intermodal route will continue to have a significant transit time advantage.

Additionally, the reduction in the relative importance of savings in transit time and increasing emphasis on reliability. This is due to a combination of improvements in supply chain management and sluggish economic growth. These adjustments favor the AWP, but much of the change in market share has already occurred. As a result, the westward shift in the breakeven location for the AWP and multimodal route due to the use of larger vessels will be limited.

4.0 Change in Container Traffic

Globally there has been a slowing in the rate of growth in container traffic relative to the growth in trade. This is a result of changes in a number of trends. Some that had accelerated growth have slowed including the rate of increase in:

- Containerization of commodities formerly shipped as breakbulk cargo
- Proportion of trade involving manufactured goods
- Offshoring of manufactured activities to Asia
- Use of hub and spoke operations and proportion of feeder movements

At the same time, a number of new trends have arisen that have reduced the growth in container volumes. These include:

- Increasing cargo densities per TEU with the introduction of strengthened boxes
- Reduction in the imbalance of flows of containerized goods

In addition, expansion in the number of ports in Asia, Latin America and Africa that are receiving direct calls by container lines has limited the growth of feeder services.

Table 6-1. Selected Common Feeder Operators

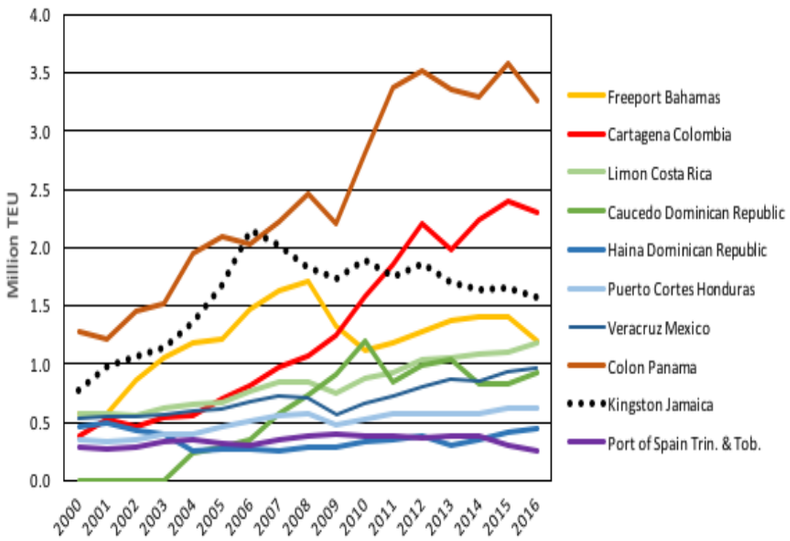
Name	Region	Vessels
Bermuda Container Line	Bermuda, USA	2
Antillean Marine Shipping	Caribbean	5
Bernuth Lines	Caribbean	22
Caribbean Feeder Services*	Caribbean	16
Crowley Liner Services	Caribbean	30
Tropical Shipping	Caribbean	29
Wing Bridge Shipping.	Caribbean	6
Dole Ocean Cargo Express	Europe, North (N)/Central (C) and South (S) America	21
King Ocean Services	N, C, and S. America	12
Seaboard Marine	N and S. America	36
X-Press	Global	70

5.0 Dedicated Feeder Services

Main container lines are becoming increasing involved in providing dedicated feeder services. CMA-CGM operates a number of feeder services some of which, are shown in Appendix A: Figures A.4 and A.5. Maersk has established a dedicated feeder service provider, SeaLand, for trade between North and South America and within the Caribbean. Several other large container lines, including MSC, Hamburg Sud and Zim also provide dedicated services. Feeder services have become more important with the increase in size of vessels transiting the Panama Canal, as well as, mainline vessels having difficulties maintaining a day-of-the-week schedule.

Dedicated services have benefited from the redeployment of vessels in the 2,000-5,000 TEU range, which formerly were used in regional services but have mobilized the larger vessels redeployed as part of the cascading effect following the introduction of the very large container vessels. Dedicated services operated by the mainline carriers have competitive advantages over common-carrier services. Their schedules can be coordinated with those of the mainline services and adjusted when these schedules are modified. At the same time, their schedules can be designed to reestablish day-of the-week feeder operations despite delays in mainline vessel operations and insure coordination with multimodal services offered by the shipping lines.

However, common carrier services will continue to have an important role. The large international shipping lines will continue to rely on common feeder services such as Caribbean Feeder Services (CFS), X-press and regional lines such as Seaboard, Crowley and Tropical Shipping (Table 6-1, Appendix A. Figures A.6, A.7). These lines will continue to serve regional ports that do not have sufficient traffic to justify calls by feeder services operated by the larger carriers. While the shipping alliances generate large volumes for these ports, the shipments cannot be consolidated because the members operate out of separate hubs. Common feeder services are also used when there is significant volatility in the number of containers carried on the mainline vessels for individual ports. By combining the volumes from several lines, a larger more efficient vessel can be used and a higher load factor achieved.



Source. Trademap

Figure 6-5. Growth in Traffic in Major Caribbean Container Ports

Table 6-2. Recent Traffic for Competing Ports

Internal Ranking (2015)	Port	Country	2014	2015	2016	Increase (%)
41	Colon	Panama	3.29	3.58	3.26	-0.9
60	Cartagena	Colombia	2.24	2.40	2.30	2.7
89	Kingston	Jamaica	1.64	1.65	1.57	-4.10
99	Freeport	Bahamas	1.40	1.40	1.20	-14.2
	Limon	Costa Rica	1.09	1.11	1.18	8.1
	Caucedo	Dominican Republic	.831	.827	.918	10.6

6.0 Inter-Port Competition

Kingston Port (CMA-CGM's terminal in Kingston) competes with a number of other transshipment ports in the Caribbean basin. Most of these have container terminals managed by third party terminal operators - Evergreen's Colon Container Terminal, APM's multi-purpose terminal in Cartagena and the new container terminal being developed by APM in Moin. Their available drafts range from 13-16 meters, but most are planning to increase their draft to 14.5-16 meters in the near future. The characteristics of these ports are outlined in Appendix A. Table A.4.

The largest competing port to Kingston is Colon port, which has three terminals with a total capacity of approximately 7 million TEU. Cartagena is the next largest, with capacity exceeding 3 million TEU with plans to expand to over 5 million TEU in the medium term. Although Colon and Cartagena have experienced strong growth over the past 15 year, and Limon moderate growth, the other container ports in the Caribbean have experienced very little growth. Freeport, like Kingston has actually seen a decline in growth (Figure 6-5). Part of this difference is explained by the type of container movement used. For Freeport, about 90% of its containers are transshipped making the port extremely vulnerable to changes in routing decisions, while only about three-quarters of the containers handled in Colon, Caucedo, and Cartagena are transshipped.2 In Kingston, only about half the containers handled are transshipment due to the recent decline in transshipment. The Port of Spain has the smallest portion of transshipped containers, but its traffic is too small to allow it to compete against the larger ports.

The loss of market share experienced by Kingston over the past decade is partly due to the decline in market share of its major client, Zim. Equally important has been its inability to provide the quality of service that would attract a major carrier. This problem was resolved by converting a public operating port to a landlord port and granting a 30-year concession to

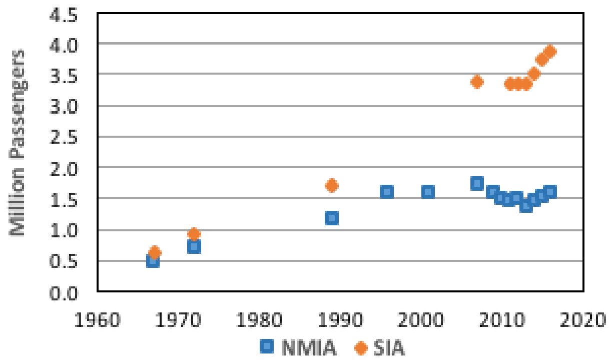
[2] Since transshipment boxes are counted twice, once in and once out. The proportion of container shipments that are import/export amounts to about 42%.

CMA-CGM for the Kingston container terminal. This change is expected to result in a substantial increase in the volume of transshipment traffic over the next decade as CMA-CGM consolidates its activities and adopts a more aggressive strategy for increasing regional market share. It is anticipated that the current volume of 1.65 million TEU will increase by at least 50% in the next five years with a doubling of the current volume likely to be reached within a decade. Thereafter, most of the growth will be generated by the increase in trade in the region. With these improvements to be introduced by CMA, the Kingston container terminal should reach capacity within ten years. With the conversion of the other berths within the basin to container terminals, Kingston should have adequate capacity for an additional 7-10 years.

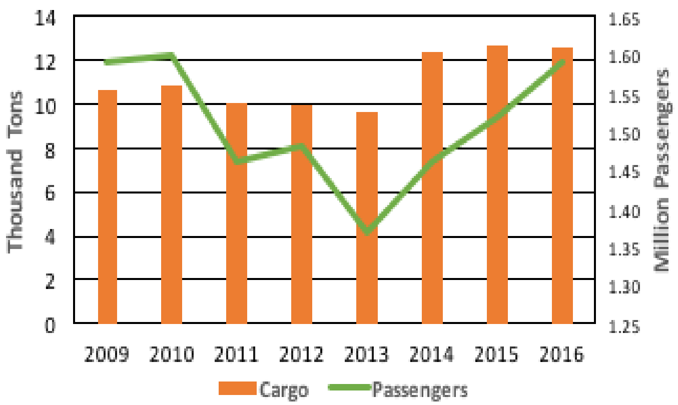
While Kingston is expected to enjoy a competitive advantage due to its central location and the commitment of a major carrier, it will continue to experience significant competition.[3] The major competition for the regional transshipment traffic is expected to come from Colon and Cartagena.[4] Colon will continue to enjoy its position at the northern end of the Panama Canal, through which most of the container ships must transit when traveling through the Caribbean. At present, Colon is only utilizing about half of its estimated capacity. Cartagena is currently operating at close to 75% of estimated capacity but has plans to increase its capacity by 75% in the medium term. The ports of Moin and Freeport are also expected to continue competing for transshipment traffic. Moin is in the process of constructing a terminal with initial capacity of 1.2 million TEU but with potential to expand to 3 million TEU, while Freeport has plans to increase its capacity to just over 3 million TEU. As Kingston's competition expands and modernizes, the development of the CSEZ and associated logistics platforms in the port and throughout Jamaica will strengthen Kingston's position as a central distribution point within the Caribbean. However, its competitive advantage in attracting feeder services for the smaller ports along the coast from Colombia to northeast Brazil will decrease as the volume of traffic through the Canal increases and more direct services are introduced. Just as the Colon Free Zone played a critical role in the development of the Colon Port, it is expected that the growth of Kingston's container terminals will increasingly depend on the expansion of activity in the CSEZ and associated logistics platforms.

[3] Prediction of future port volumes is notoriously difficult due to the significance of strategic decisions by shipping lines in designing their routes and ports in making the necessary capital investments. The increasing importance of shipping lines in the development of container terminals has added to the uncertainty in where growth will occur in markets with competing ports. The IBD analysis of the Caribbean container market ("Caribbean Regional Action Plan on Freight Logistics, Maritime Transport and Trade Facilitation", December 2014) utilized a traditional analysis of existing trends and assets and concluded that Kingston would have a major share of the regional container traffic. However, it did not anticipate the stagnation that would have continued had CMA-CGM not chosen Kinston for its regional hub.

[4] The IDB study also projected that Cartagena would have a slightly larger share and Colon as a slightly smaller share.



Source. Trademap
Figure 6-6. Airport Passenger Traffic



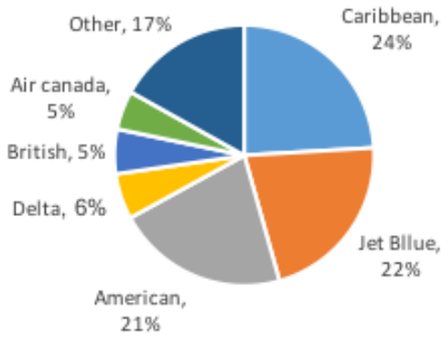
Source. Trademap
Figure 6-7. Traffic at the NMIA 2009-2016

7.0 Air Cargo

Neither of the international airports in Jamaica handle significant volumes of air cargo. Nearly all of the airfreight is transported as belly cargo on scheduled passenger services. Of the two international airports, Sangster International Airport (SIA) has experienced sustained growth in passenger traffic over the past half century as a result of the growth in tourism on the north side of the island. In contrast, Noman Manley International Airport (NMIA), which serves business traffic and the residents of the Greater Kingston area, has not experienced significant growth for the last quarter century (Figure 6-6). During this same period, the volume of air cargo increased from a few thousand tons in 1970 to 31 thousand tons in 1996, but then declined to 16 thousand tons in 2007. It has since recovered and settled in the range of 10-12 thousand tons in 2016 (Figure 6-7).

The runway at NMIA was extended from its original length of 8,700 feet to 8,900 feet, sufficient to handle the 747 with Maximum Takeoff Weight (MTW) of 380 tons at 40º C (Appendix A. Figure A.9). The current plan is to extend NMIA's runway by about 500 meters to meet the International Civil Aviation Organization's (ICAO) safety standards and allow the MTW to be increased to 430 tons. The airport already has parking positions for aircraft up to Boeing 747-400 (Code E), however, at present the largest passenger aircraft landing in Jamaica is the Boeing 777.

Currently, NMIA is operating well below capacity for its current mix of aircraft and well below what is possible, as the average size of aircraft using the airport increases. (However, larger aircrafts would require a modification of the terminal to handle the increased peak of arrivals/departures.). Although NMIA serves most regional airlines, (Figure 8, Appendix A. Table A.6) most of its cargo is transported on foreign carriers, such as American and British Airlines. The potential for significant growth in airfreight at NMIA or in Jamaica is constrained by the limited volume of foreign trade in high value-density cargo and the absence of a national carrier with a significant network. In contrast to Jamaica, regional airports with significant air freight are hubs for their own national carriers. I.E. Ed Dorado in Bogota, Tocumen in Panama, and Piarco in Trinidad and Tobago. In addition, these countries have major cargo generators, such as horticultural products in Colombia, the Colon Free Trade Zone in Panama, and the oil and gas industry in Trinidad and Tobago.



Source. IDG
Figure 6-8. Airline Passenger Market Share

When considering the potential for a significant increase in the volume of airfreight in Jamaica, it is important to recognize that the basis of its competitive advantage is regional, not local. There are many locations in the Caribbean region that have similar or greater comparative advantages. Regional airfreight traffic has fluctuated considerably over the past decade, as shown in Appendix A. Figure A.10 both for individual airports and overall. The peaks in 2000 and 2013 were followed by decreases. The current level is about 12% below 2013. Panama is currently handling more than half of the airfreight for the countries competing directly with Kingston (Appendix A. Figure A.10).

There are a number of efforts currently underway in Jamaica that will contribute to growth in airfreight. These include:

- Expanding bilateral agreements as part of Jamaica's open skies policy, including Asia (Sri Lanka), Middle East (Qatar) and Africa (South Africa and Kenya)
- Concessioning NMIA, which should ensure timely increase in capacity to accommodate future growth,
- Developing Jamaica as a logistics hub for rapid distribution of goods to USA markets using existing courier services

Although the potential for developing a Sea-Air operation in Jamaica has been discussed, (specifically at NMIA, Vernamfield, and/or Tinson Pen), a convincing value proposition has yet to be presented.[5]

NMIA currently has small cargo handling facilities. Its Cargo and Logistics Centre includes a 3.8 thousand m2 (41,000 ft2) cargo building, which serves courier packages and other airfreight. The facility also has an adjacent customer reception building. A five thousand square meters expansion has been proposed for the centre but current capacity should be adequate for the facility's anticipated growth in the near term.

[5] It remains unclear how a Sea-Air service would provide significant savings for Asian cargoes relative to the current multimodal connection via the USWC.

8.0 A Logistics Strategy for the Development of the CSEZ

The development of the CSEZ requires an efficient port to serve as the gateway for international and domestic imports to be stored, processed and distributed to the domestic and regional markets. These activities will, in turn, make the port more attractive to both shippers, shipping lines and logistics providers. From lessons learnt, the synergies between ports and nearby SEZ's has become increasingly important and has been the basis for the success of high performing zones such as Tianjin SEZ in China, Jebel Ali FZ in the UAE, Subic Bay SEZ in the Philippines, Tangier FZ in Morocco, and Pelabuhan Tanjung Pelepas Port (PTP) in Malaysia among others.

A wide variety of logistics services are required to assist the containerized cargo moving through Kingston Port. Some services will be provided within the CSEZ, but others will be provided in facilities closer to the port. Thus, the success of the CSEZ is linked to the success of these other facilities, not only because of synergies between different types of services offered but also because these services contribute to the success of the broader vision of Jamaica as a logistics hub.

Because it will take several years to plan, develop and populate the CSEZ, in the interim it will be important to provide a variety of logistics platforms to support the continuing growth of container traffic in the port of Kingston for imports, exports, and cargo distribution within the region. The logistics services required for these types of cargoes can be grouped into four categories:

Category 1. **Transshipment cargo** for distribution throughout the Caribbean and the north coast of South America, which will continue to be the major type of container traffic handled in Kingston port. These containers require not only temporary storage but also reconsolidation and minor repairs. These services are typically provided within the container terminal because of the relatively short dwell times, 10 days or less.

Category 2. **Containers** carrying import cargoes, which require additional services such as de-stuffing and temporary storage for less than a container load of cargo (LCL), inspections and clearances by Customs and other government agencies, cleaning and repairing of containers, and the management of empties. These activities are typically performed within the port because the goods have not yet been cleared Customs and these dwell times are typically 1-3 weeks. Similar services may be provided for unitized imports of vehicles and large machinery as well.

Source. IDG

Figure 6-9. Location for Various Stages of Logistics

Category 3. Once goods are removed from containers, **imported goods are typically stored in warehouses** for 2 weeks to 3 months before being distributed to wholesalers, retailers or direct to consumers. During this time period, a number of services are performed including inventory management, order processing, labeling, kitting and some assembly or customization. These goods are usually transferred to areas or SEZ's nearby the port because of:

- lower storage costs
- difficulties in performing these services under customs bond
- the need for rapid delivery, which is not possible if the goods have not been cleared.

Category 4. Imports of intermediate goods to be processed, local goods to be processed and exported, and branded products for regional distribution is the last category. **The consolidation, processing, storage and distribution of these goods are performed in special zones** designed to facilitate these activities. The zone provides a much broader range of logistics services including assembly, customization, warranty repairs, and recycling. Turnover for this type of cargo generally varies but is in the range of 2-6 months.

IDG examined both the port and the CSEZ and developed a logistics strategy for the movement and storage of goods under the above categories. The proposed locations for the first three categories are shown in Figure 6-9. On-port facilities include the area in the port to the north of the container terminal, which would serve the container cargo and the area to the west of the terminal, which would serve the vehicle cargo. Off-port facilities include Tinson Pen and the warehousing district northeast of Tinson Pen up to Spanish Town Road. Their characteristics are shown in Table 6-3 below.

Table 6-3. Interlinked Locations for Logistics Activities

Location	Container Terminals	Terminal Backup Area	Tinson Pen	Warehousing District	CSEZ
Area (ha.)	90 +35	50	40	58	~250
Functions	Transshipment	Unstuffing/ Reconsolidation	Consolidation/ Distribution	Domestic Distribution	Regional Distribution
Inputs	Containers	Cargo	Imports/Exports/ Consumer Goods	Cleared Imports	Intermediate Goods/ Final Products
Turnover	5-14 Days	5-21 Days	2 Weeks- 2 Months	2 Weeks- 2 Months	3 Weeks-3 Months
Services	Temporary Storage/ Minor Repairs	Temporary Storage/ Clearance/ Minor Repairs	Processing/ Inventory Management	General Warehousing	Processing/ Inventory Management/ Repairs and Warranty Work
Customs Status	Bonded		Partially Bonded		Partially Bonded
Connections	Internal Truck Movements	Internal and External Truck Movements	Bonded Trucks Major Roads/Regular and Bonded Trucks		

Table 6-4. Kingston Port Quays		
Operator	**Length (m)**	**Depth (m)**
Kingston Wharves Ltd.		
Eastern	152	8.9
	912	9.5
Western	304	12.7
Kingston Container Terminal		
North	490	14.2
West	600	14.2
South	1300	14.2

8.1 Site Development

The development of the logistics locations identified in 8.0 requires an adjustment to their regulatory status and land use. In addition:

Category 1. For the container terminal, it will be necessary to allocate additional area for berthing and storage as containers and roll on/roll off (RoRo) traffic increases. Over the next 15 years, it is anticipated that the 1.5 kilometers of wharf concessioned to Kingston Wharves Ltd. (KWL) as multipurpose berths will be converted to container berths to handle the overflow from the existing container terminal (Table 6-4). This requires that the backup area behind the wharf be converted into container storage yards. The RoRo storage area would be relocated to the western end of the terminal in the area where the soils have limited load-bearing capacity.

Category 2 activities would be performed in the area to the north of the existing container terminal where the bonded area (CFS) and customs inspection facilities are located. The area would be reconfigured not only to improve the flow of cargo but also to replace older structures with modern transit storage and cargo inspection facilities. As the demand for transit storage and related services increases, this area would be extended east, and the port boundary would be pushed back to Newport Boulevard. The storage activities currently located in this area would be relocated to Tinson Pen or the nearby general warehousing area both of which, are currently underutilized.

Category 3 activities would be performed in Tinson Pen. This is effectively a 40-acre greenfield site with close proximity to the port. It has been proposed to include this area within the port boundary by constructing a limited-access flyover. However, once the port area has been expanded to include the area up to Newport Boulevard, there should be no need for further expansion. Instead, the site could serve as a near-port logistics platform for storage and distribution of imported goods that have been cleared. These would be primarily fast-moving consumer goods (FMCG) and spare parts. This cargo could be transferred from the container terminal using a nighttime shuttle service.

Table 6-5. Jamaica's Ranking Relative to its Competitors

Rankings	Colombia	Panama	Costa Rica	Jamaica
Enabling Trade	85	58	57	89
Global Competitiveness	61	42	54	75
Doing Business	53	70	62	67
Logistics Performance Indicators	94	40	89	119

Table 6-6. Jamaica's Improvement in Competitive Indices

Indexes	2012	2016	Components
Enabling Trade	79	89	Market Access, Border Administration, Transport and Communications Infrastructure, Business Environment
Global competitiveness	97	75	Competitiveness, Efficiency Enhancers, and Innovation and Sophistication Factors
Doing business*	123	67	obtaining credit, protecting investors, paying taxes, trading across borders, enforcing contracts, and resolving insolvency
Logistics Performance	124	119	Customs, infrastructure, logistics competence, timeliness, international shipments, track and trace

Category 4 activities would be performed in the CSEZ. The zone would have both bonded and unbonded facilities. Goods would be transferred to and from the port by road using one or more of the routes presented in 9.0 below.

8.2 Logistics Sector

In terms of competitiveness in trade and logistics, Jamaica is ranked below its major competitors as shown in Table 6-5. While these indices differ in both the parameters they measure (Table 6-6) and the scales they use for evaluation,
the similarity of the results suggest that additional improvements are necessary if Jamaica is to become as a true logistics hub.

Jamaica has made some progress in improving its competitiveness as shown in Table 6-6. These indices however are necessarily backward looking and do not take into account the buildup in momentum that Jamaica appears to have achieved in the short term. Nevertheless, more is required to further improve Jamaica's ranking.

The logistics industry in Jamaica has been slow to develop due to a lack of demand for modern logistics services. The retail and wholesale sector, which is normally a driver of modern logistics accounts for only 18% of the gross domestic product (GDP) and its share had been declining. Also, most of the firms in Jamaica are small scale and have experienced decreasing productivity. The food and beverage sector, which is another major client for logistics services is also small in Jamaica, with the exception of a few large manufacturers. The other significant sources of demand for logistics services are the construction materials, the cruise industry and tourism. The former, has relatively simple logistics requirements. The latter relies heavily on external logistics service providers to deliver containerized imports directly to hotels and cruise vessels.

Table 6-7. Available Warehousing by District	
District	**Square Meters**
Kingston & St. Andrew	67.6
Manchester	2.0
St. Thomas	14.5
Hanover	3.3
St. Mary	.9
St. Catherine	20.5
St. James	30.7
Clarendon	20.1
Trelawney	3.4
St. Ann	.6
Portland	2.3
TOTAL	**165.9**

Only about 20 companies are currently involved in logistics in Jamaica and the majority are running less than half full-time. Most are located in the city of Kingston. There are few international players, notably Fedex, United Postal Service (UPS), and Deutsche Postal Service (DHL), but their operations are relatively small-scale and focus on small package courier services.

While there is a significant amount of warehousing in the country, most are older, traditional structures are located in Kingston (Table 6-7). They are designed to provide storage, but not value-added logistics. The two exceptions are:

- **Grace Kennedy Food Distribution Center** - A 22,000 m2, modern warehouse with racked storage and a semi-automated inventory management system for both domestic and export products. (Figure 6-10, 6-11) It is operated by the third-party contractor, Logistical Distribution Services Ltd (LDSL), which subcontracts approximately 200 haulage contractors and assistants.

- **Kingston Wharves Total Logistics Facility** - A 15,000 m2, modern warehouse adjacent to its multipurpose port terminal, which is being constructed to provide 3rd party logistics services. When completed, it will provide space for modern customs processing and a range of logistics services including inventory management, pick and pack, labeling, distribution, and postponement.

8.3 Trade Facilitation

Trade facilitation is a critical element in the development of an economic zone, or any other platform for international trade and logistics. It encompasses simplification, coordination, automation, and transparency of the procedures related to international trade in goods and services. For the Caribbean, Jamaica has taken the lead in trade facilitation. It is implementing many of the reforms necessary to ensure that the CSEZ and related platforms will be attractive to foreign investors. These reforms include:

- Installing ASYCUDA World, a widely-used Customs ICT platform, for processing customs declarations and coordinating clearance procedures for both sea and air freight

Source. Google Earth
Figure 6-10. Grace Kennedy Distribution Center

Source. J. Arnold
Figure 6-11. Stacked Storage in Grace Kennedy Distribution Center

- Introducing a single electronic window for submission of all documents related to the clearance of cargo as well as for coordinating the approval activities by the various regulatory agencies including testing and physical inspection
- Developing a Port Community System for tracking the movement of goods moving through the ports and airports, interconnecting the logistic service providers involved in this process, facilitating electronic payments for services, and interfacing with customs and other e regulatory agencies[6]
- Developing a risk management system with an Authorized Economic Operator (AEO) program, which includes post-audit capabilities and the mutual recognition with AEO programs in other countries.
- Improving access to information on commodity classifications, applicable duties and taxes, cargo documentation, and procedures required by international shipments in a user-friendly, internet-based environment, and
- Increasing flexibility in the formation of bonded facilities and transport of goods in bond.

While these reforms have been introduced throughout the world, they are relatively new within the Caribbean. The installation of these types of reforms usually requires a few years to implement. I.E. The individual systems take a minimum of four years and longer when the systems are to be integrated. This time depends less on the setup time for the systems and more on the time for retraining personnel. This is a particular problem for most regulatory agencies, whose personnel are usually less familiar with IT systems, hence more comfortable with systems based on experience and intuition and are not used to the new levels of accountability introduced through these systems. The latter is a particular problem with regards the introduction of risk management systems.
In Jamaica, most of the reforms have only been introduced within the past two years. While significant progress has been made, major problems have yet to be resolved including:

- The basic ASYCUDA World system is operational but some of the modules, including the one for selection of inspectors, are not yet operational.
- The Port Community System, perhaps the most difficult component, is a collaboration between of the Port Authority of Jamaica, Jamaica Customs Agency and the Shipping Association of Jamaica but incorporating the systems used by major players such as the new Terminal Operating Systems being introduced by CMA-CGM and KWL will require more time.

[6] Participants include terminal operators, shipping lines, truck companies, ship agents, forwarders, and customs brokers.

- The Single Electronic Window is limited to submissions to a few regulatory agencies. A complete system will require more time because the other government agencies have to develop IT compatible procedures.[7]
- The present level of physical inspections remains high, about 38% compared with the 10%-15% target usually associated with these efforts.
- The AEO program is limited to the larger companies involved in international trade but accounts for half of the declarations.

Additional reforms will be needed to support the development of the CSEZ and associated near-port logistics platforms. These include:

- **Establishment of a trade portal**. This Customs website provides a lookup feature for the commodity classification code, but no information on the duties and taxes, certification requirements and trade agreements and regulations affecting imports.[8]
- **Simplified movement of goods in bond**. Current regulations require an escort. This is not a problem given the relatively small volumes and short distances travelled. However, new systems need to be developed to support the CSEZ and the establishment of other new logistics platforms. Modern techniques involving global positioning systems such as GPS and electronic seals are now being considered.
- **Establishment of bonded factories and other entities.** These will be important for establishing logistics platforms that have a mix of facilities only some of which, handle goods in bond.

It is essential that the efforts to complete these reforms continue and firm dates for implementation be set to coincide with the introduction of the near-port logistics platforms and the CSEZ.

[7] Business process reviews for all relevant agencies, upgrading of existing systems, and Memorandums of Understanding between Agencies have been realized. However, a clear political commitment is necessary to overcoming the typical challenges of sharing information.
[8] For reference see the Singapore and Myanmar trade portals. The latter is under development but provides a simpler format.

Source. IDG
Figure 6-12. Port Access Roads

Source. IDG
Figure 6-13. Access Via Spanish Town Road

9.0 Alternative Routes Connecting Port and Other Logistics Hubs

The following is a high-level overview of potential alternative routes from the port to the CSEZ site. IDG developed these options after in-depth discussions and collaboration with the Port Authority and NWA.

9.1 Port Exits

The port currently has three exits, which are all limited (Figure 6-12). Vehicles exiting on Shannon Drive can head northwest on the Port Kingston Causeway but otherwise must proceed south to 8th Avenue and exit onto Marcus Garvey Drive heading north. Further to the southeast, there are additional exit onto Marcus Garvey at 5th Avenue and 4th Avenue. As the container traffic grows and the use of Tinson Pen increases, it will be necessary to develop a higher volume access to Marcus Garvey. The design of this access should be part of a broader plan to revise the land uses and traffic patterns in the northeastern side of the port.

It should be noted that there was an earlier plan to construct a flyover between the port and Tinson Pen. While this would solve the problem of port access, it has the disadvantage that is would:

- cause significant disruption to traffic on Marcus Garvey for a period of up to a year
- require a 100 – 150-meter approach ramp on either side
- involves a significant capital expenditure.

9.2 Connections to CEDA South Area

There are three potential access routes from the CSEZ to the port. Each of these routes have their own opportunities, constraints and cost implications, which will be further examined in IDG's Infrastructure Assessment in Phase II of the project. Of the possible three routes, two are via public roads and highway networks and the third access-way is a mix of public roads and a new, dedicated internal road utilizing the existing JRC rail right-of-way. The three routes are as follows:

Source. IDG
Figure 6-14. Access Via the Dyke Road

Source. IDG
Figure 6-15. Route Utilizing the Existing JR Rail Right-of-Way

- **Route 1 Option. Access Via Spanish Town Road** (Figure 6-13, 7.5 km/4.7 miles)

  This route is from the port exit to Marcus Garvey Drive (4 lanes) then crossing over to Spanish Town Road (4-lanes) and heading northwest to the Six Mile intersection with Mandela Highway (6-lanes). Trucks following this route would use a flyover and a new service road to access the north side of Mandela Highway and the entrance to the CSEZ.

  Route 1 Requirements/Constraints. This route utilizes existing roadways but would require the construction of a flyover and a service road along Mandela Highway for trucks/vehicles to access the CSEZ. The major difficulty with this connection from the port to the CSEZ is that there is considerable vehicular traffic along Spanish Town Road, where capacity is often limited during the day. Currently there are two bottlenecks along this route: i) at the intersection of Marcus Garvey Drive and Spanish Town Road, and ii) at the Six Mile intersection where Spanish Town Road meets the Mandela Highway. That said, there are simple transport solutions to mitigate this congestion such as moving cargo during evening or off-peak hours.

- **Route 2 Option. Access Via the Dyke Road** (Figure 6-14, 17 km/10.6 miles)

  This route is from the port exit to the Port Kingston Causeway (6 lanes/Toll Road) continuing around the port, then southwest, turning north onto Dyke Road (2-lanes) then continuing onto Municipal Boulevard (2-lanes). At the intersection with Mandela Highway, a truck would head east to access the CSEZ.

  Route 2 Requirements/Constraints. This route uses existing roads and includes a toll road but is less congested that Route 1 above. For trucks/vehicles heading to the CSEZ, access is quite direct.

- **Route 3 Option. A Dedicated Route Utilizing the Existing JR Rail Right-Of-Way** (Figure 6-15, 5.5 km/3.4miles)

  This route is from the port exit to the intersection of Marcus Garvey Drive (4-lanes), to the Port Kingston Causeway (4-lanes), then northwest along a new, dedicated, secured two-lane road designed within the JRC rail right-of-way. This new road would go through the Seaview Garden community, connecting to a new bridge over Hunts Bay and into the CEDA South area, accessing

from the south. Access to the CSEZ would continue along the rail right-ofway road and then via the Rio Cobre dyke road to an intersection at the Mandela Highway, which would provide access into the CSEZ.

Route 3 Requirements/Constraints. This route requires the construction of a brand-new road following the JRC rail right-of-way, a new bridge over Hunts Bay, an upgrade of the Rio Cobre dyke road, as well as, an intersection improvement on the Mandela Highway to access the CSEZ. It should be noted that a new, dedicated road along the JRC rail easement could only be 20 meters/66 feet wide or 2-lanes, as it is impossible to widen this route further. A new road would also physically split the Seaview Garden community in two and would pass along the boundary of the Riverton Solid Waste Facility, which has its own set of environmental and safety concerns. That said, the above three routes are valid transport and logistic options/solutions to access the CSEZ from the port of Kingston.

Chapter Seven
Market Analysis

Box 7-1. Macroeconomic Indicators

- **Jamaica's Growth in 2016**
  - Real GDP grew 0.3% relative to the April - June period of 2016.
  - GDP growth year to date, January to June is 0.2%.
  - The Agriculture, Forestry and Fishing sectors have faced three consecutive quarters of decline. The 2nd quarter outputs were -8.5% due to the decline in the production of crops and livestock farming.
  - The Manufacturing and Construction sectors continue to grow at 2.4% and 1.5% respectively.
  - The Hotels and Restaurants industry grew by 8%.
  - Stopover visitor arrivals grew 2.8% to 944,000 and expenditure 8.5% to achieve US$671 million, year to date.

- **Macroeconomic Developments in 2017**
  - Reported inflation was 1.1%.
  - Unemployment as at April 2017 fell to 12.2%.
  - The current employed labor force has grown by 35,800 persons to 1,204,800. This is the highest in Jamaica's history.

- **Projections for 2018**

Jamaica's Fiscal Year 2018 forecast is expected to be 2% to 3% growth owing to favorable conditions in the construction, mining, hotel and restaurant sectors. Key projects like the Alpart reopening and hotel expansions (2,000 additional rooms) are expected to drive this growth.

Source: JAMPRO

1.0 Introduction

This chapter is an overview of Jamaica and the CSEZ's competitive and comparative advantages, as well as, a market analysis. It includes: i) a comparative benchmarking exercise, ii) a review of key barriers to investment in Jamaica, iii) an evaluation of industry trends, trade agreements, flows and patterns, iv) a summary of key sectors for the CSEZ, and v) industry operating parameters.

2.0 Methodology

To understand the potential attractiveness of the CSEZ, it must be put into its market context. This entails an assessment of: i) Jamaica's business environment, ii) industry trends, and iii) trade and investment flows to ascertain Jamaica's market strengths and weaknesses and to evaluate the country and the CSEZ's competitive position and comparative advantages against its likely competitors. As such, for this market analysis IDG examined:

- The costs of doing business in Jamaica through a competitive benchmarking exercise
- The barriers to doing business in Jamaica through an investor survey
- The perception of Jamaica as an investment location
- Industry and investment trends in Jamaica and in the region
- Import and export flows and Jamaica's trade agreements
- Industry sectors that might locate in the CSEZ.

The results of this Market Analysis will form the basis of IDG's Demand Forecast in Chapter 8, which will set out the levels of demand for the CSEZ in three scenarios – a conservative case, a base case and an aggressive case.

3.0 Competitive Benchmarking

In today's modern society, businesses must respond and adjust rapidly to dynamic economic demands in order to maintain their competitive position. This has made their 'locational selection' a top priority, resulting in increasingly more frequent corporate relocations, expansions, and restructuring efforts. In general, 'locational selection' is a very individualized process for each industry sector, often with parameters shifting on a case-by-case basis. In the past, business locations were selected from only a few key factors such as market access and infrastructure, but this is no longer the norm.

Today, firms assess how to: i) enter new markets, ii) keep costs down, iii) improve production and product quality, iv) reduce time to market, and v) add value for their customers and stakeholders, all while tracking their competitors. As such, this benchmarking exercise assesses operating conditions and costs from a corporate seeker's perspective. In this context, the benchmarking exercise analyzes the competitiveness and comparative advantages of the CSEZ in both the quality of the operating environment and the cost of doing business.

3.1 Benchmarked Locations

In the future, the CSEZ will compete for investors/tenants against a number of SEZs, FZs, EPZs and IPs in the Caribbean and Latin American region. To best understand the CSEZ regional market position, IDG benchmarked Jamaica and the CSEZ against its key competitors – Colombia, Costa Rica, the Dominican Republic and Panama. The comparable SEZ/FZs selected to benchmark were:

- Barranquilla Atlantico Free Zone, Colombia
- Quantum Free Zone, Costa Rica
- Las Americas Free Zone, Dominican Republic
- Panama Pacifico SEZ, Panama

The above list of competing zones was selected for their comparable features with the CSEZ. All benchmarked zones: i) have zone regimes, ii) are similar in size, iii) market their facilities to similar sectors and investor mixes (foreign and domestic), and iv) provide equivalent services. In addition, the selected zones have other important qualities, which will be of interest as the CSEZ is planned and designed, such as their: i) types of serviced land, ii)

offerings of pre-built/standard warehouse buildings, iii) types and quality of infrastructure and utilities, and iv) range of security. The selected zones are primarily industrial, though office and ICT space are available in most of their premises. All benchmarked zones offer duty-free importation of raw materials and other fiscal incentives. They are also PPP's for the development or operation of the zone, an approach being investigated by Jamaica for the CSEZ and which is increasingly favored globally in order to spread the financial risk of a project.

3.2 Quality of Operating Conditions

Businesses generally seek to minimize risk and maximize opportunities in their decision-making process to locate, relocate or expand existing operations by searching for locations, which provide them with a safe and flexible operating environment. In most cases, investors prefer to locate in countries with stable and predictable economic performance, a streamlined legal and regulatory environment, favorable tax levels[1] and a high-quality of life. To address these preferences, the following key factors were assessed by IDG:

- The macroeconomic environment
- External risks to investment
- Ease of business
- Operating conditions
- Quality of life

(To easily identify the differences in rankings between benchmarked competitors, IDG has color-coded the following tables to reflect better or worst performances than Jamaica. Green denotes countries that are performing better than Jamaica and red signifies countries doing worse than Jamaica.)

[1] Today investors rely less on fiscal incentives and put more value on a transparent and efficient business environment.

Table 7-1. Key Macroeconomic Indicators for Benchmarked Countries (2016)

Country	GDP (US$ Billions)	GDP Annual Growth Rate (%)	GDP Per Capita (PPP, US$)	Inflation Rate (%)
Jamaica	14.03	1.4	8,835	2.3
Colombia	282.46	2.0	14,158	7.5
Costa Rica	57.44	-1.0	16,614	-0.0
Dominican Rep.	71.58	-2.3	15,209	1.6
Panama	55.19	4.9	23,015	0.7

Table 7-2. Key Population Indicators for the Benchmarked Countries (2016)

Country	Population*[2] (2016 est.)	Literacy*[3] (%)	Unemployment Rate*[4] (%)
Jamaica	2,970,340	88.7	13.3
Colombia	47,220,856	94.7	9.9
Costa Rica	4,872,543	97.8	9.0
Dominican Republic	10,606,865	91.8	14.4
Panama	3,705,246	95.0	5.8

3.3 The Macroeconomic Environment

3.3.1 Economic Growth

The initial factors to be benchmarked are macroeconomic conditions in each benchmarked country. Indicators benchmarked include: i) Total Gross Domestic Product (GDP), ii) GDP annual growth, iii) GDP per capita - Purchasing Price Parity (PPP), iv) inflation rate by percentage, v) population estimates, vi) literacy rate by percentage, and vii) unemployment rate by percentage.

As indicated in Table 7-1, Colombia has the largest GDP of the benchmarked countries, ranking 41st among the world according to the WB, whereas Jamaica is ranked 119th. The Dominican Republic has the largest GDP in the Caribbean economy. Because of its relative population sizes and PPP, Panama in turn has a much higher GDP per capita, ranking 53rd versus Jamaica's 101st position. Panama also exhibited the fastest growth in 2016 of the competitors, moving 3.5 percentage points above Jamaica, with inflation at 0.7%.

As seen in Table 7-2, Jamaica has the smallest population of the benchmarked countries, albeit the third largest English-speaking population in the northern hemisphere after the USA and Canada. That said, Jamaica displays a significantly lower general literacy rate than competitor countries, and notably a higher unemployment rate, shy only by a few tenths of a percentage from the Dominican Republic. This combination of high unemployment and low purchasing power offers a large skilled and unskilled labor pool with low wages to investors coming to Jamaica, which could be turned into a possible competitive advantage for the CSEZ if jobs and skillsets are properly matched.

[2] Population estimate from July 2016. Source. The World Fact Book
[3] Literacy for total population. Source. The World Fact Book
[4] Estimated total unemployment (male and female over 15 years). Source. International Labor Organization

Table 7-3. Investment/Imports/Exports of Benchmarked Countries (2016)

Countries	Foreign Direct Investment[5]	Exports[6]	Imports
Jamaica	790	1,202	4,767
Colombia	13,593	31,045	44,831
Costa Rica	3,180	9,908	15,322
Dominican Republic	2,523	8,745	17,789
Panama	5,978	11,195	9,238

3.3.2 Foreign Investment

In general, investors will choose countries and SEZ's, which will afford them the highest rate of return on their investment. Hence, companies often utilize foreign direct investment (FDI) figures to help them determine countries or areas to invest in. Contributing factors to decision-making include: i) incentives, ii) high productivity of capital and labor, iii) access to raw materials, and/or iv) special market access. Hence, IDG examined these factors.

Table 7-3 illustrates that Jamaica attracts far less FDI than its competitors. In 2016 within the region, only Ecuador, El Salvador, Suriname and the Bahamas attracted less FDI than Jamaica. With an abundance of natural resources, a growing middle class, a large market, a relatively streamlined business environment, and increased security, Colombia has become a regional leader in FDI and has the highest FDI investments levels within the benchmarked countries. Second highest FDI is found in Panama, which leverages the Panama Canal and its sophisticated logistics to attract investors. Costa Rica follows behind Panama, boasting the oldest continuous democracy in Latin America with stable economic indicators and good living conditions, which helps the country attract a continual flow of FDI. Within the Caribbean region, the Dominican Republic is the main recipients of FDI, with the USA being, historically, its largest investor. In comparison to these benchmarked countries, Jamaica continues to lag in its ability to attract FDI, with concerns over security, as well as, increased operating costs despite government policies to support FDI as a key driver for economic growth in the country.

3.3.3. External Risk to Investment

Risk in any form plays a significant part in most investors' decision-making process. To protect assets from volatile conditions – whether political, economic, or financial – investors generally prefer to locate in countries with a history of economic freedom, stability, and a sound policy environment. There are

[5] FDI in current US$ millions. Source. World Bank
[6] Imports and exports in US$ millions. Source. UN Comtrade

Table 7-4. Human Freedom Index Ranking 2017 (159 Countries)

Countries	Foreign Direct Investment[7]	Exports[8]	Imports
Jamaica	59	72	54
Colombia	93	84	112
Costa Rica	38	40	35
Dominican Republic	70	89	63
Panama	48	55	30

Table 7-5. Index of Economic Freedom Ranking 2017 (186 Countries)[9]

Country	Economic Freedom Ranking	Economic Freedom Index
Jamaica	Moderately Free	69.5
Colombia	Moderately Free	69.7
Costa Rica	Moderately Free	65.0
Dominican Republic	Moderately Free	62.9
Panama	Moderately Free	66.3

numerous methods to quantify risk levels for comparative purposes. For the purposes of this benchmarking exercise, IDG used the preferred indexes: i) the Cato Institute's Human Freedom Index, ii) the Heritage Foundations' Economic Index and iii) the World Economic Forum's Global Competitiveness Index. (Tables 7-4 through 7-6)

The Cato Institute's Human Freedom Index is 'a social concept that evaluates personal, civil, and economic freedoms' using 79 distinct indicators' and it measures 159 countries around the world. On review, Costa Rica and Panama rank in the top third of this index, and both countries have improved their ranking since the previous reporting period - 2016. Both Costa Rica and Panama also have above average indicators, indicating a generally good level of independence, impartiality, and reliability of their judicial regime and their police within the countries. Colombia is at the opposite end of the spectrum of these competitors, with judicial and civil enforcement problems and high levels of corruption. Both the Dominican Republic and Jamaica are somewhat on par, with Jamaica benefitting from a more independent judicial system though lagging in other indicators. According to the ranking however, both countries still suffer from significant levels of corruption, poor enforcement, and a non-negligible business costs, mostly attributed to crime. It should be noted that Jamaica fell two places in the ranking since 2016.

The Heritage Foundation's Index for Economic Freedom 'tracks 12 freedoms – from property rights to financial freedoms – in 186 countries around the world.' Scores in the 60s denote 'moderately free' countries, which is where all benchmarked competitors are ranked. After a review of the specific indicators, Colombia and Jamaica both allow notably more economic freedoms within their countries than the other three competitors, hence their elevated rankings. Jamaica, along with the Dominican Republic and Panama have improved their rankings over the past few years, while both Colombia and Costa Rica have dropped. For Jamaica, the Heritage Foundation[10] notes that the country suffers from 'bureaucracy hinders, which effects the ability of investors and entrepreneurs to do business in

[7] FDI in current US$ millions. Source. World Bank
[8] Imports and exports in US$ millions. Source. UN COMTRADE
[9] The Heritage Foundation's Economic Index Ranking 2017
[10] http://www.heritage.org/index/country/jamaica

Table 7-6. Global Competitive Index Ranking 2017[11] (137 Countries)

Country	Overall Ranking	Basic Requirements	Efficiency Enhancers	Innovation and Sophistication Factors
Jamaica	70	76	68	54
Colombia	66	90	54	64
Costa Rica	47	53	48	42
Dominican Republic	104	98	93	105
Panama	50	37	57	48

Box 7-2. Competitive Economies

The **World Economic Forum Report** shows that competitiveness – understood as higher productivity – is a key driver of growth and resilience. The historic proportions of the economic crisis and the relative performance of economies since its onset in 2008 have shed light on how structural weaknesses can exacerbate the effects of, and hinder recovery from shocks.

During the crisis, the more competitive economies systematically outperformed the least competitive in terms of economic growth: they either withstood the crisis better or recovered more quickly. This result holds true at every stage of development.

Source: World Economic Forum

the country'. In addition, it sights, 'government corruption and crime' as a serious problem, unfortunately undercutting the confidence and competitiveness of both businesses and investors.'

The Global Competitiveness Index (GCI) prepared by the World Economic Forum examines '12 pillars of competitiveness' (institutions, infrastructure, macroeconomic environment, health, education and training, efficient market access, labor, financial market development, technological readiness, market size, business sophistication, and innovation), weighs each factor, and ranks 137 economies accordingly.

According to the GCI rankings, Jamaica remains around the mid-point within the ranked economies. In 2017, Panama, Costa Rica and Colombia fared better than Jamaica in the Index rankings, and the Dominican Republic remains significantly behind all benchmarked countries. As illustrated in Table 7-6, Jamaica's poor performance derives from low scores in: i) market size, ii) innovation, iii) macroeconomic environment, iv) technological readiness, and v) infrastructure, though some of these issues will be addressed in the near term through the implementation of the LHI and the CSEZ. However, the most problematic factors identified by this Index are: i) crime and theft, ii) inefficient government bureaucracy, iii) tax rates, iv) corruption, and v) poor work ethics, which must be addressed to optimize the CSEZ's success.

[11] The World Economic Forum's Global Competitive Index Ranking 2017

3.3.4 Ease of Doing Business

Although Jamaica has recently improved its legal, regulatory and institutional environment with the introduction of the new SEZ regime, the country still has a significant-ways to go to further improve its overall business environment, in order to be competitive against the benchmarked countries.

The ease of doing business is traditionally benchmarked against the World Bank's Doing Business (DB) Index, which ranks 190 countries around the world. DB examines regulatory environments towards starting and operating a local business. While Jamaica's ranking is 70, Colombia and Costa Rica have better rankings coming in at 59 and 61 respectively. The Dominican Republic and Panama however, rank lower than Jamaica at 99 and 79 respectively. (Table 7-7)

Table 7-7. Doing Business Ranking 2018 (190 Countries)

Country	DB 2018 Ranking	Starting A Business	Construction Permits	Getting Electricity	Registering Property	Getting Credit	Protecting Minority Investors	Paying Taxes	Cross-Border Trade	Enforcing Contracts	Resolving Insolvency
Jamaica	70	5	98	91	128	20	81	122	130	127	35
Colombia	59	96	81	81	60	2	16	142	125	177	33
Costa Rica	61	127	70	21	49	12	119	60	73	129	131
Dominican Republic	99	116	62	108	79	105	96	149	59	136	121
Panama	79	39	88	18	83	29	96	180	54	148	107

When examining the individual indicators, Jamaica ranks best on starting a business than all its competitors, which will be advantageous for the CSEZ. The country's other strong indicators are enforcing contracts, resolving insolvency, and protecting minority investors, which are all very important indicators for promoting investment in Jamaica and within the CSEZ. Jamaica however has significant amounts of reform work to be done to improve its cross-border trade index, which will be key to improving trade for Jamaica and promoting the CSEZ. At present, it costs a third more to import goods than the regional average, and two-thirds more to export, which is an evident concern for an export-based development like the CSEZ.

Although Jamaica lags behind its benchmarked competitors for obtaining construction permits, electricity, and registering property, these indicators should not be an issue within the CSEZ, since these activities will be handed as part of the SEZ investor approval process through the CSEZ's One Stop Shop (OSS).

3.4 Operating Conditions and Costs

All benchmarked countries have enacted a more modern SEZ/FZ regime prior to Jamaica[12], which has allowed them to streamline their operating conditions and costs for a longer time period. This puts Jamaica at somewhat of a disadvantage verses competing countries who have had SEZs/FZs for years and which are providing serviced land, pre-built, standard warehouse/factories, as well as, supporting infrastructure and utilities and harmonized logistics. To better understand each country's operating conditions and costs, IDG prepared Table 7-8:

Table 7-8. Snapshot of Operating Costs Per Benchmarked Locations

Benchmarking Factors	Caymanas SEZ Jamaica	Barranquilla Free Zone Colombia	Quantum Economic Zone Costa Rica	Las Americas Free Zone Dominican Republic	Panama Pacifico Panama
Land					
Size (Ha)	236	100	>100	100	106
Number of Lots	156+	85	50	80	76
Land Type	Lease	Lease/Sell	Lease/Sell	Lease/Sell	Lease/Sell
Pre-Built Factories	Yes	Yes	Yes	Yes	Yes
Infrastructure/Utilities					
Power-Plant (MW)	Dedicated Power Line from National Grid/ LNG Power Plant	Dedicated Power Line from National Grid	Dedicated Power Line from National Grid	On Site Power 44 mw Sub-Station	Dedicated Power Line from National Grid
Electricity Charges (Per/kWh)	To Be Determined	0.10	0.12	0.20	0.17
Water Charges (Per/m^3)	To Be Determined	0.68	0.46	0.21	0.26
Wastewater Treatment Plant	Connected to Municipal Plant (Pre-Treatment Required)	Connected to Municipal Plant	On Site Facilities (Pre-Treatment Required)	Connected to Municipal Plant	On Site Facilities (Pre-Treatment Required)

[12] Jamaica enacted their SEZ regime in 2016.

Solid-Waste Removal Outsourced	Yes	Yes	Yes	Yes	Yes
Natural Gas (Per/M^3)	LNG	0.22	No Gas	No Gas	No Gas
Phone Lines Service	Fiber Optics Underground Network	Fiber Optics Underground Network	Fiber Optic Underground Network	Fiber Optic Underground Network	Fiber Optic Underground Network
Available Bandwidth (Kbps per capita)	Unlimited	16.8	36.2	11.2	Unlimited
Connectivity (Km)					
Distance to Nearest Port	10	0 (Port of Barranquilla)	5 (To Moin)	9 (To Caucedo)	5 (To PSA)
-- to Nearest Largest City	3 Kingston's Boundary	3 Barranquilla	4 Limon	19 Santo Domingo	0 Panama Pacifico
-- to International Airport	33 (To Kingston's Manley Airport)	6 (To Barranquilla)	108 (To San José)	3 (To Santo Domingo)	5 (To Panama Pacifico)
Taxes and Incentives					
Corporate Tax Rate (%)	Exempt	20	Exempt	Exempt	Exempt
VAT (%)	Exempt	Exempt	Exempt	Exempt	Exempt
One Stop Shop	Yes	Yes	Yes	Yes	Yes
Tax Holiday (Years)	Perpetuity for Developer	Perpetuity	12 Renewable in 12-year Periods	Perpetuity	Perpetuity
Other Fiscal Incentives	Exempt from income tax on profits and others, duties for import duties on raw/construction/ materials and as per trade agreements	Exempt import duties on raw materials and trade agreements	Exempt on import duties on raw materials, stamp duties, withholding tax on royalties and fees, export duties and remittances, sales tax on local purchases	Local suppliers to FZ companies are exempt from import duties on raw materials, local tax exemptions, option to sell the exported production to the local market, repatriation of	OSS, exempt import duties on raw materials and trade agreements

			of goods and services. Tax 10% fiscal credit for new processing companies that reinvest earnings or to cover training of SME suppliers. Local suppliers can benefit from FZ advantages if 40% sales to FZ and trade agreements	100% of products, trade agreements	
Specific Requirements		Specific investment and direct job creation commitments, depending on total assets, during the first 3 years	None but favor technology transfer and local linkages and employment	80% local labor, excepting management and admin staff	85% local labor
Industry/Sectors Information					
Zone Type	Light and Medium Industries	Light and Medium Industries	Light and Medium Industries	Light and Medium Industries	Mixed Use Light and Medium Industries
Key Sectors	Light Manufacturing, Logistics, BPO/ICT, Creative, Furniture, Paper,	Light Manufacturing, Agro-business, Garment and Apparels, Pharmaceuticals,	Light Manufacturing, and Advanced Manufacturing/ Industrial	Medical Devices, Electronics, ICT and BPO, Textiles, Footwear, Agro-	Transport and Logistics, Specialized Light Manufacturing, High Tech,

	Repairs, Metal Fabrication, Textiles, Food and Beverage, Pharmaceuticals, Plastics and Others	Logistics, Plastics and Services		Processing, and Transport/ Logistics	BPO, and Services
Labor Wages (US$/Month)					
Management	2,500	2,030	1,135	3,050	2,020
Skilled	1,241	1,100	600	940	1120
Unskilled	215	246	528	310	480
Quality of Life					
International Housing	Kingston	Cartagena	Limon	Santo Domingo	Panama Pacifico
International Schools	Kingston	Cartagena	San Jose	Santo Domingo	Panama Pacifico
International Hospitals	Kingston/USA	Cartagena	San Jose	Santo Domingo	Panama City
Entertainment Facilities	Kingston	Medium	Medium	Medium	High
Security	High Level	High Level	High Level	High Level	High Level

Table 7-9. Cost of Land and Standard Factory Buildings in Benchmarked Locations

Countries	Land (US$/M2/Yr)	Standard Factory Building	Office Space
Jamaica	9	68	270
Colombia	300	76	180-350
Costa Rica	N/A	80	200-400
Dominican Republic	N/A	64	240
Panama	200	55	150

3.5 Examination of Key Operating Factors

3.5.1 Land

For ease of review, Table 7-9 compares the selected SEZ/FZ locations within each benchmarked country and compares the average prices of land and standard factory buildings against Jamaica. The table shows that land is relatively cheap in Jamaica, compared to its competitors, however, serviced industrial land is in limited supply in the country. It should be noted that some SEZ/FZ's in benchmarked countries choose not to offer land for sale, but rather prefer to enter into long leases (40-50 years) with investors. Jamaica is competitive on standard factory building equivalents, though their inventory is older and somewhat outdated compared to modern factory shells utilizing LEED technology and automated ICT systems. Jamaica's office space however, is relatively more-costly than its competitors.

Table 7-10. Cost of Utilities in Benchmarked Locations[13]

Countries	Power (US$/kWh)	Water (US$/M^3)
Jamaica	0.18	0.37
Colombia	0.10	0.68
Costa Rica	0.12	0.46
Dominican Republic	0.20	0.21
Panama	0.17	0.48

3.5.2 Utilities

When IDG surveyed investors, the cost of power was almost unanimously given as the number one barriers to investment in Jamaica. While issues were raised with the quality of service – black-outs, brown-outs, long hook-up lags, etc. – the primary power concern was the price of electricity in Jamaica versus regional competitors. Table 7-10 lists the price of power and water for industrial uses in the selected benchmarked locations.

While power in Jamaica is expensive and is often not stable, it is not dramatically different than the cost of electricity in Panama or the Dominican Republic. Jamaica's power however, is significantly more expensive that Colombia or Costa Rica, but this is because Jamaica is an island and without oil reserves. Hence, the proposal to develop LNG or alternative clean power sources (solar/wind) in Jamaica is an encouraging and exciting prospect, which if enacted, will most definitely reduce the cost of power significantly in the country. And if incorporated into the CSEZ, will reduce power costs for investors, support the CSEZ's environmental commitment and allow the CSEZ to market the zone with extremely competitive utility costs.

In contrast to power, water costs in Jamaica are lower than in other benchmarked locations, with the exception of the Dominican Republic, where water is underpriced. It should be noted that although water is priced at a competitive rate in Jamaica, access to water is not always available for large-scale projects like the CSEZ. As such, it will be imperative for the CSEZ to obtain guaranteed access to a dedicated water network to ensure the project has long-term sustainability.

[13] Source. Published rates for each country.

Table 7-11. The Evolution of Jamaica's Population and Workforce

Factors	2013	2014	2015	2016	2017
Total Population	2,714,669	2,717,991	2,723,246	2,728,900	2,734,600
Population 14 and Over	2,104,170	2,116,648	2,122,740	2,088,200	2,092,600
Labor Force	1,284,462	1,307,986	1,320,163	1,342,000	1,358,300
Employed Males	628,400	643,800	643,400	651,400	663,200
Employed Females	471,100	486,300	489,300	512,400	522,500
Unemployment Rate	14.4%	13.6%	14.2%	13.3%	12.7%

Source. STATIN

Table 7-12. Monthly Salaries for Benchmarked Countries

Countries[14]	Unskilled US$	Skilled US$	Technical US$	Managers US$	Average US$	Call Centres US$
Jamaica	215*[15]	1,241	1,667	2,500	504	640
Colombia	246*	1,100	1,567	2,032	341	728
Costa Rica	528*	597*	771*	1,134*	862	851
Dominican Republic	310*	943	1,795	3,047	358	601
Panama	416*	1,116	618	2,016	490	-

3.5.3 Cost and Availability of Labor

Jamaicans enjoy a reputation for 'creativity and good levels of general education'. Over the years, concerns have been voiced over workforce quality - limited skillsets and a poor work ethic. Some observers worry that traditional skills in construction, furniture-making, and garments may be eroding, because increasingly Jamaica imports labor in these areas. There is agreement, however, that Jamaica has good educational and vocational institutions to respond to technical and industry needs.

Table 7-11 sets out the evolution of Jamaican labor and population between 2013 and 2017. showing that population has experienced steady growth over the past three years at about 0.2%, while the labor force has fluctuated since 2013. The proportion of employed males remains stable around 49% though females have much increased their numbers in the total workforce. Finally, the unemployment rate has fallen since 2013, except for a small uptake in 2015. In 2017, the labor force made up almost half of the total population in the country with 65% of the over 14-year-olds, endowing Jamaica with a large pool of workers.

Table 7-12 compares monthly salaries by labor force types between Jamaica and the selected benchmark locations. From the table, it is clear to see that Jamaica's labor is not the most expensive across the spectrum and the country has the lowest minimum wage (US$215) amongst its competitors, but wages are high comparatively. Investor interviews revealed to IDG that Jamaican wages are considered high by foreign investors, who attribute this to the island's high consumer prices. Investors further argued that while labor is trainable technically, there are issue with work attitude and problems trying to find highly expert/experienced workers.

[14] Based on legal minimum wage. Source. Ministries of Labor in each country.
[15] Data from the report 'SEZs in Panama: Technology spillovers from a labor perspective,' Center for International Development at Harvard University, May 2017

3.5.4 Investment Incentives

Table 7-8 above lists core investment incentives in benchmarked locations, which helps compare and contrast similar fiscal and non-fiscal features offered by locations. But this does not reveal discretionary or non-transparent incentives that locations use to attract investors. That said, for the past 10 years the WB has been surveying investors and statistics point to the same conclusions, fiscal incentives are not 'critical decision-making factors' for investors. What is important to them is an accountable and fast-tracked investment environment, where they can do business and an efficient and effective manner to reduce their costs.

3.5.5. Financial Incentives

The benchmark locations offer similar financial incentives to attract direct investment, including exemptions from corporate taxes in Costa Rica, Dominican Republic and Panama, but a reduced tax rate of 20% in Colombia and 12.5% in Jamaica. Although Costa Rica proposes renewable tax holidays, the other locations apply the exemptions or reduced rates in perpetuity. Other tax incentives include VAT exemptions and reduced duties on production equipment. Perhaps a more significant incentive is the availability of a one-stop shop within the zones, which provides a streamlined means to set-up and operate in an SEZ/FZ, in particular with regards to obtaining work permits and customs clearances.

3.5.6. Non-Financial Incentives

All the benchmarked countries offer non-financial incentives of some sort to their investors. For all the benchmarked locations, they are either strategically located near or in close proximity to an airport or seaport and are served by better infrastructure than other locations elsewhere in their host country. The zone operators or the government provide some type of subsidized training costs to foreign investors who choose to locate in their zones, be it free or low rental rates for the use of the training facilities within their zones. In some of the benchmark zones considered here, restrictions on local labor requirements or working days/hours are less stringent than in the domestic economy. Other common non-financial incentives include waiving foreign exchange restrictions (none of the benchmark countries impose these) or limits foreign ownership of land though land is not available for purchase in the zones listed.

3.5.7 Implications for the Demand Forecast

The comparative benchmarking analysis provides the following information for the demand forecast:

- **Power** is a significant hurdle for production, in both cost and reliability. Jamaica has a clear disadvantage verses its competitors with regards to energy – the CSEZ might significantly alleviate this by providing reliable, cost-effective service.

- **Small domestic market** and as-yet limited connectivity restrict the potential for high-volume production. Industries likely to locate in the CSEZ, at least in early phases, will serve niches.

- **Labor** may be one of the country's strength, though not on cost, which is comparable to or slightly higher than regional competitors. Jamaica does benefit from good basic literacy, as well as, a workforce that is trainable and creative.

- **Serviced land and premises** are an attractive feature of the CSEZ, given both are unavailable on the island currently. Strong utilities and services will do much to ensure occupancy.

- **Non-fiscal incentives** will play a very significant role in the zone's success. Investors list red tape and lack of government commitment as key barriers to doing business, behind energy cost. A commitment to serve investors/tenants in the CSEZ in a business- friendly manner, will be paramount.

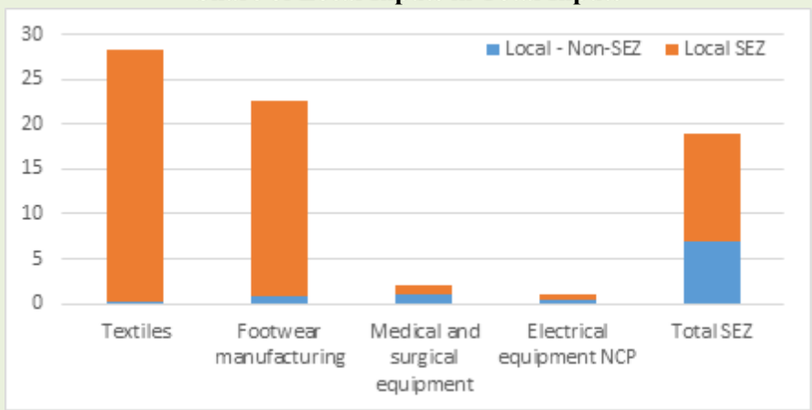
Box 7-3 on the following page, highlights how SEZs can build linkages with the domestic economy and the potential to reap benefits beyond employment.

Box 7-3. Backward Linkages Based on the Economic Census of Companies in SEZs

In 2014, the Central Bank published the results of a census of companies operating under SEZs. The main objective was to depict the landscape of the characteristics of the firms operating within the special tax regimen. One of the issues that was covered was the extent of backward linkages, measured mainly by the source of inputs. The results indicate that the **headquarters or affiliated companies outside the Dominican Republic supply 81% of the raw materials** used by firms located in SEZs. The remainder of domestic input is divided between 7 percent of inputs purchased from Dominican companies outside SEZs and 12 percent inside SEZs. The census also found significant variation between the sourcing patterns of traditional zone industries like textiles, clothing and footwear (which source 28 percent and 22 percent of their inputs domestically, respectively) and newest industries like medical and surgical equipment and electrical equipment (which source less than three percent of their inputs domestically).

Few manufacturing linkages have been created between firms inside the zones resulting in very few forward linkages that could benefit the domestic economy. The majority of firms that sell a large percentage of their output inside zones are not other manufacturing firms but ancillary services companies in sectors like construction, civil engineering, manufacturers of plastic, paper and wood containers, and cleaning companies – all of which report at least 85 percent of their sales to other firms within zones.

Share of Local Inputs in Total Inputs



Source: Banco Central dela República Dominica (2014)

The small size of backward linkages is also compounded by the fact that most SEZs companies also import the majority of their machinery (87 percent). Footwear manufacturing imports 94 percent of its machinery, finishing of textile products imports 90 percent, while manufacture of pharmaceuticals, medicinal chemicals and botanical products sector imports 75 percent of its machinery.

Source: Special Economic Zones in the Dominican Republic: Policy Considerations for a More Competitive and Inclusive Sector, World Bank, Nov 2016

3.6 Barriers to Doing Business

Although not fully objective, the actual experiences and opinions of existing businesses can be insightful to help better understand some of the key difficulties of operating within in a given economy. For the Market Analysis, IDG interviewed a series of companies (foreign and domestic) in key industry sectors[16] to determine what, in their view, were the top five barriers to investment in Jamaica. The following are the key barriers, in their order of importance, as provided by investors:

3.6.2 Power Cost and Availability

The cost of power was almost unilaterally sited as the most critical barrier to investment in Jamaica. It is seen by companies as 'the' issue in the country, which most limits industry, holds back competitiveness, and restricts diversification into more energy-intensive sectors and sub-sectors. Access to power is also a problem in Jamaica, as it is difficult to get clean, stable, reliable power, requiring most companies to depend heavily on backup generators[17] to manage black-outs and brown-outs. Power surges were also mentioned as a concern for businesses, as these surges damage machinery and wreck-havoc on computerized/automated systems.

3.6.3 Bureaucracy

Companies identified 'bureaucratic red tape' as being the second most significant barrier to investment in Jamaica. Although starting a business has been streamlined, the actual process of acquiring land, obtaining permits, and starting operations was denoted as 'a nightmare'. Domestic companies cited procedural changes to the Free Zone /Special Economic Zone regime were 'messy', and all exporting companies agreed that a reform of Customs was required in order to improve efficiency and introduce more transparent processes, procedures and fee structures into the system.

[16] IDG held one-on-one interviews with management of each company and used a formal investor survey as the basis for questioning.
[17] Back-up generation is expensive in Jamaica as fuel rates are also extremely high.

In IDG's interviews, Customs documentation requirements for exports were flagged as extremely problematic and time-consuming, with 8-10 documents needed for Jamaican exporters versus three documents in the Dominican Republic or Trinidad. Companies said that in Jamaica there are unnecessary documents and fees, which puts the country at a disadvantage against its regional competitors. Lastly, companies all cited a lack of coordination between regulating agencies as being a significant problem in Jamaica, leading to unnecessary delays and duplication of documents and efforts.

3.6.4 Lack of Government Support

In addition to 'red tape', companies strongly believe that the government agencies in Jamaica work in 'silos', do not share information, and do not develop comprehensive, overarching plans, strategies or policies for the betterment of the country. Companies highlighted problems such as poor leadership, unwilling decision-making, governance issues and a reluctance to "implement". In fact, the development of the CSEZ was quoted as a good example, where discussions have been on-going for a long period of time with no actual visible progress made for implementing the CSEZ. Another concern from businesses is the 'tax rates' in Jamaica, which changes yearly and limits company's ability to plan long-term, whereas Panama guarantees investors' taxes at the licensing of a business.

3.6.5 Poor Work Ethic

Companies identified 'work ethic issues' as being a concern for industry and a barrier to investment. In Jamaica, where there is absenteeism, it is usually a direct consequence of crime, which can impose curfews on workers and stop them from coming to work or getting back home. Companies also reported an increase in the past five years of incidents of theft – not always petty – and a decline in work standards (timeliness, appearance, attitude, and focus). Some companies identified that workers have become less dedicated to their jobs and companies and feel more entitled to higher wages without increased productivity. In Jamaica, there is also a lack of skilled worker for middle management positions and as such, companies are missing layers of management, making it difficult to delegate, grow or diversify their companies.

3.6.6 Lack of Industrial Land and Factory/Warehouse/Office Space

Jamaica's population is concentrated in two or three main areas of the country. The Kingston/St Andrews/St Catherine locale accounts for almost half of the island's population. As a result, this is where much of the economic activity in the country occurs and where industrial land and premises are scarce. Historically, businesses in Jamaica have grown organically on lands privately-owned and often originally designated for residential land uses. As Greater Kingston further expands and develops, there is need for serviced industrial lands and high quality, modern office space, factories and warehouses with security, which will allow companies to start or expand their businesses in a more dynamic manner. The proliferation of individual special economic zones is a strong indication of this need.

3.6.7 Implications for the Demand Forecast

Encouragingly, the barriers identified above stand to be addressed by the implementation of the CSEZ:

- **Barrier 1. Power.** The CSEZ has the opportunity to provide cheaper, reliable power to tenants, thus removing an important barrier to investment, production and limits to the diversification of activities.

- **Barrier 2. Bureaucracy.** The zone should be seen as a 'pilot project', which will help streamline red tape and develop a constructive interface between regulatory agencies and businesses. It is also an important opportunity to start fresh and work together to ensure both government and the private sectors needs are met.

- **Barrier 3. Government Support.** The GoJ can use the CSEZ project as a show-piece on how it can work with the private sector and build a 'game-changing project for the country'.

- **Barrier 4. Human Resources.** There are a number of zones around the world that provide public and/or private sector training programs, targeted at improving labor work ethic issues and productivity.

- **Barrier 5. Land and Suitable Space.** Pent up demand for land and space opens up opportunities for the CSEZ and can support private sector's expansion or upgrading needs.

3.7 Jamaica as an Investment Location

Although Jamaica is a popular island in the Caribbean, it is more often seen as a 'holiday' destination rather than an 'investment' location. The international image of Jamaica is that of beaches and reggae, more than a country of educated entrepreneurs and skilled craftsmen, which it is. The majority of business ventures are domestically owned and operated and service the local and/or immediate Caribbean market. In order to attract FDI on a significant scale, which will help boost the economy with new capital, ideas, and markets, Jamaica will need a large-scale, vibrant project like the CSEZ to be implemented. The following highlights some of the issues to be addressed in Jamaica and within the CSEZ to improve the country as an investment destination, as determined by the private sector (foreign and domestic) during IDG's interviews.

3.7.1 Security Concerns

Jamaican investors are very aware of the security concerns in the country. Beyond the personal safety dimension, security carries a real and high cost in Jamaica. It is almost always listed as the second cost indicator in the WB Doing Business Index, after electricity. Security concerns mean businesses spend capital on security installation, staff, and secured transport, as well as, businesses loose labor hours when communities are taken hostage by curfews. It has been estimated that crime makes up 4-6% GDP a year, and a GDP loss of 8-9%.[18]

The perception of insecurity is a powerful deterrent to investors. The proliferation of armed guards and buzzer-released access doors sends a very negative image. But perception is not the only problem. Jamaica's ranking in the 2016 Transparency International Corruption Perception Index fell from 69 to 83 out of the 175 countries surveyed. Measured security is actually getting worse in Jamaica and is recorded in the public domain as doing so.

3.7.2 Quality of Life

Jamaica suffers from an unequal wealth distribution - the top 20% of the population owns 50-55% of the country's wealth, while a growing number of Jamaican's live in difficult economic conditions. For the majority of Jamaican's, housing and utilities, health and education are basic, while the affluent live within guarded enclaves in large, modern

[18] Private Sector Organization of Jamaica

houses and send their children abroad to study. In terms of quality of life for potential investors or managers who will be relocating with their families, Jamaica may lack some common urban amenities such as international housing, and hospitals, high-end shopping and entertainment facilities, an extensive range of mid-high end, international restaurants, and secure neighborhood parks but all this is available in the USA, which is a short flight from Kingston. Jamaica does however offer a wide range of outdoor activities, beaches, wellness retreats and some incredibly innovative local cuisines, which should be showcased.

3.7.3 Human Resources Quality

The private sector expressed concerns over the quality of Jamaica's workforce. Although the population speaks English, and there is a good basic literacy rate in the country, companies find it difficult to obtain qualified labor and to retain them once trained. In addition, it is said that well educated Jamaican's often leave the country for better jobs and opportunities rather than stay and work in Jamaica.

3.7.4 Failed Initiatives

There is a fair amount of skepticism in the business community with regards to government's large-scale economic reforms or infrastructure plans. In general, businesses would prefer the government minimize its involvement in economic activities and be more receptive to private sector proposals. In particular, existing investors recommend agencies consult with them before changing rules under which they operate, or how they plan to develop an activity or area. Interviews also shed light on a number of private initiatives to address some of the community and labor issues in the country.

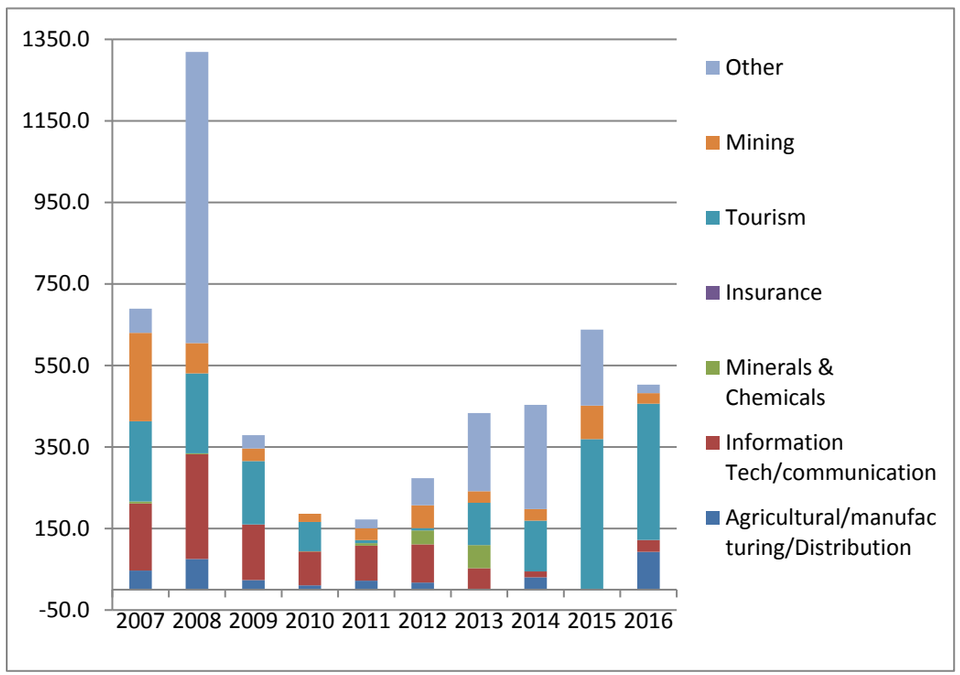
3.7.5 Implications for the Demand Forecast

The obstacles to invest in Jamaica – whether perceived or real – have implications for the CSEZ's demand. It appears likely that some domestic investors will welcome the availability of secured space with high-quality infrastructure. This may spur both expanded business and new ventures, for export and the domestic markets. However, the challenge to sell Jamaica as 'an investment location' in the short term remains real, and if not addressed, will negatively affect demand. Hence, the CSEZ will be more successful if the GoJ commits to the following:

- **Provide something unique to Jamaica.** The CSEZ must be a bold and innovative project. It is an opportunity to provide high-quality, industrial, serviced land with state-of-the-art infrastructure and utilities and modern, secure operating space that is leased at a competitive rate to Jamaica. The CSEZ should provide investors with a OSS and after-care services to help the private sector conduct business in Jamaica and beyond and cut through any red tape. The zone should also link with customs and the port providing streamlined logistics.

- **Defy expectations.** There is much skepticism over the GoJ's commitment to the CSEZ project. The CSEZ project needs the unwavering, full support of the government and key politicians as champions. There must be a commitment by government to provide the land, infrastructure, utilities, and streamlined processes, which are required to make the project successful. The GoJ must not only promise this but must keep their commitment.

- **Push public relations.** The CSEZ will need a strong and innovative marketing and promotional campaign. Abroad, it will be about rebranding Jamaica away from its 'all-inclusive tourism destination' image. The CSEZ should be billed as 'the" place to be for business in the Caribbean and the Americas', showing strong commitment by government to provide security, infrastructure and facilitation. Within Jamaica, the CSEZ should be branded as 'the place to build a vibrant business community for everyone'.



Source: JAMPRO

Figure 7-1 - Annual Foreign Direct Investment by Sector (US$ million)
(2008 "other" includes majority shareholding acquisition in conglomerate)

4.0 Investment Trends

An examination of investment over the past decade can provide information about levels of investment and industry sectors developed in Jamaica. This in turn will help inform the demand forecast and future promotion campaigns for the CSEZ.

4.1 Foreign Direct Investment by Sector

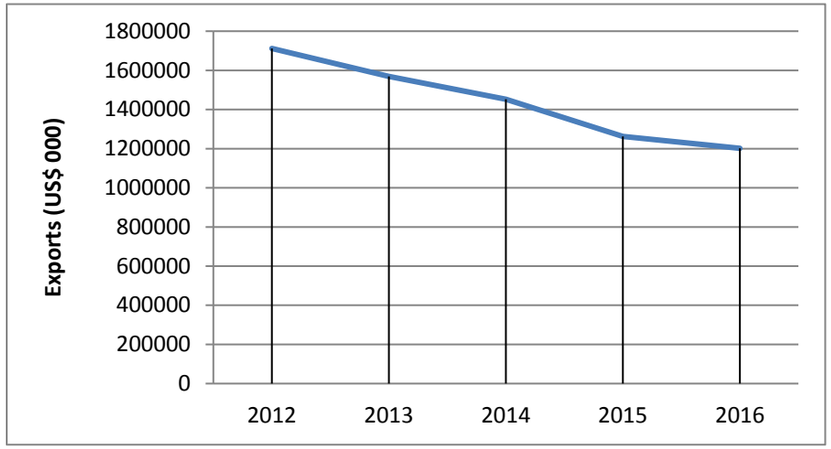
Figure 7-1 presents FDI by sector from 2007 to 2016. Like the rest of the world, Jamaica was affected by the global 2008 downturn but recovered to have investment grow on a year-to-year basis from 2011 to 2015. It is interesting to note that while tourism is significant in recent years, FDI has been diversified over the past decade.

In 2016, FDI decreased in the Caribbean. Inflows into Jamaica fell by 7%, as the value of greenfield investments (tourism and infrastructure) declined.[19] Yet, Jamaica was the largest recipient of FDI in the region during this period.

4.2 Implications for the Demand Forecast

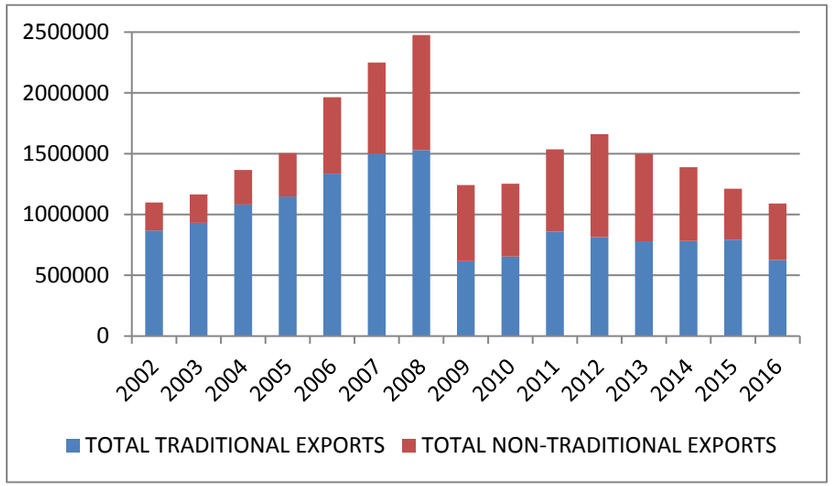
Tourism, construction and financial services are the engines of Jamaica. Because of security issues, power costs and poor connectivity to larger markets, an influx of FDI may be limited in the short-medium term. The CSEZ will give Jamaica the opportunity to grow their manufacturing and export sectors, but this may take time to be realized. Based on past investment trends, potential industry sectors for the CSEZ would include: i) food and beverages, ii) furniture, iii) metal work, and iv) light assembly.

[19] World Investment Report 2017, UNCTAD



Source: COMTRADE

Figure 7-2 - Annual Exports (US$ million)



Source: COMTRADE

Figure 7-3 - Evolution of Non-Traditional vs. Traditional Exports (US$ million)

5.0 Trade Trends

Analyzing trade patterns will reveal the products Jamaica exports and their target markets, as well as, the raw materials needed to support such exports. The examination of these trade patterns will help identify the types of activities that might thrive in the CSEZ.

5.1 Exports

Since 2012, Jamaica has experienced a downturn in exports. Figure 7-2 further reveals that Jamaica lost half its exports from 2008 to 2009, in large part due to the hit on its traditional exports and has not come close to pre-2008 levels again.

5.2 Exported Commodities

Figure 7-3 charts Jamaica's exports from 2002 to 2016, distinguishing between its traditional and non-traditional exports. In the first half of the period, the former was the backbone of the country's trade, though non-traditional exports grew annually, both absolutely and relative to traditional exports. While traditional exports more than halved in the second period, non-traditional exports maintained a better performance until recent years.

Table 7-13 below shows the stability of Jamaica's top exports over the past five years. Inorganic chemicals, organic or inorganic compounds of precious metals, etc. occupies the top spot every year with Mineral fuels a consistent second. Beverages, spirits and vinegar and Ores, slag and ash alternate take third and fourth place. Sugars and confectionery cede fifth place to Coffee only in 2016. This steady pattern of exports demonstrates the country's continued reliance in raw material exports. Hence, Jamaica having a relatively underdeveloped manufacturing sector.

Table 7-13. Evolution of Top Exports by Value (2012-2016)				
2012	2013	2014	2015	2016
28 - Inorganic Chemicals, Organic or Inorganic Compounds of Precious Metals, (of Rare-Earth Metals, of Radioactive Elements or of Isotopes)	28	28	28	28
27 - Mineral Fuels, Mineral Oils and Products of their Distillation, Bituminous Substances, Mineral Waxes	27	27	27	27
22 - Beverages, Spirits and Vinegar	22	26	26	26
26 - Ores, Slag and Ash	26	22	22	22
17 - Sugars and Sugar Confectioneries	17	17	17	17
09- Coffee, Tea, Maté and Spices	09	09	09	09

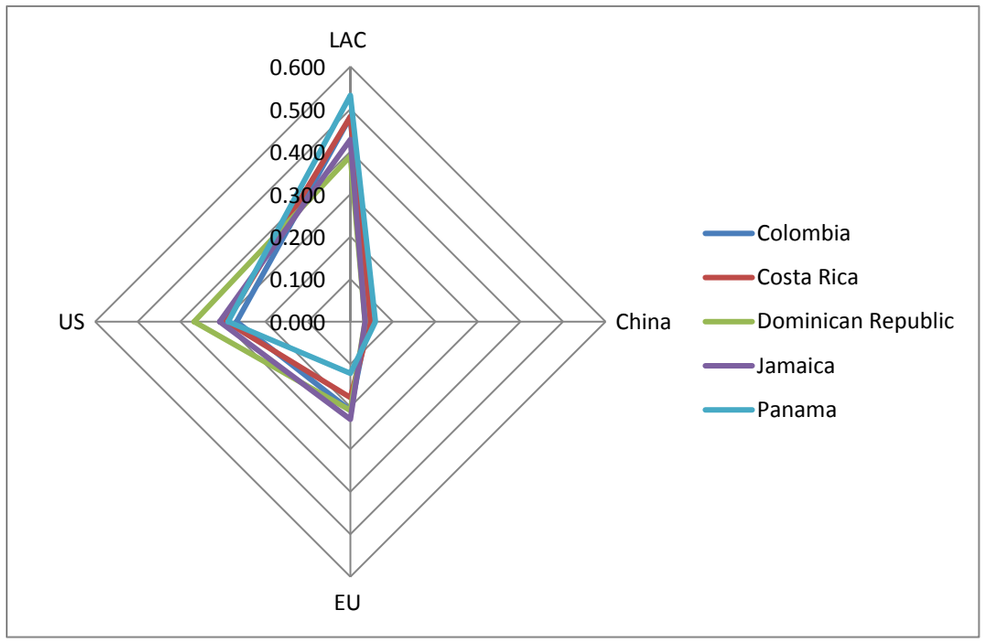
Source: COMTRADE

5.3 Trading Partners

Jamaica's top export markets are the USA, Canada, the United Kingdom (UK), Slovenia, Netherlands and the Russian Federation. Table 7-14 below outlines exports to these destinations between 2010 to 2016. It is color-coded to ease identification. Exports to these top five destinations represent two-thirds of Jamaica's total exports. The US and Canada are consistently Jamaica's top markets, with exports to the US falling but still more than double those to Canada. The UK and the Netherlands also feature as top markets, with still much smaller shares of export values. Finally, Slovenia and the Russian Federation make repeated appearances in the top five. According to COMTRADE data, exports to the Russian Federation were of HS Chapter 28 category (Inorganic chemicals, organic or inorganic compounds of precious metals, of rare-earth metals, of radioactive elements or of isotopes), to Slovenia exports were of also HS Chapter 28 (Artificial corundum, whether or not chemically defined, aluminum oxide, and aluminum hydroxide).

Table 7-14. Evolution of Top Export Markets by Value (US$. 2010-2016)						
2010	2011	2012	2013	2014	2015	2016
609,008,161	878,535,839	804,809,509	721,149,664	571,561,172	438,810,940	326,194
163,492,372	262,362,755	120,372,498	220,385,801	219,570,271	181,056,024	54,479
80,653,373	109,841,168	71,353,902	105,890,888	82,385,040	109,110,614	120,333
Norway 68,422,521	93,344,530	UAE 69,506,591	80,896,753	75,903,629	Iceland 99,002,320	Germany 113,115
66,352,457	51,406,404	68,992,006	62,662,628	74,177,098	87,766,034	85,775
USA	Canada	UK	Slovenia	Russian Federation		

Source. JAMPRO



Source. IDG based on ECLAC(UN) data

Figure 7-4 – Distribution of Export Markets of Benchmark Countries

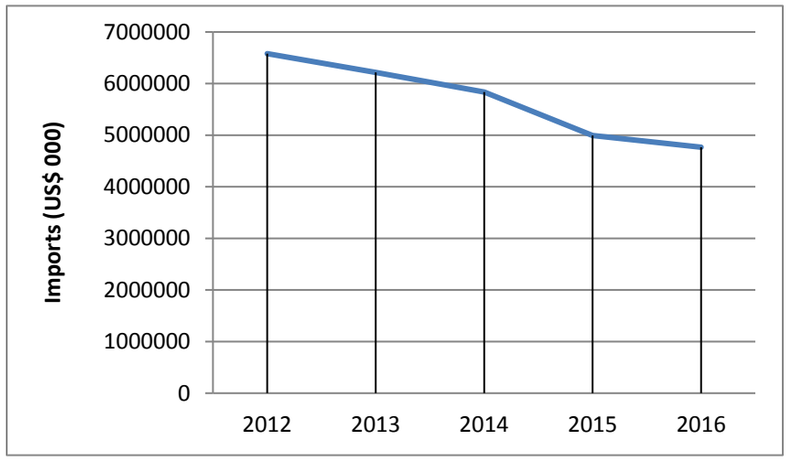
Figure 7-4 depicts the export market preferences of Jamaica and the benchmark countries. All export overwhelmingly are to Latin America and/or the Caribbean region. The US is the second market for all, though Jamaica observes more balance between the US and the European Union than the others. China remains a distant export target for all the countries benchmarked.

5.4 Imports

An analysis of Jamaica's imports can provide insights into the types of products the domestic market requires and local production demands, and perhaps opportunities for some import substitution. From a review of import data, everything Jamaica imports is consumed, including food and disposable products for Jamaica's strong tourism sector. Even though these products could be sourced in the country. Industry consumers state it is difficult to acquire consistent quality and quantities of products in Jamaica, so industry sectors must source from abroad to maintain their standards. Some of this outsourcing could be addressed through improved production on the island, but it should be noted that multinational outfits tend to integrate their supply chains, which can curtail domestic sourcing.

The Heritage Foundation states[20] that 'The average applied tariff rate is 7.3 percent. Jamaica is relatively open to foreign investment, but state-owned enterprises distort the economy… High financing costs continue to hamper private-sector growth'. Jamaican businesses agree that importing is relatively easy, though influence still plays an important role in quality of service, both at the port and from Customs. They also point to difficulties financing new ventures, in particular expansion, with risk-averse or inflexible lending.

[20] http://www.heritage.org/index/country/jamaica



Source: COMTRADE

Figure 7-5 – Annual Imports (US$ million)

Table 7-15. Evolution of Top Imports by Value (2012-2016)

2012	2013	2014	2015	2016
27 - Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes	27	27	27	27
22 - Beverages, spirits and vinegar	84	84	84	87
87 - Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	87	87	85	84
84 - Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	22	85	87	85
85 - Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such	85	10 - Cereals	39 - Plastics and Articles Thereof	39

Source. COMTRADE

5.5 Import Levels

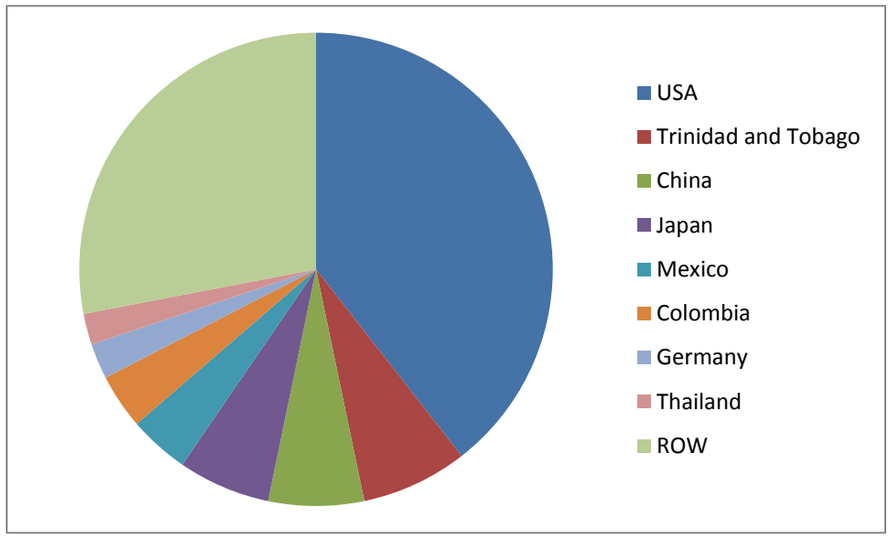
Figure 7-5 illustrates Jamaica's imports between 2012 to 2016, which like its exports, have been falling. Confirming Jamaica's status as a large importer of goods, its trade balance is negative, around the US$4 billion mark, but falling. It is worth noting that this shrinking trade deficit is due not to expanding exports but to a slow-down in imports, by 28% over the period.

Jamaica's negative trade balance stresses the need to boost the country's exports to put it on more even and sustainable footing. It also suggests a role for the CSEZ in increasing Jamaica's export production, as well import substitution. An important target for development of the zone may be remittances, which account for around US$2 billion a year and growing. These come primarily from the US (66%) with the UK (12%) and Canada (9%) trailing. The CSEZ might tap into these remittances to move to funding production rather than consumption, as at present.

5.6 Imported Goods

Table 7-15 reports the top five imports, by value, for 2012 to 2016. Again, these show a great deal of stability, with Petrol predictably the consistent leading import. Beverages and Spirits follow, in non-negligible part as inputs to Jamaica's own beverage production. Significant imports of Vehicles are also evidenced throughout the period, while Plastics make an appearance from 2015, reflecting new demand from both domestic and industry consumers.

Looking at Jamaica's top five imports does not yield immediate ideas for diversifying production, since the country is unlikely to find and exploit its own petrol or make cars in the near future. However, there is potential for more linkages in the food and beverages sectors, and for the development of vehicle parts, simple machinery, or light electricals production. Plastics might also be explored, bearing in mind environmental considerations. Finally, some existing investors are actively looking at semi-knocked-down vehicles and considering fully-knocked-down in the relatively near future, which would make a significant dent in imports – and might be an important opportunity for the CSEZ.



Source: COMTRADE
Figure 7-6 – Distribution of Import Source by Value (2016)

5.7 Trading Partners

Figure 7-6 depicts Jamaica's import sources for 2016. At almost a third of all imports, the US is the country's single largest source of imported commodities, as it was its top export market. Three regional neighbors appear in the top eight sources: i) Trinidad (7% of imports), ii) Mexico (4%), and iii) Colombia (4%). Asia and its supply of vehicles and consumer goods makes a strong show, with China, Japan, and Thailand the combined source of 15% of Jamaica's imports. Germany is the sole European source in the top eight, likely for its supply of cars and parts. The rest of the world accounts for the remaining 28%, with no single country making up more than 1.8% of Jamaica's import.

5.8 Trade Agreements

According to the Ministry of Industry, Investment and Commerce (MIIC)[21], 'SEZ operations in Jamaica would be mainly 'efficiency seeking' investments. (I.E. Investors who locate in a host country to access export markets, more so than the domestic market of the host). Hence, investors will require market access to the existing and future trade lanes, which will emerge in the medium-term." MIIC identifies these major lanes as Asia to Europe (9% of 2013 Global Trade) and to North America (8%), with North America to Europe taking up 5%. Jamaica has preferential access to Europe and North America, but these may be revisited in the relatively near future. Jamaica does not offer meaningful market access to other trade corridors expected to grow substantially over the coming years – South-South: Asia to Middle East/Africa and to South America. A review of Jamaica's trading agreements can shed light on potential issues to be addressed as the CSEZ moves forward.

[21] MIIC Special Economic Zones White Paper, June 2015

The Caribbean Basin Initiative (CBI) gives duty-free access to Jamaican exports into the US, provided they contain at least 35% local value added and US materials make up 15% of the finished value. Goods made from 100% US materials are duty-free. Generally, textiles, footwear, leather goods, tuna, petrol and watches are excluded from this Act, though some duty reductions are available for these products.

The Economic Partnership Agreement is a general agreement aimed at all ACP countries. It grants duty- and quota-free market access to Jamaican exports, except sugar. It also includes (remote) services.

CARIBCAN is a non-reciprocal Canada-Caribbean trade agreement, which was under renegotiation in the 2000's, but failure to reach agreement was acknowledged in 2007. Jamaica can export some products duty-free to Canada, provided a minimum of 60% of the factory price comes from Jamaica, the Commonwealth Caribbean or Canada. As with the CBI, textiles and garments, footwear and leather goods, and lubricating oils are excluded. Jamaica's principal export to Canada is alumina (duty-free).

CARICOM was created by Jamaica, with Barbados, Guyana and Trinidad, in 1973. In 2002, it was revised to allow for the eventual establishment of a single market, and single economy. Today, it boasts 15-member states and five associate members, and 16 million people. Jamaica enjoys duty-free access to 13 CARICOM members, for products wholly produced from CARICOM materials or from extra-community materials, if these have been sufficiently transformed to change their tariff heading.

CARICOM-Negotiated Agreements grant different Jamaican products duty-free access to Colombia, Costa Rica, Cuba, the Dominican Republic and Venezuela. Some of these agreements are partial and some dormant. As a result, trade preferences can be more discretionary and less transparent.

GSP Donor Countries (Australia, Belarus, Japan, New Zealand, Norway, the Russian Federation and Switzerland), which extends better than Most Favored Nation import rates on Jamaican products.

Under these various preferential trading agreements, the following main Jamaican exports enter the markets of the US, Canada, EU, GSP donor countries, and CARICOM, duty-free:

- Ackee
- Alumina
- Animal and vegetable oils and fats

- Animal feed
- Bauxite
- Beverages
- Bread, biscuits, cakes
- Chemicals including ethanol
- Citrus products
- Cocoa products
- Coffee
- Milk products
- Dasheen
- Furniture
- Juices
- Machine and transport equipment
- Malt extract and preparations thereof
- Meat and preparations
- Fruits and preparations
- Vegetables and preparation
- Rum
- Sauces
- Tobacco
- Wearing apparel including leather (MFN for CARIBCAN)

It is worth noting that the benchmarked countries selected in Section 2 of this Chapter have similar trade agreements, impinging on some of Jamaica's competitive edge.

- **Colombia:** Canada, CARICOM, EU, US
- **Costa Rica:** Canada, CARICOM, EU, US/CAFTA
- **Dominican Republic:** CARICOM, EU, US/CAFTA
- **Panama:** Canada, EU, US.

In its White Paper, MIIC argued: 'It will be important to offer SEZ investors an attractive Free Trade Agreement (FTA) network that includes key markets in the major existing and future trade lanes. Any effort to expand Jamaica's bilateral FTA network will require coordination with our regional trading partners in CARICOM." It further recommends negotiations to clarify the treatment of SEZ exports by CARICOM as well as Costa Rica, Cuba and the Dominican Republic; and exploration of duty relief with ASEAN, China, MERCOSUR and SADC.[22] As both the CBI and CARIBCAN are silent on these exports, it may also be advisable to formalize the administrative practice of granting them preferential access.

5.9 Implications for the Demand Forecast

The foregoing analysis of Jamaica's trade patterns offers invaluable insights into the mix of commodities that Jamaica consumes and might explore through the CSEZ.

- **Natural resource commodities.** Jamaica is not endowed with mineral fuels, iron and steel, or precious metals, which limits the development of certain production. These products are not appropriate for light/medium industrial SEZs
- **Energy-intensive commodities.** Refined mineral fuels and extruded metals are important inputs for many industries and Jamaica will continue to import these for the foreseeable future.
- **Heavy industries.** Although Jamaica does not have established activities, there are some fairly advanced investment plans for vehicles, in particular. Though the CSEZ will not be able to support heavy industry, it might be able to capitalize on the development of selected specialized machinery to support heavier industry.
- **Consumer goods.** Jamaica has a past tradition of making consumer goods such as -garments and furniture- though most are imported presently. If the labor cost/quality can be addressed, these sectors could reclaim their place in the country's economic outlook and could be included in the CSEZ. Simple electrical goods might also take off.
- **Research and Development.** Some interviewees mentioned Jamaica's potential for research-intensive activities, in particular in the pharmaceutical, bio-tech, and beauty sectors. As a potential partner to productive operations in the CSEZ, this niche sector is worth examining.

[22] Ibid.

Table 7-16. Potential Investment Sectors for the CSEZ	
Potential Sectors	**Potential Subsectors**
Warehousing	Open Storage, Private/Shared Refrigerated Warehouses, Containers (De)Stuffing, Logistics, and Distribution
BPO/ICT	Call Centers, Back-Office Support, Added-Value Services, Data Mining, and Coding
Creative	Sound, Post-Production, Advertising and Graphics, Print, Crafts, Fashion and Jewelry
Furniture	Traditional wood, Part-Assembly, Mattresses and Upholstery, Hospitality and Shop Fittings, and Bespoke
Paper	Paper Products, Medical Disposables, Beauty, Packaging and Labeling
Repairs	Motor Vehicles and Parts, Appliances, and Refurbishment
Metal Fabrication	Building Materials, Window and Door Frames, Fences and Gates, and Hand Tools
Textiles	Apparel, Uniforms, and Household Linens
Food & Beverages	Canned foods, Fruit and Nut Preparations, Confectionery, Snacks, Specialty and Gourmet Preparations, Shared Packing and Research and Development
Pharmaceuticals	Health and Beauty, Specialty Oils, and Optical Devices Assembly
Plastics	Bottles and Containers, Household Goods, Furniture, Plastics for Industrial Use, Pipes, and Films
Other	Hotels, Technical Training, and Business Incubator

6.0 Industry Summary

Previous studies on the potential industries for the CSEZ have focused on traditional exports and existing production. These studies have merit since current activities have developed in light of Jamaica's natural endowments and business environment. However, the CSEZ offers an opportunity to explore new ground in Jamaica, utilizing both the new legal, regulatory and institutional environment put in place through the SEZ Act. With Government working with the private sector - new technologies, products, services, and markets could be developed. It is in this context, that IDG broadens the range of potential industry sectors for the zone.

In support of this direction, a recent World Bank report suggested that manufacturing investors' criteria for picking locations are changing, fiscal incentives and low labor costs are no longer decisive, and rather the ability to use new technologies is the new lynchpin.[23] It is therefore crucial that Jamaica invests in equipping its labor with bold technology skills. The country's global connectedness – logistical and virtual – will also improve the chances for growth and employment.

Table 7-16 sets out industries likely to locate in the CSEZ based on this chapter's analysis. The following sections highlight particular features and requirements of each industry sector proposed for the CSEZ. In general, Jamaica may wish to focus on recruiting investors in industries that have strong value-added, employment, and export potential. Due to current issues with power costs and connectivity, early tenants may be involved in logistics and produce niche goods and services.

It is not recommended that the CSEZ place limits on the types of firms and tenants it seeks to attract. There will no doubt be interest from industries not anticipated in this report. The sectors identified below were used for the Demand Forecast in the following chapter.

[23] *Trouble in the Making? The Future of Manufacturing-Led Development*, World Bank, 2017

Table 7-17. Warehousing/Logistics Sector Parameters		
Parameters	**Typical Operation**	**Large Operation**
Distribution of Companies	60%	40%
User Type	Covered Warehousing Non-Polluting	Open and Covered Warehousing / Logistics Non-Polluting
Preferred Location	Light Industrial	Light Industrial
May Require Pre-Built Facilities	Yes	Yes
Net Land Requirement (ha)	1	2
Peak Power Required (kVA)	50	100
Monthly Power Use (kWh)	10,000	25,000
Monthly Water Use (m^3)	20	50
No. of Managers	1	3
No. of Technicians	2	30
No. of Workers	20	65

6.1 Warehousing/Logistics Sector

Warehousing/logistics constitutes the storage of imported goods and company inventory in closed premises, refrigerated storage, and open storage for bulk equipment and products. It can extend to freight consolidation and forwarding, and third-party inventory and distribution management. Much of containerized shipping relies on economies of scale and turnover – momentum Jamaica has yet to gather. However, the proximity of the island to major shipping lines and large markets does make it a potentially attractive storage and distribution point, assuming quick reaction times can be achieved. This is a demand-driven activity, but the CSEZ could rapidly accommodate open storage for the buoyant local construction market and other local and regional storage needs.

Warehousing activities require a variety of prebuilt warehouses, with sufficient roof heights and space to maneuver equipment. They typically sit in a light or medium industrial area, allowing for parking of trucks, cargo, freight forwarding, and transshipment stations. Attractiveness is dependent on excellent connectivity to port and airport. (Table 7-17)

Table 7-18. ICT/BPO Services Sector Parameters

Parameters	Typical Operation	Large Operation
Distribution of Companies	85%	15%
User Type	Services Non-Polluting	Services Non-Polluting
Preferred Location	Offices/Light Industrial	Offices/Light Industrial
May Require Pre-Built Facilities	Yes	No
Net Land Requirement (ha)	0.5	1.5
Peak Power Required (kVA)	450	1,000
Monthly Power Use (kWh)	125,000	200,000
Monthly Water Use (m3)	200	500
No. of Managers	4	5-8
No. of Technicians	250	2450
No. of Workers	200	2000

6.2 BPO/ICT Services Sector

The ICT/BPO sector leverages information and telecommunication technology to offer a range of business services, including but not limited to, customer and sales support, accounting/human resources/payroll, and data capture and treatment. The sector includes captive providers dependent on one client and third-party service providers with varied clientele. Increasingly, there are efforts to capitalize on IT skills to develop new services in customized programming, coding, data mining, and product-specific applications etc. Global trends evidence both wholly-owned business providers and sustained growth of third-party providers, including smaller niche services. Current relocation of these sectors away from say, the Philippines, affords an opportunity for Jamaica's fast-growing BPO activities.

ICT/BPO services typically locate in office space or light industrial areas. They require high bandwidth connectivity and air-conditioned space suitable for substantial computer equipment. Clarification will therefore be needed as to the fiscal treatment of this equipment in the CSEZ. A mixed pool of more experienced programmers and dynamic graduates will be necessary for the development of more IT-focused services. Jamaica's young labor force, with a number of accounting and legal graduates, as well as the education institutions' recognized experience of BPO training, could offer interesting prospects to investors – and support business incubators and local entrepreneurship in the CSEZ. (Table 7-18)

Table 7-19. Creative Industries Sector Parameters

Parameters	Typical Operation	Large Operation
Distribution of Companies	60%	40%
User Type	Light Industrial Post-Production Graphics Jewelry and Design	Light Industrial Studio Fashion
Preferred Location	Light Industrial	Light Industrial
May Require Pre-Built Facilities	Yes	No
Net Land Requirement	0.5	2ha
Peak Power Required (kVA)	450	500
Monthly Power Use (kWh)	50,000	100,000
Monthly Water Use (m^3)	200	200
No. of Managers	1	3
No. of Technicians	25	100
No. of Workers	75	100

Table 7-20. Furniture Sector Parameters

Parameters	Typical Operation	Large Operation
Distribution of Companies	90%	10%
User Type	Light Industrial Furniture Toys, Instruments	Light Industrial Furniture Industrial Fixtures
Preferred Location	Light Industrial	Light Industrial
May Require Pre-Built Facilities	Yes	No
Net Land Requirement (ha)	1	2
Peak Power Required (kVA)	500	1,500
Monthly Power Use (kWh)	80,000	100,000
Monthly Water Use (m^3)	1,000	1,500
No. of Managers	1	1
No. of Technicians	8	8
No. of Workers	150	200

6.3 Creative Industries Sector

This varied sector would capitalize on Jamaican's innovation, talent, and reputation. It could comprise of artificial intelligence, robotics, audio, video, CAD work, studio and post-production, press, as well as, fashion and design activities. Requirements will be for large, clean space and robust IT equipment. Young entrepreneurs and start-ups would most likely be the initial investors. Clients would be from the whole of the Caribbean, and North and Latin America. (Table 7-19)

6.4 Furniture Sector

A traditional Jamaican industry, suffering from cheap Asian exports and an aging skilled workforce, but still enjoying a good reputation and some solid producers and designers. Opportunities exist from other developing businesses and high-end niches. This sector requires space in light industrial locations and is undertaken in small to large factories depending upon the product and production demands. Adequate space for the storage of raw materials is required. Opportunities to transfer specialized skills to a younger Jamaican workforce in order to revive this sector in the country. (Table 7-20)

Table 7-21. Paper Sector Parameters		
Parameters	**Typical Operation**	**Large Operation**
Distribution of Companies	100%	0%
User Type	Medium Industrial Paper Products Some Chemical Waste	N/A
Preferred Location	Medium Industrial	N/A
May Require Pre-Built Facilities	No	No
Net Land Requirement (ha)	4	N/A
Peak Power Required (kVA)	1,000	N/A
Monthly Power Use (kWh)	600,000	N/A
Monthly Water Use (m^3)	15,000	N/A
No. of Managers	1	N/A
No. of Technicians	5	N/A
No. of Workers	200	N/A

Table 7-22. Machinery/Repairs Sector Parameters		
Parameters	**Typical Operation**	**Large Operation**
Distribution of Companies	80%	20%
User Type	Light Industrial Repairs and Refurbishment Appliance Assembly Non-Polluting	Light/Medium Industrial Light Manufacturing SKD Non-Polluting
Preferred Location	Light industrial	Light/Medium industrial
May Require Pre-Built Facilities	Yes	No
Net Land Requirement (ha)	1	4
Peak Power Required (kVA)	400	1,500
Monthly Power use (kWh)	40,000	250,000
Monthly Water Use (m^3)	1,000	3,000
No. of Managers	2	4
No. of Technicians	14	90
No. of Workers	100	190

6.5 Paper Sector

For Jamaica, the paper sector would use wood or recycled paper pulp to produce paper tissue for household or hospitality use, writing paper, notebooks, newsprint, cardboard, packaging and other paper and pulp products. This implies certain environmental controls and the importation of raw materials, in particular waste paper whose treatment will need to be clarified. This sector could also support other tenants in the CSEZ.

The paper industry is a large user of water and power – both of which might best be provided in the CSEZ. It requires a clean environment, especially for products destined for use in hospitality, for cruises, or for medical applications. There is potential to substitute for imports in this sector and to also expand within the Caribbean and Latin American markets. (Table 7-21)

6.6 Machinery/Repairs Sector

This broad sector includes simple industrial machinery, motors, pumps, air conditioners, transformers, switches, semi-conductors, and consumer appliances. There is local know-how for all types of repairs and refurbishment of vehicles and electricals in Jamaica, which would be the initial phase of development of this industry. It could serve not only the active local market but also the broader regional market, provided the current law can be amended to allow for the temporary duty-free import of product to be refurbished or repaired, such as used cars. Finally, some have identified potential for automotive assembly from semi-knocked-down or knocked-down kits.

This sector requires both open and factory space. Port connectivity is crucial, as will be reliable low-cost power and skilled labor. This sector might also support some electric appliance assembly for the Caribbean and American markets. (Table 7-22)

Table 7-23. Metal Fabrication Sector Parameters

Parameters	Typical Operation	Large Operation
Distribution of Companies	100%	0%
User Type	Medium Industrial Stamping, Casting, Forging Some Polluting	N/A
Preferred Location	Light/Medium Industrial	N/A
May Require Pre-Built Facilities	Yes	No
Net Land Requirement (ha)	4	N/A
Peak Power Required (kVA)	4,000	N/A
Monthly Power Use (kWh)	1,000,000	N/A
Monthly Water Use (m^3)	5,000	N/A
No. of Managers	4	N/A
No. of Technicians	20	N/A
No. of Workers	300	N/A

Table 7-24. Textile Sector Parameters

Parameters	Typical Operation	Large Operation
Distribution of Companies	90%	10%
User Type	Medium Industrial Cut and Sew Wash and Finish	Medium Industrial Cut/Sew/Dye/Wash Leather Products Some Chemical Waste
Preferred Location	Light Industrial	Light/Medium Industrial
May Require Pre-Built Facilities	No	No
Net Land Requirement (ha)	1.5	4
Peak Power Required (kVA)	500	3,000
Monthly Power Use (kWh)	100,000	550,000
Monthly Water Use (m^3)	2,500	100,000
No. of Managers	3	4
No. of Technicians	10	15
No. of Workers	400	500

6.7 Metal Fabrication Sector

Metal fabrication comprises both primary metals production such as bars, rods or pipes and fabricated products such as tools, automotive components and other stamped, polished or cast items. There is local know-how for a variety of metal working, which relies on imported raw materials. This activity could benefit from the construction drive on the island, but also suffers from cheap Asian imports of all types of metal products.

The metals sector is a large consumer of energy, so the cost of power in Jamaica may be a brake on development. The CSEZ may offer an answer if it is can provide reliable, low-cost electricity to these investors. There may also be opportunities to tie this sector to local mines. Early metals production is likely to be for less sophisticated household products (utensils, hand tools, doors) or simple industrial products (pipes, roads and bars, tools). This sector requires factories, reliable power and a skilled workforce. (Table 7-23)

6.8 Textile Sector

Unlike some countries, Jamaica is not a vertically-integrated textile producer with a complete value chain from carding or synthetics filament production through weaving, dyeing, cutting and sewing, to finishing, or leather tanning and production. The industry has also lagged through lack of investment in both capital and labor in the sector. Despite the CBI, the Jamaican garment industry has not expanded as expected, because: i) preferential access to key markets was lost following the removal of the quota system, ii) it faces competition from low-cost producers, iii) it has a large untrained labor force, iv) its small factories inhibit the achievement of economies of scale, v) it depends on few markets and imported inputs, and iv) high overhead costs are observed.

This sector would most likely use the CSEZ for short, quick-turnaround runs. Until Jamaica can offer large economies of scale and superior connectivity, it will face stiff

competition from other locations like the Dominican Republic, Costa Rica, Sri Lanka, India and Bangladesh, which bank on lower-cost labor and reduced environmental controls. The parameters in Table 7-24 above are primarily for apparel and house linens, with some leather goods production. These operations are accommodated in standard factory spaces, require stable, reliable electricity and are large scale employers.

6.9 Food and Beverage Sector

Food and beverage processing is a traditional sector in Jamaica and includes a broad variety of products including fresh, canned, dried, preserved and frozen meats, fish, nuts, fruits and vegetables, sugar, coffee, cocoa, oils, dairy, snacks, juices, sodas and alcoholic drinks, as well as, tobacco products. Potential is still hampered by its history of commodity exports over value-added products, and limited reliable supply for scale processing. Nevertheless, Jamaica enjoys a strong established presence both regionally and in ethnic markets in North America and Europe. There is also growing interest globally in niche, gourmet and organic products and goods.

This industry requires a clean environment, rigid health standards, certifications (HACCP), uninterrupted power supply to minimize spoilage, ability to support a continuous cold chain, and a reliable supply of raw materials – in both quantity and quality. (Table 7-25)

Table 7-25. Food and Beverage Sector Parameters

Parameters	Typical Operation	Large Operation
Distribution of Companies	80%	20%
User Type	Light Industrial Non-Polluting	Light Industrial Non-Polluting
Preferred Location	Light Industrial	Light/Medium Industrial
May Require Pre-Built Facilities	No	No
Net Land Requirement (ha)	1	4
Peak Power Required (kVA)	500	8,000
Monthly Power Use (kWh)	300,000	1,000,000
Monthly Water Use (m^3)	100,000	250,000
No. of Managers	2	40
No. of Technicians	5	300
No. of Workers	150	1,500

Table 7-26. Pharmaceutical Sector Parameters

Parameters	Typical Operation	Large Operation
Distribution of Companies	90%	10%
User Type	Light Industrial Mixing and Packaging R&D Some Chemical Waste	Light Industrial Drug Formulation R&D, Drug Trials Chemical Waste
Preferred Location	Light Industrial	Light Industrial
May Require Pre-Built Facilities	No	No
Net Land Requirement (ha)	0.5	5
Peak Power Required (kVA)	300	1,000
Monthly Power Use (kWh)	80,000	120,000
Monthly Water Use (m^3)	400	3,500
No. of Managers	3	7
No. of Technicians	40	70
No. of Workers	40	350

6.10 Pharmaceutical Sector

There are several long-standing cosmetics and traditional treatment companies, with active research and development (R&D) and solid regional reputations, operating in Jamaica. Para-pharmaceuticals and pharmaceutical productions in this context covers the development of organic chemicals (base and intermediate), some drug formulation, medicament packaging, and possible R&D including clinical trials. There is an opportunity to also undertake ground breaking research/study on medicinal marijuana in this sector.

Pharmaceutical operations require clean space, some refrigeration, special waste treatment, reliable clean water and skilled labor. The CSEZ offers the opportunity to develop this sector by cost-sharing its specific requirements, in particular as regards chemical effluent treatment and green concerns. It might also address issues related to health procedures over the importation of raw materials. Jamaica reportedly has good chemists and pharmacists to support this industry. (Table 7-26)

Table 7-27. Plastics Sector Parameters

Parameters	Typical Operation	Large Operation
Distribution of Companies	95%	5%
User Type	Light/Medium Industrial Injection Moulding Plastics and Rubber Products	Medium Industrial Specialized Plastics Some Chemical Waste
Preferred Location	Light Industrial	Medium/Heavy Industrial
May Require Pre-Built Facilities	No	No
Net Land Requirement (ha)	0.5	4
Peak Power Required (kVA)	500	3,000
Monthly Power Use (kWh)	100,000	200,000
Monthly Water Use (m^3)	2,000	8,000
No. of Managers	10	15
No. of Technicians	40	60
No. of Workers	160	300

Table 7-28. Support Services Parameters

Parameters	Training Facilities	Hospitality Facilities	Incubator Facilities
Preferred Location	Light Industrial	Light Industrial	Office/Light Industrial
No. of Managers	2	2	1
No. of Technicians	2	5	2
No. of Workers	20	50	6
Net Land Requirement (ha)	1	1	1
Peak Power Required (kVA)	500	1,000	500
Monthly Power Use (kWh)	50,000	100,000	150,000
Monthly Water Use (m^3)	100	3,000	100

6.11 Plastics Sector

Plastics support a number of Jamaican industries, both in itself and as component of other products. Larger food processors in Jamaica have brought in their own packaging lines because of this missing supply of bottles, boxes, films etc. With diversification of local production, demand for plastics is likely to grow.

Plastics production requires clean factory space in light industrial areas, and in Jamaica is based on imported raw materials so streamlined importation and connectivity are important. (Table 7-27)

6.12 Support Services

The development of the CSEZ is likely to attract interest in supporting services. A relatively quick need may be for logistics activities, training facilities, business incubators for SMEs, research and development labs, hospitality facilities, office space, exhibition halls, convenience retail and possibly twinned with existing institutions, which could be an important incentive for both investors and workers. Tenants may also welcome the addition of a boutique hotel for investors or visitors. All of these would be purpose-built premises, rather than converted office/light industrial space. (Table 7-28)

Chapter Eight
Demand Forecast

1.0 Overview

This demand forecast chapter contains: i) a demand methodology, ii) three demand scenarios – a conservative, base, and aggressive case – with associated assumptions, and iii) 20-year demand projections for tenants/investors, land, pre-built factories, electricity, water, and employment generation for the CSEZ.

The demand forecast is based on: i) the competitive and comparative benchmarking of Jamaica and the CSEZ against key competitors, ii) the market analysis, which examined the full spectrum of industry sectors that may be attracted to the CSEZ project in the short, medium and long-term, iii) trade and investment flows, patterns, and data for the region and the country, and iv) inputs from private sector meetings and investment surveys presented in earlier chapters of this study.

2.0 Demand Forecasts

A demand forecast typically estimates the number and types of investors/companies likely to locate in an SEZ over a 20-year period. A 20-year timeframe is traditionally used to correspond with the long-term investment horizons a developer uses to estimate a project's IRR.

IDGs demand forecast identifies not only the potential number and type of investors/companies for the CSEZ but also estimates:

- Serviced land requirements of investors/tenants
- Pre-built facilities requirements of investors/tenants
- Monthly power requirements of investors/tenants
- Monthly water requirements of investors/tenants
- Employment generation for the CSEZ

2.1 How the Demand Forecast is Used

The demand forecast is a critical element in a feasibility study as it determines investment potential for the zone, the planning parameters for the master plan for the site, infrastructure/utility requirements for development, as well as the phasing of the project. This information is then costed, synthesized and tested in an economic and financial model to identify the project's IRR and ERR and the zone's short, medium and long-term viability.

3.0 Demand Forecast Methodology

IDG uses a 'best practice demand forecasting methodology' to estimate investor/tenant interest in an SEZ project and to determine demand for land, buildings, infrastructure, and employment over a 20-year timeframe. Although demand forecasting is not a scientific undertaking, it is a skillful calculation based on established data, performance indicators, and informed assumptions.

A variety of standard forecasting tools and techniques were used to create the demand projections for the CSEZ. These are outlined in Table 8-1 below:

Table 8-1. Demand Forecast Methodology

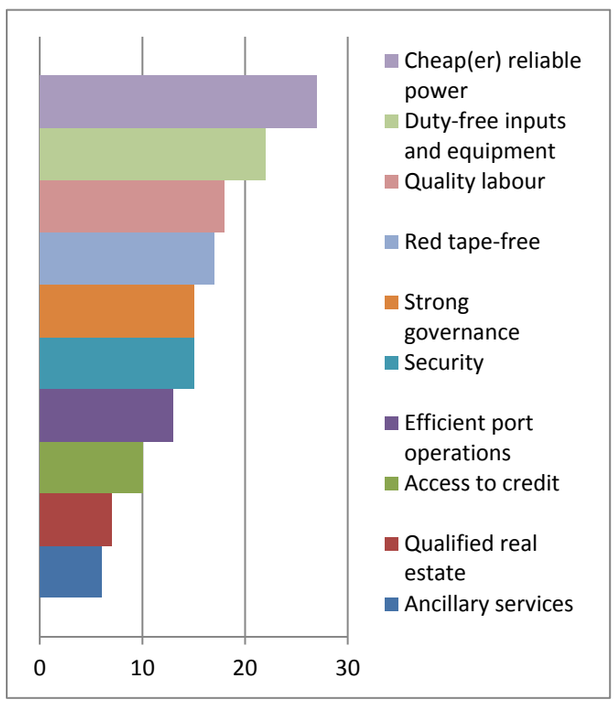
	Forecasting Techniques	Description
1.	**Historical Demand**	The examination of historical data pertaining to the formation of domestic and foreign companies locating or doing business in Jamaica and specifically, in the Kingston area. This provides a baseline understanding of industry investment to date.
2.	**Trend Extrapolation And Data Mining**	The identification of changing industries and sector trends over the past five years or coming five years, utilizing online data targeting the Caribbean and LAC region, company preferences, trade flows, and new trends/innovation provided by companies during telephone or in-person interviews.
3.	**Conjoint Analysis**	The identification of key barriers to investment regionally and in Jamaica, the determination of minimum land/infrastructure/utilities/environmental/labor/ support amenity requirements, the development of competing projects and their locations, and how all these aspects might affect investment decisions by companies considering locating in Jamaica. This analysis also identifies what the CSEZ will need to make it an attractive investment location.

4.	**Scenario Creation**	The creation of three scenarios and associated assumptions to reflect possible development alternatives for the CSEZ project and its corresponding demand. This sets out varying political, legal, regulatory and institutional as well as the physical design, utilities, infrastructure, economic and financial factors that will affect the development of the CSEZ.
5.	**Investor Surveys**	Survey companies to determine their intent or interest in setting up in the CSEZ or expanding their operations into the CSEZ. Although relocation is not encouraged, (and is also rare), relocation questions provide further insight into the conditions required to make a company relocate or expand into the CSEZ.
6.	**Rules-Based Forecasting**	Techniques 3 through 5 allow the IDG Team to create and apply new 'rules,' which would alter the historical data and typical investment trends.

In addition to the above, IDG examined:

- The political willingness of supporting SEZ projects in the country
- New policy initiatives
- Economic conditions in Jamaica
- The existing business environment and the potential for a One-Stop Shop within the CSEZ
- Global trade and logistics trends and
- Proposed and implementing investment plans by both the public and private sectors – foreign and domestic.

As well, IDG considered the development of competing special economic zones or other similar projects, and the ability of the GoJ to align its agencies behind this national, flagship project.



Source. IDG

Figure 8-1. Investor Priorities for the CSEZ

Hence, when undertaking the demand forecast the following was considered:

Historical demand. IDG examined the historical demand of investments over the past ten years by examining Jampro's comprehensive databases. A review of companies that actually started business and continue to operate allowed IDG to determine the types of industries and numbers of enterprises that could met minimum investment thresholds and hence would be potential candidates for the CSEZ. By analyzing this historical data and the pattern of enterprise creation prior to the development of the CSEZ, one can establish a baseline level of demand. This shows the counterfactual level of enterprise creation in the absence of the CSEZ.

Trend extrapolation and data mining. IDG analyzed the fluctuation of investment data in light of changing economic factors and industry trends and advancements. So as historical demand provides a baseline, trend extrapolation allows for increased or decreased levels of demand assuming all things do not continue as they did in the past – in this case for instance, with the implementation of the LHI and the SEZ Act, as well as the proposed develop of the CSEZ. An additional examination and analysis of key trade and investment data and investigating data mining, helped identify new and expanded industry sectors for Jamaica and potentially hidden demand for the CSEZ.

Conjoint analysis. IDG identified the ranked preferences of investors by industry sector. IDG asked the existing business community and foreign investors to prioritize their doing business requirements if 'locating' in Jamaica in order to understand the barriers to investment in the country and to identify key features necessary to make the CSEZ attractive to investors. By holding one-on-one interviews with the private sector, IDG was able to gauge investor responses to open-ended question such as 'What facilities, infrastructure/utilities, services or benefits would you most welcome in the CSEZ?' and 'What are the barrier to businesses in Jamaica?' Figure 8-1 summarizes the responses by the private sector. It should be noted that 'tax exemptions' were not a top priority for foreign investors, though this issue was mentioned by local companies as they wanted to ensure a level playing field for investors either located within or outside the zone.

Private sector intentions. While undertaking the investor survey, IDG explored the appetite of respondents to relocate to the zone. Although relocating existing operations to the CSEZ may be uneconomical, companies might choose to open affiliated businesses or expand existing activities within the SEZ. Although

none of the respondents were currently considering this possibility, a few thought they might suspend their future development plans to see if the CSEZ would be ready in the short term, especially if it offered more attractive power solutions and streamlined port/facilitation services.

From IDG's discussions with the private sector – both foreign and domestic – there is a real interest in the CSEZ and its facilities and the majority of respondents believed that there is pent-up demand for the CSEZ and other economic zones in Jamaica.

4.0 Demand Forecast Scenarios

The analysis of historical data, trends and intentions provides a strong basis for forecasting, if all other things remain equal. However, the intent is for the CSEZ to be a **'game-changer'** for Jamaica, making it a positive driver of modernization, innovation, and technology. In addition, the CSEZ will have a more streamlined business environment, facilitation/training/incubator services, on-site customs facilities, state-of-the art buildings, infrastructure and utilities and 24-hour security. In order to capture this positive change in the country and incorporate the variances in investment behavior, IDG developed three demand forecast scenarios for the CSEZ. These scenarios are assessments of what demand could be, **if** certain conditions occurred in Jamaica.

4.1 Base Case Scenario

The base case scenario for the CSEZ assumes:

- The GoJ has a strong champion to support for the establishment of the CSEZ
- Key MDAs are aligned and are committed to working together to implement the CSEZ project in a timely and cost-effective manner
- The JSEZA continues to finalize their SEZ regime (legal, regulatory and institutional structure) and is staffed and funded appropriately to support the implementation of the CSEZ
- The LHI and other supporting policies are implemented and sustained over time
- There is a commitment by the GoJ to continue to improve the business climate in Jamaica and to make the country more competitive on a regional and global level
- Private sector investment continues to be encouraged and supported by the GoJ

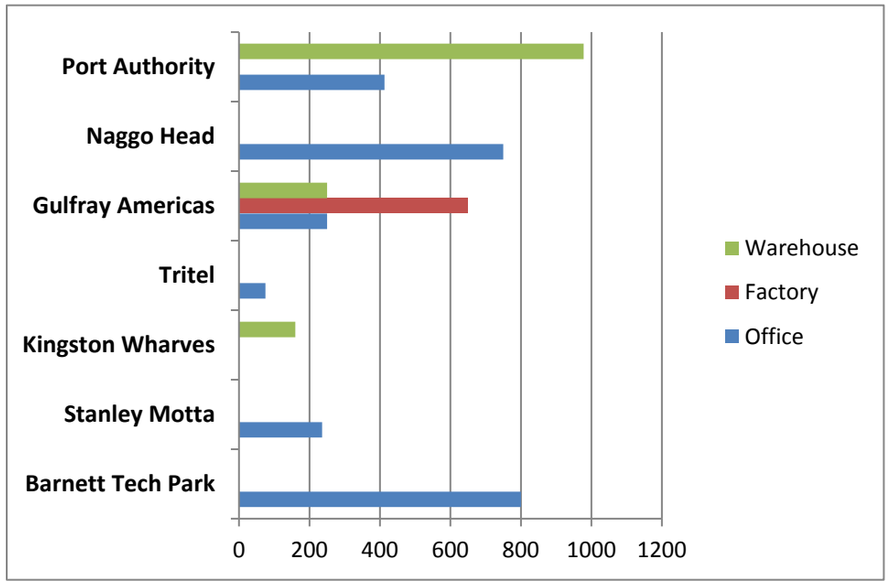
- PPPs and new innovative development partnerships are explored
- The GoJ limits both private and public-sector development plans for competing SEZ's and Industrial Parks (IPs) in Kingston in the short-term to allow the CSEZ to maximize its up-take
- Power solutions for the CSEZ such as a dedicated line, a captive power plant, or LNG are guaranteed and offered at affordable rates
- Water and wastewater solutions are available for the site, which match industry sector requirements
- The CSEZ upholds an environmental/eco-friendly commitment
- Mandela Highway at the entrance of the CSEZ is redesigned to optimize access to the zone
- A One-Stop Shop/Facilitation Services are available within the CSEZ
- Customs officers are housed in the CSEZ to facilitate cargo in a streamlined manner
- The CSEZ has 24-hour security
- The CSEZ is operated by a private enterprise
- The CSEZ is developed in accordance to with the findings and recommendations set out in this feasibility study

4.2 Aggressive Case Scenario

The aggressive case scenario for the CSEZ assumes:

- The GoJ has a number of strong champions across all levels of government to support for the establishment of the CSEZ
- All government MDAs are aligned and working together to implement the CSEZ project in a timely and cost-effective manner
- The JSEZA finalizes their legal, regulatory and institutional structure and is staffed and trained to fully support the implementation of the CSEZ
- The LHI and new supporting policies such as customs and power reforms are implemented and sustained over time
- The ports and airports of Jamaica are further privatized and upgraded
- Jamaica improves its business climate and Doing Business (DB) Index
- Private sector investment in Jamaica is increased due to the improved economic policies of the country

- The GoJ continues to support PPPs and also explores new innovative development partnerships in order to build national priority projects in Jamaica
- In the short-term, the GoJ limits both private and public-sector development plans for competing SEZ's/IP's in Kingston to allow the CSEZ to grow
- Power solutions for the CSEZ such as a dedicated line, a captive power plant, or LNG are guaranteed and offered at affordable or competitive rates
- Water and wastewater solutions are available for the site, which match the industry sector requirements
- The CSEZ is committed to design, infrastructure and environmental excellence
- The CSEZ's One-Stop Shop (OSS) with after-care services is automated with streamlined processes and procedures
- An aggressive marketing and investment promotion campaign is developed and fully funded for the CSEZ
- Customs have a building and a full complement of officers housed in the CSEZ and they utilize e-systems/automation to process, track, and monitor cargo/movements
- Logistics between the Port and the CSEZ are optimized
- The CSEZ has 24-hour security
- A communication plan is prepared for the CSEZ to inform CEDA and the Greater Kingston residents
- The CSEZ is developed and operated by a private developer/enterprise
- Solutions from the impacts the Soapberry Wastewater Treatment Plant and the Riverton Solid Waste Facility are properly mitigated
- The CSEZ is developed in accordance to with the findings and recommendations set out in this feasibility study or in alignment with a proven business plan prepared by an experienced developer
- The rest of the CEDA North and South areas are actively developed and promoted on a global level



Source. JSEZA

Figure 8-2. Short to Medium Term SEZ Supply (In 1,000s of Ft2) Total 4.6 Million Ft2

4.3 Conservative Case Scenario

It must be acknowledged that a variety of negative, geo-political or global economic factors could also depress demand for the CSEZ. Although this conservative scenario is not the desired development path for the zone, it does illustrate the potential risks associated with not meeting certain conditions listed above. In particular, the cost and quality of electricity is the number one concern of most businesses surveyed; several choosing to make significant investments in their own power generation to remain or expand their businesses. The failure to deliver clean, stable, uninterrupted, cost-effective power would seriously undermine the CSEZ project.

Another important threat to the success of the CSEZ is the number of competing industrial projects (SEZs/IPs or otherwise) being proposed or being implemented in the short term, as presented in Figure 8-2, which excludes the proposed projects by CHEC and FCJ on the CEDA lands. All these projects drastically decrease demand for the CSEZ project and will negatively impact the start-up phase of the zone. Lastly, by not providing adequate wastewater treatment solutions for the CSEZ it may reduce the attractiveness of certain sectors to the zone.

The conservative demand scenario assumes:

- There remains government support for the CSEZ project, but the zone continues to strive to identify a strong campion
- MDAs associated with implementing the CSEZ are not properly coordinated and do not share critical information
- The JSEZA is under-funded and under staffed
- The LHI and other supporting policies are implemented but not properly funded
- There is a commitment by the GoJ to continue to improve the business climate in Jamaica and to make the country more competitive on a regional and global level, but little progress occurs
- Global investment and trade growth struggles in the near term

- Jamaica's GDP growth is slower than expected through the medium and long-term
- Jamaica is affected by a natural disaster in the medium to long-term
- Linkages to the Port from the CSEZ remain unaddressed
- Alternative industrial projects and space at competitive prices are available within the Greater Kingston area
- Private sector investment continues to be encouraged and supported by the GoJ
- The GoJ continues to support PPP opportunities with the private sector
- Operational risks to businesses exist in the CSEZ in the short to medium term
- Power solutions for the CSEZ such as a dedicated line, a captive power plant, or LNG are guaranteed and offered at affordable rates
- Water and wastewater solutions are available for the site, which match industry sector requirements
- Maintenance of the CSEZs infrastructure is not maintained
- Commitment to a high environmental standard within the zone is not prioritized
- Mandela Highway at the entrance of the CSEZ is redesigned to optimize access to the zone
- An OSS with investor facilitation services are available within the CSEZ, but not all the necessary processes and procedures are streamlined
- Customs officers are housed in the CSEZ to facilitate cargo in a more streamlined manner, but reforms to the Customs law remain unchanged
- The CSEZ has 24-hour security
- The CSEZ is operated by a private developer/enterprise, but performance standards are not met
- Soapberry Wastewater Treatment Plant and the Riverton Solid Waste Facility remain unchanged and environmental concerns are not mitigated
- Only portions of the findings and recommendations set out in this feasibility study are implemented or followed

5.0 Demand Projections

Tables 8-4 to 8-6 below present the 20-year demand projections for the CSEZ under the proposed three scenarios - a conservative, base, and aggressive case:

Table 8-4. Projected Number of New Investors/Tenants in the CSEZ Over a 20-Year Period – Conservative Scenario

Conservative Case

Sector	Year 5	Year 10	Year 20
Warehousing/Logistics – Standard	2	2	3
Warehousing/Logistics – Large	1	2	4
BPO/ICT – Standard	1	1	1
BPO/ICT – Large	0	2	3
Creative/Innovation – Standard	0	1	2
Creative/Innovation – Large	0	0	1
Furniture – Standard	0	1	1
Furniture – Large	0	1	1
Paper	0	0	1
Repairs – Standard	1	1	2
Repairs – Large	0	0	1
Metal Fabrication	0	0	1
Textiles – Standard	0	1	1
Textiles – Large	0	1	1
Food & Beverages – Standard	0	2	3
Food & Beverages – Large	0	0	1
Pharmaceuticals – Standard	0	1	2
Pharmaceuticals – Large	0	0	0
Plastics – Standard	0	1	1
Plastics – Large	0	0	0
Support Services (Incubators, Training Facilities, Hospitality Facilities, Research and Development Facilities etc.)	1	2	3
Total	**6**	**19**	**33**

Table 8-5. Projected Number of New Investors/Tenants in the CSEZ Over a 20-Year Period- Base Case Scenario

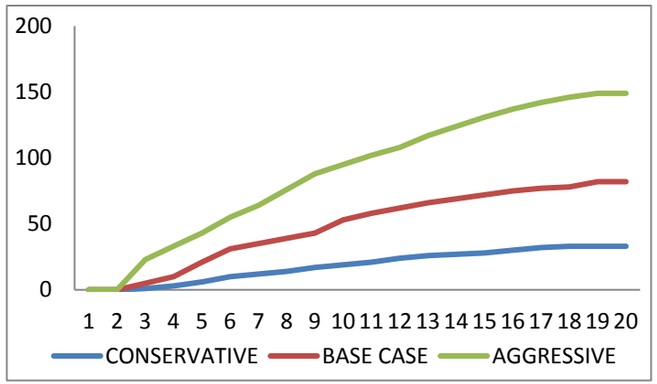
Base Case

Sector	Year 5	Year 10	Year 20
Warehousing/Logistics – Standard	2	5	7
Warehousing/Logistics – Large	2	4	8
BPO/ICT – Standard	1	3	7
BPO/ICT – Large	1	3	5
Creative – Standard	1	3	5
Creative – Large	0	1	2
Furniture – Standard	1	2	3
Furniture – Large	0	2	3
Paper	1	1	1
Repairs – Standard	1	3	4
Repairs – Large	0	1	2
Metal Fabrication	1	2	2
Textiles – Standard	1	3	7
Textiles – Large	0	1	1
Food & Beverages – Standard	0	3	5
Food & Beverages – Large	2	5	5
Pharmaceuticals – Standard	1	2	4
Pharmaceuticals – Large	1	2	3
Plastics – Standard	1	2	2
Plastics – Large	1	1	2
Support Services (Incubators, Training Facilities, Hospitality Facilities, Research and Development Facilities etc.)	3	4	4
Total	**21**	**53**	**82**

Table 8-6. Projected Number of New Investors/Tenants in the CSEZ Over a 20-Year Period – Aggressive Case Scenario

Aggressive Case

Sector	Year 5	Year 10	Year 20
Warehousing/Logistics – Standard	4	7	11
Warehousing/Logistics – Large	5	7	11
BPO/ICT – Standard	2	8	11
BPO/ICT – Large	1	3	5
Creative – Standard	6	11	16
Creative – Large	1	2	3
Furniture – Standard	1	4	6
Furniture – Large	1	2	5
Paper	1	2	3
Repairs – Standard	2	3	4
Repairs – Large	1	2	4
Metal Fabrication	1	3	5
Textiles – Standard	1	4	9
Textiles – Large	1	2	4
Food & Beverages – Standard	2	8	14
Food & Beverages – Large	4	7	11
Pharmaceuticals – Standard	2	4	7
Pharmaceuticals – Large	1	4	5
Plastics – Standard	1	3	5
Plastics – Large	1	2	3
Support Services (Incubators, Training Facilities, Hospitality Facilities, Research and Development Facilities etc.)	4	7	7
Total	**43**	**95**	**149**



Source. IDG
Figure 8-3. Cumulative Tenant/Investor Demand Forecast for the 20-Year Period

6.0 Demand Projections

Extensive interviews conducted in Jamaica and abroad informed the operating parameters presented in the Market Analysis. Based on these parameters, forecasts have been prepared for land, pre-built facilities, power, water and labor under each of the three scenarios, over a period of 20 years. The demand forecasts assume that the CSEZ is constructed in 2 years and during that time, no tenants will be utilizing the zone.

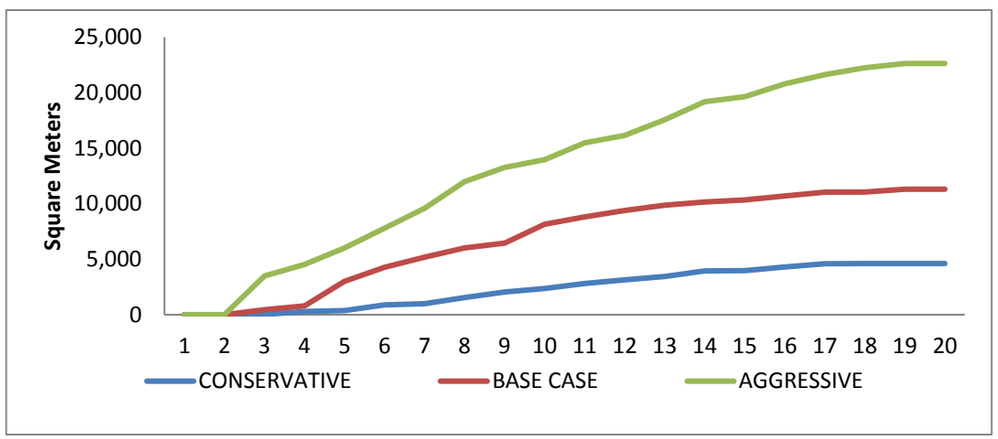
6.1 Investors/Tenants

IDG prepared 20-year tenant forecasts for the CSEZ. (Tables 8-4 to 8-6) The conservative case scenario assumes that within the first five years of operations, the CSEZ has 6 tenants mainly in the warehousing and logistics sectors and a few ancillary investors to support these activities. However, demand is relatively slow in the near-term. Between Years 5-10, a more varied complement of industrial tenants invests in the CSEZ, to raise the number of tenants in the zone to 19. By Year 20, there are 33 tenants in the CSEZ.

The base case scenario assumes an early raise of warehousing and logistics investments bringing 21 tenants to the CSEZ by Year 5. This is followed by a number of key investments in the manufacturing, processing, and ICT/BPO sectors by Year 10, which steadily increases the zone tenants to 53 by Year 10. As the zone continues to mature, supporting sectors and ancillary services flourish bringing the number of tenants in the CSEZ to 82 by Year 20.

The aggressive case has a steady upwards trajectory with significant and constant investment in the warehousing, logistics and manufacturing sectors bringing the tenant demand to 43 by Year 5, increasing to 95 by Year 10 and with the addition of ancillary services, the tenant demand reaches 149 by Year 20. Figure 8-3 compares the investor demand for all three scenarios.

Table 8-7. Sector and Land Requirements				
No.	**Sector**	**Typical Land (Ha)**	**Large Land (Ha)**	**Land Use Categories**
1	Warehousing/Logistics	1	2	Light Industrial
2.	ICT/BPO	0.5	1.5	Light Industrial/Office
3.	Creative Industries/Innovation	0.5	2	Light Industrial
4.	Furniture	1	2	Light Industrial
5.	Paper	4		Medium Industrial
6.	Machinery/Repairs	1	4	Light/Medium Industrial
7.	Metal Fabrication	4		Light/Medium Industrial
8.	Textiles	1.5	4	Light/Medium Industrial
9.	Agro-Business	1	4	Light/Medium Industrial
10.	Pharmaceuticals	0.5	5	Light Industrial
11.	Plastics	0.5	4	Light/Medium Industrial
12.	Support Services	1	1	Light Industrial/Office



Source. IDG
Figure 8-4. Base Case Cumulative Land Demand (20-Years)

6.2 Land

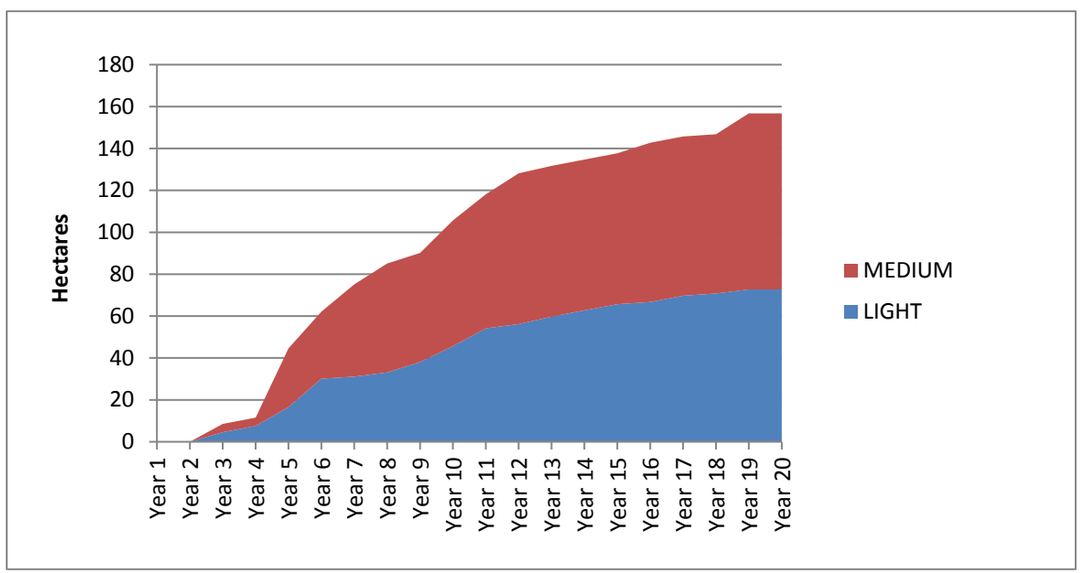
IDG estimated the amount of land that would be required by tenants in the CSEZ over a 20-year time period. To calculate this land demand, IDG multiplied the number of tenants in each corresponding sector by their land requirements per year, and then grouped land demand into light industrial, medium industrial and office categories to better illustrate the potential split of land uses proposed for the CSEZ. (Table 8-7).

The land demand for the CSEZ under the conservative case scenario is 13-ha in Year 5, 32-ha in Year 10 and 64-ha in Year 20. In the base case scenario, the land requirements are 45-ha in Year 5, 106-ha in Year 10 and 157-ha in Year 20. In the aggressive case scenario, the CSEZ land demand is 84-ha in Year 5, 176-ha in Year 10 and 280-ha in Year 20. Figure 8-4 illustrates the differences in land uptake between the three scenarios.

It should be noted that the land requirement is for 'net land', which is land that is purchased or leased by investors. 'Gross land' is a calculation that includes roads, green space, utility rights-of-way and shared open space. In the case of SEZs, the size of a zone is calculated in 'gross land' measurements, which means that the tenant land demand will need to be increased by approximately 30% to support the necessary infrastructure and supporting open space necessary for a zone to properly function. Hence, this means the CSEZ would require approximately **83-ha (205-acres)** of gross land under the conservative case scenario, **204-ha (504-acres)** under the base case scenario, and **364-ha (899-acres)** under the aggressive scenario.

Ten percent of the net land requirement is the amount of land required for pre-built facilities in an SEZ. Hence, for the conservative, base and aggressive cases, the CSEZ will require 6 ha, 15 ha and 28 ha respectively of pre-built facilities.

Table 8-8. Land Demand Forecast in Hectares				
Land Use Categories	**Scenarios**	**Year 5**	**Year 10**	**Year 20**
Light Industrial	Conservative Case	3.5	10.4	15.9
	Base Case	12	35.85	57.75
	Aggressive Case	21.2	60	95.2
Medium Industrial	Conservative Case	8	16	40
	Base Case	28	60	84
	Aggressive Case	56	100	164
Office Buildings	Conservative Case	1.5	5.6	8.1
	Base Case	5	10.15	15.25
	Aggressive Case	6.8	16	20.8
	Aggressive	84	176	280

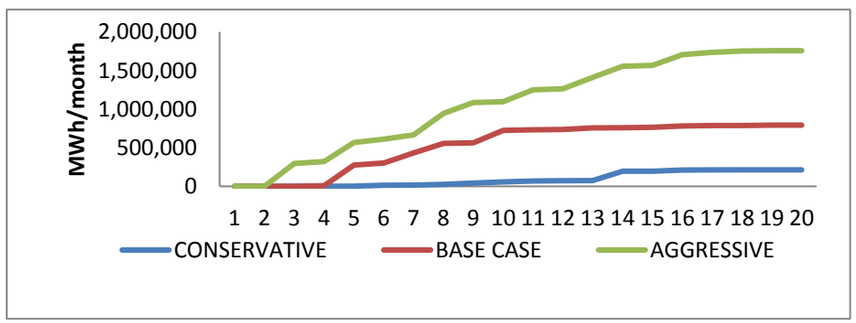


Source. IDG

Figure 8-5. Base Case Cumulative Land Demand (Light and Medium Industrial)

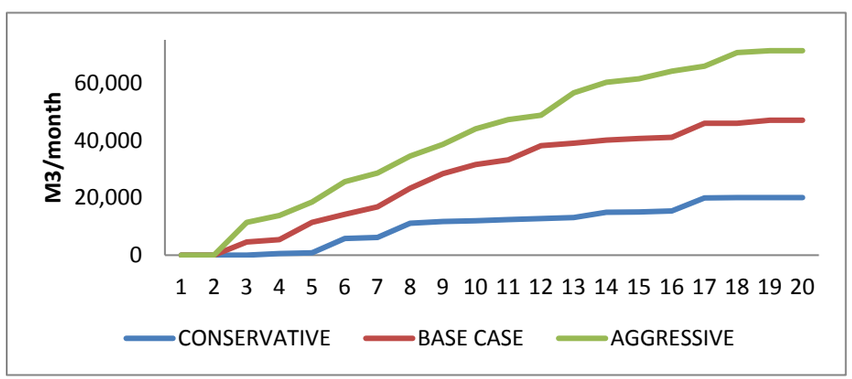
Table 8-8 further breaks down the land demand into land use categories per each scenario. In the conservative case, the CSEZ will require 16-ha of light industrial land, 40-ha of medium industrial land and 8-ha of office land by Year 20. In the base case, the CSEZ will utilize 58-ha of light industrial, 84-ha of medium industrial and 15-ha of office land by Year 20. (Figure 8-5) For the aggressive case, 95-ha of light industrial land, 164-ha of medium industrial land and 21-ha of office land will be required to support the land demand within the CSEZ.

Table 8-9. Power and Water Demand Forecast				
Requirements	**Scenarios**	**Year 5**	**Year 10**	**Year 20**
Monthly Power Use (MWh)	Conservative Case	370	2,365	4,610
	Base Case	**3,010**	**8,155**	**11,305**
	Aggressive Case	6,015	13,970	22,630
Monthly Water Use (m^3)	Conservative Case	2,200	58,650	213,850
	Base Case	**275,700**	**724,300**	**792,900**
	Aggressive Case	568,050	1,097,550	1,757,200



Source. IDG

Figure 8-6. Cumulative Power Demand for the 20-Year Period (MWh/Month)



Source. IDG

Figure 8-7. Cumulative Water Demand for the 20-Year Period (M3/Month)

6.3 Power and Water

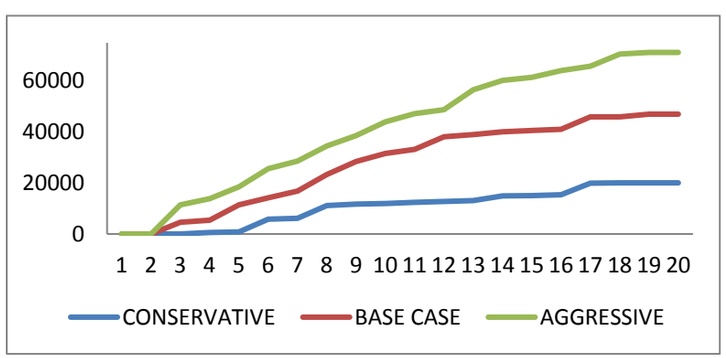
The demand for power and water within the CSEZ was calculated from the number and types of tenants forecasted in the previous sections, according to the conservative, base case and aggressive scenarios. (Table 8-9)

In order for the CSEZ to be competitive on a regional and global level, it will be critically important that it is able to offer its investors state-of-the art infrastructure. This means that power and water must be prioritize as this project moves forward. It is anticipated that the CSEZ will potentially require a captive power station within its premises, or at minimum, a dedicated power line connected to an off-site sub-station. In addition, the zone will require potable and grey water for its industry sectors.

That said, under the base case scenario, the monthly power requirement for the CSEZ is forecasted at 3,010 MWh in Year 5, 8,155 MWh in Year 10, and 11,305 MWh in Year 20. The power requirement under the conservative case is almost one third less than the base case scenario, while the aggressive scenario is double or 22,630 MWh the base case. Figure 8-6 compares all these scenarios.

The monthly water demand for the CSEZ under the base case scenarios is forecasted at 276 thousand cubic meters in Year 5, going up to 724 thousand cubic meters in Year 10, and reaching 793 thousand cubic meters by Year 20. Figure 8-7 shows the variances between each scenario.

Table 8-10. Total Direct Employment Forecast				
Scenarios	**Employees**	**Year 5**	**Year 10**	**Year 20**
Conservative Case	Managers	12	58	134
	Technicians	300	5,466	8,654
	Workers	510	6,450	11,270
	(Skilled)	354	5,596	9,705
	(Unskilled)	156	854	1,565
	Total	**822**	**11,974**	**20,058**
Base Case	Managers	151	360	461
	Technicians	3,740	10,773	17,477
	Workers	7,517	20,447	29,067
	(Skilled)	6,389	17,637	25,065
	(Unskilled)	1,128	2,810	4,002
	Total	**11,408**	**31,580**	**47,005**
Aggressive Case	Managers	273	560	880
	Technicians	5,463	14,127	22,424
	Workers	12,764	29,334	47,919
	(Skilled)	10,705	24,795	40,346
	(Unskilled)	2,059	4,539	7,573
	Total	**18,500**	**44,021**	**71,223**



Source. IDG

Figure 8-8. Cumulative New Jobs for the 20-Year Period

6.4 Employment

The industry summary from the previous chapter identified the number and types of employees required by companies in each industry sector. Labor categories were listed as: i) Managers (owners and mid to upper level management), ii) Technicians (lower to middle level managers, accountants, and supervisors) and iii) Workers -skilled and unskilled - (low-level supervisors, machine and assembly line operators, and drivers). Table 8-10 is an overview of the employment demand by category for the CSEZ for the 20-year demand period.

In the conservative case, the total number of jobs forecasted in Year 5 within the CSEZ is 822. By Year 10 employment raises to 11,974 and by Year 20, the zone will have 20,058 employees working within its parameters. Of those jobs in Year 20, 1,611 will be for unskilled labor.

For the base case, the total number of jobs forecasted in Year 5 is 11,408 – of which 1,128 are unskilled – growing to 31,580 skilled and 2,810 unskilled in Year 10. Under this scenario, in Year 20, there will be a total of 47,005 jobs within the CSEZ, of which 4,002 will be for unskilled labor.

Under the aggressive scenario, 18,500 jobs are forecasted for Year 5, 44,021 jobs for Year 10, and 71,223 jobs by Year 20. Of these jobs, 10,705, 24,795, and 40,346 are for skilled labor in Years 10, 15 and 20 respectively.

It should be noted that both the base case and aggressive case scenarios anticipate steady job growth over the 20-year demand period, while the conservative case sees employment numbers somewhat set by Year 8 (Figure 8-8). The GoJ should also keep in mind that different industry sectors require various types of skillsets, so the government may wish to court investors more in line with Jamaica's long-term educational and employment goals and objectives.

Chapter Ten

Infrastructure Assessment, Plans and Cost Estimates

1.0 Overview

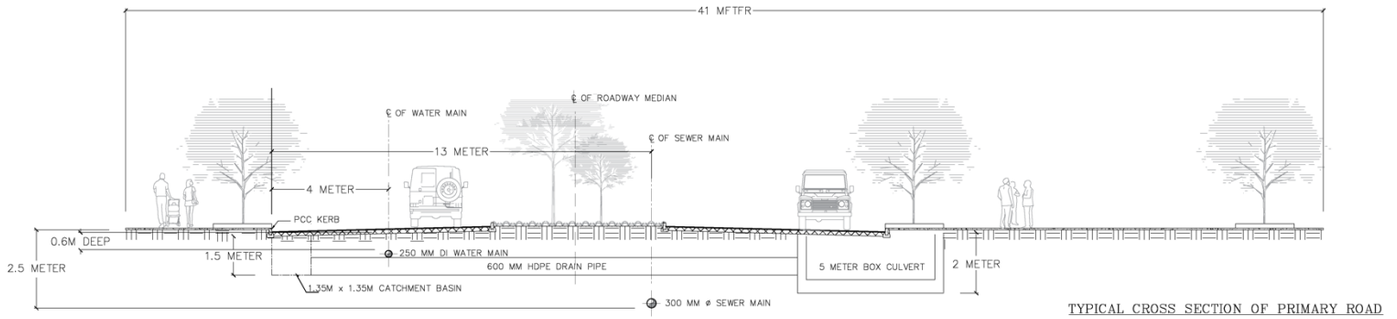
This chapter presents: i) infrastructure/utility requirements, ii) conceptual infrastructure/utility plans for the CSEZ and iii) cost estimates for the project, in accordance with the master plan prepared by Gensler. The cost estimates are for the earthworks and proposed infrastructure/utilities networks required to support the project. To better understand all aspects of the CSEZ project, the infrastructure/utility costs have been broken down into total project costs and by phase.

2.0 Infrastructure Assessment and Conceptual Infrastructure/Utility Plans

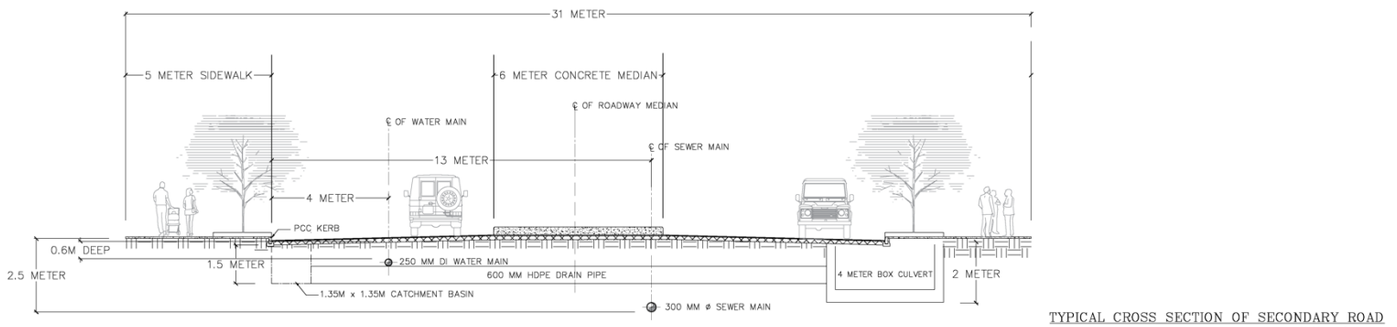
The following sections are an overview of the required on and off-site infrastructure/utilities for the CSEZ. They include conceptual infrastructure/utility plans for: i) roads, ii) power, iii) water, iv) drainage/storm water, and v) sewerage (wastewater/wastewater treatment) networks, as well as a description of the solid waste and telecommunications solutions for the project. The infrastructure/utilities for the CSEZ have been prepared taking into consideration the environment and by incorporating, wherever possible, eco-friendly solutions and green technology. All plans are developed for the 20-year, base case scenario identified in the demand forecast in Chapter 8.

2.1 Road Hierarchy

The road cross-sections below has been prepared to illustrate the types of roads within the CSEZ and the location of all other utility networks within the road right-of-way. As fully detailed in the master planning chapter, there are three-types of roads within the CSEZ with the following widths: i) a 41-meters, ii) 31-meters, and iii) 28-meters. The roads are to be prepared to international standards and to handle heavy traffic.



TYPICAL CROSS SECTION OF PRIMARY ROAD
SCALE 1 : 65



TYPICAL CROSS SECTION OF SECONDARY ROAD
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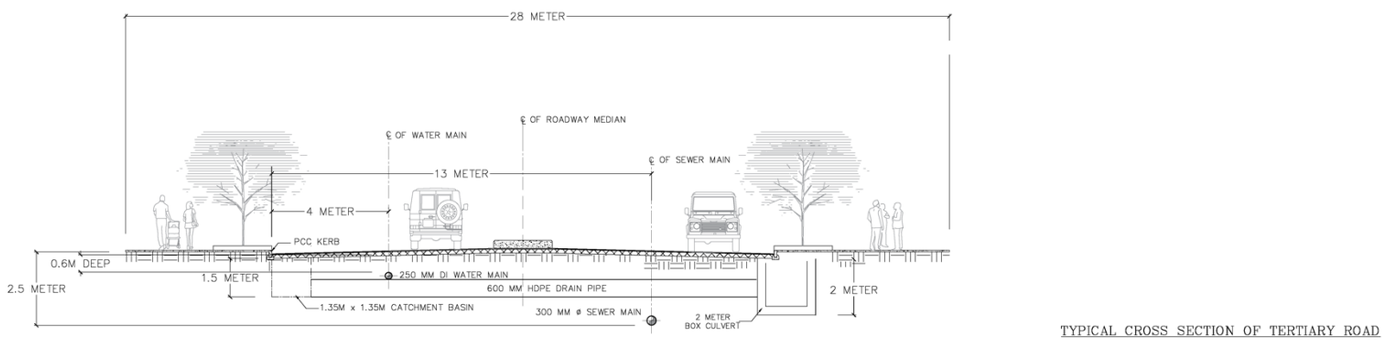


TYPICAL CROSS SECTION OF TERTIARY ROAD
SCALE 1 : 65

No	Date	Revision	By

CLIENT
PIOJ/JSEZA

PROJECT
CAYMANS SPECIAL ECONOMIC ZONE (CSEZ)

LEAD CONSULTANT
INTERNATIONAL DEVELOPMENT GROUP LLC

ASSISTANT CONSULTANT
FLUID SYSTEMS ENGINEERING LTD.
P.O. BOX 60, KINGSTON, JAMAICA

TITLE
TYPICAL CROSS SECTION OF PRIMARY, SECONDARY & TERTIARY ROADS

DESIGNED	MOJ	APPROVED		DRWG. No.
DRAWN	KC	DATE	JULY 2018	CSEZ 04
CHECKED	MOJ	SCALE	1 : 65	

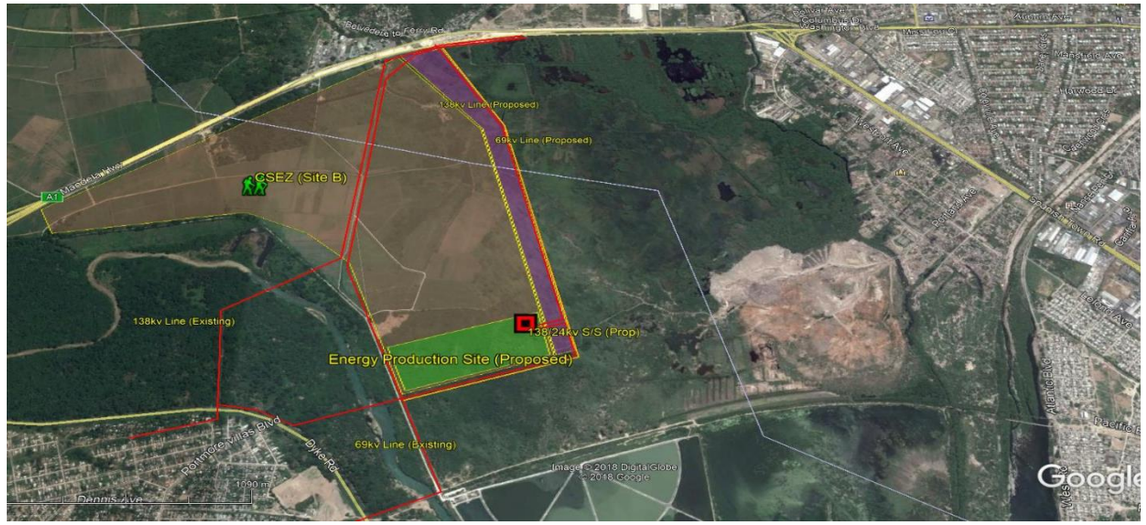


Figure 10-1. Map showing the 138 Kv and 69 Kv transmission lines in their present locations crossing the CSEZ and their proposed

2.2 Power Plan

2.2.1 Power Requirements for the CSEZ

Under the base case scenario, the CSEZ requires 20 Mega Volt Amps (MVA) of power over a 20-year period. IDG has examined many sources of power for the CSEZ from electricity to biogas. All options have been outlined below.

2.2.2 Utility Grid Power Supply Options for the CSEZ

Currently, there are two transmission lines traversing the CSEZ site, which are owned by JPS. These circuits are: i) a 138 Kilovolt (Kv) line consisting of wooden poles and H structures, which support 'Greely' 927.2 Kcm aluminum conductors, and ii) a 69 Kv transmission line consisting of wooden pole structures, which supports 'Canton' 394.5 Kcm aluminum conductors. The 69 Kv circuit transmits power via a radial circuit from the Duhaney substation to supply the 20 Mega Watt (MW) Naggo Head substation in Portmore. The 138 Kv circuit is a critical backbone link, which connects the Old Harbour power generation plant and the Duhaney substation. (See Figure 10-1.)

First, it must be noted that to have unobstructed use of the CSEZ lands, both the 138/69 Kv circuits need to be relocated to the eastern boundary of the CSEZ site. From detailed discussions with senior management at JPS's System Control and Engineering Departments, the relocation of these lines is possible. In addition, it is possible to support the CSEZ's projected power requirement of 20 MVA under the base case scenario from either of these two transmission lines, however, JPS would prefer that the CSEZ be connected from the 69 Kv Duhaney line to the Naggo Head line.

This is because the 138 Kv Old Harbour - Duhaney transmission lines are a critical component of the 138 Kv 'back bone' grid, that supplies bulk power directly from the Old Harbour Power Station to Duhaney substation. Currently, the Duhaney substation supplies significant industrial, commercial, and residential loads to Greater Kingston.

Alternatively, power for the CSEZ could be established off a tap from the 69 Kv Duhaney - Naggo Head radial feed. This feed has the distinct advantage of being less costly and would not present any of the protection/ reliability concerns, which would be presented by using the 138 Kv line described above. However, since the 69 Kv line would initially be a radial feed, it would not have the reliability of a node connected to the 138 Kv line, as radial lines are able to receive power from only one source, while a circuit node connection would allow power from more than one source. The only issue regarding the use of the 69 Kv feeder would be that the present conductor (Canton 394.5 MCM Aluminum) would have to be upgraded to a Darien 559 conductor between the Duhaney substation and the CSEZ, to enable the circuit to carry the additional 20 MVA load. As such, IDG recommends the construction of bay structures for the CSEZ substation to enable a '69 Kv feed-in and feed-out' from the outset of the project.

Design and construction issues regarding the support of this heavier conductor would be addressed during the relocation of both transmission lines (138 Kv Old Harbour to Duhaney and the 69 Kv Duhaney to Naggo Head) to the eastern boundary of the site, as mentioned above. Both circuits would pass to the east of the CSEZ for the 20 MVA substation. Here a 69 Kv line will tap in and out of the substation and continue to its dead-end point at Naggo Head in St. Catherine. The present capacity of the line is 53.975 MW with present peak loads of 24 MW.

Reliability of the 69 Kv transmission line should equate that of the 138 Kv option within the next 3-5 years, when a planned 69 Kv link is to be constructed between the New Twickenham and Naggo Head substations. With this link established, and the re-conducting of the line segment between Naggo Head and the CSEZ substation. At this time, the CSEZ would then be able to receive power from two sources, both the Naggo Head and Duhaney substations.

2.2.3 The Substation for the CSEZ

A 20 MVA (1x20MVA) 69 Kv – 24 Kv substation will have to be constructed within the zone to supply power to the CSEZ. Because the proposed 69 Kv line would initially be a radial feed, it is recommended that a 69 Kv ring bus be constructed in the CSEZ at the outset, in preparation for the future power feed from the Twickenham to Naggo Head link. A 24 Kv split bus should also be constructed in the CSEZ. This will allow a total load, in a loop configuration, within the CSEZ.

2.2.4 The Distribution Network: The Medium Voltage Plan for the CSEZ

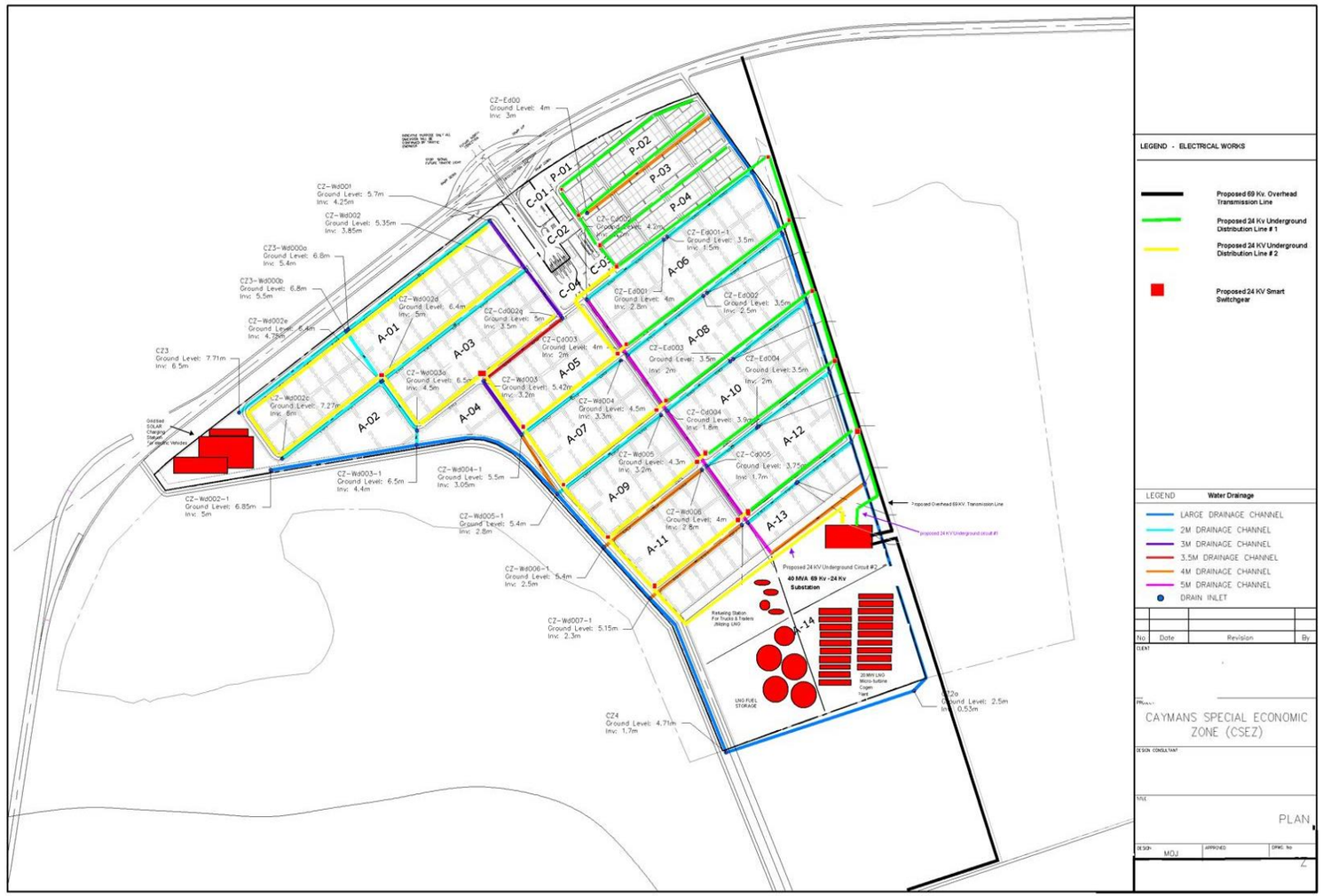
The following medium voltage circuit plan has been prepared for the CSEZ. It has been created to support a 20 MVA load. The power plan provides a 2 X 24 Kv underground circuit to supply the CSEZ's power loads. Each of these circuits are capable of carrying 50% of the power load for the project. The power cables to be used in the CSEZ will be tree resistant, cross-linked polyethylene (TRXLPE) underground cables with the conductors being 750 Kcm stranded, copper conductors, capable of carrying 562 Amps. Each circuit will consist of three of these cables running in schedule with the 40 PVC ducts and connected to a network of manholes throughout the zone. As seen in the power plan, the circuits for the CSEZ will leave the substation in different directions -one to the east and the other, to the west of the property.

An intelligent medium voltage junction and metal clad switchgears will aid in the flexibility of the system by allowing the loads on each street to be switched between feeders, as dictated by loading, circuit maintenance, or emergency outage requirements on particular blocks or line segment. This arrangement will also allow for isolation switching, which may help the maintenance of other underground services such as water and sewage, without affecting the power supply to the CSEZ's individual tenants.

These switchgears will not only serve as a 'branch line protection' but will also serve as the protected supply points to the respective plots. Each metal clad switchgear will be capable of supplying a maximum of eight plots. Other features of the switchgear like the Supervisory Control and Data Acquisition (SCADA) and SF6 insulations, will enable remote monitoring and on load switching by JPS or by other authorized engineers.

2.2.5 Phasing of the Power Network

The phasing plan for the power infrastructure within the CSEZ is as follows. For Phase I, the relocation of the existing 138 Kv and 69 Kv transmission lines, which now cross the property will be moved to the eastern boundary of the site. The new 69 Kv line, the construction of the 20 MVA substation, and the site's distribution lines will be undertaken during this first phase. For Phase II, a Liquefied Natural Gas (LNG) storage facility could be constructed, if an agreement could be made with New Fortress Energy. The use of LNG for the CSEZ would substantially reduce the tenant's power costs and would make the project more attractive to investors.


LEGEND - ELECTRICAL WORKS
Proposed 69 Kv. Overhead Transmission Line
Proposed 24 Kv Underground Distribution Line # 1
Proposed 24 KV Underground Distribution Line # 2
Proposed 24 KV Smart Switchgear
LEGEND Water Drainage
LARGE DRAINAGE CHANNEL
2M DRAINAGE CHANNEL
3M DRAINAGE CHANNEL
3.5M DRAINAGE CHANNEL
4M DRAINAGE CHANNEL
5M DRAINAGE CHANNEL
DRAIN INLET
CAYMANS SPECIAL ECONOMIC ZONE (CSEZ)
PLAN
MDJ
40 MVA 69 Kv -24 Kv Substation
Proposed 24 KV Underground Circuit #2
Proposed Overhead 69 KV. Transmission Line
LNG FUEL STORAGE
20 MW LNG Micro-turbine Cogen Plant
Refueling Station For Trucks & Trailers Utilizing LNG
CZ-Ed00 Ground Level: 4m Inv: 3m
CZ-Wd001 Ground Level: 5.7m Inv: 4.25m
CZ-Wd002 Ground Level: 5.35m Inv: 3.85m
CZ3-Wd000a Ground Level: 6.8m Inv: 5.4m
CZ3-Wd000b Ground Level: 6.8m Inv: 5.5m
CZ-Wd002e Ground Level: 6.4m Inv: 4.78m
CZ3 Ground Level: 7.71m Inv: 6.5m
CZ-Wd002c Ground Level: 7.27m Inv: 6m
CZ-Wd002-1 Ground Level: 6.85m Inv: 5m
CZ-Wd002d Ground Level: 6.4m Inv: 5m
CZ-Cd002g Ground Level: 5m Inv: 3.5m
CZ-Wd003a Ground Level: 6.5m Inv: 4.5m
CZ-Wd003-1 Ground Level: 6.5m Inv: 4.4m
CZ-Wd004-1 Ground Level: 5.5m Inv: 3.05m
CZ-Wd005-1 Ground Level: 5.4m Inv: 2.8m
CZ-Wd006-1 Ground Level: 5.4m Inv: 2.5m
CZ-Wd007-1 Ground Level: 5.15m Inv: 2.3m
CZ4 Ground Level: 4.71m Inv: 1.7m
CZ-Cd001 Ground Level: 4.2m
CZ-Ed001-1 Ground Level: 3.5m Inv: 1.5m
CZ-Ed001 Ground Level: 4m Inv: 2.8m
CZ-Ed002 Ground Level: 3.5m Inv: 2.5m
CZ-Cd003 Ground Level: 4m Inv: 2m
CZ-Ed003 Ground Level: 3.5m Inv: 2m
CZ-Ed004 Ground Level: 3.5m Inv: 2m
CZ-Wd005 Ground Level: 5.42m Inv: 3.2m
CZ-Wd004 Ground Level: 4.5m Inv: 3.3m
CZ-Cd004 Ground Level: 3.9m Inv: 1.8m
CZ-Wd005 Ground Level: 4.3m Inv: 3.2m
CZ-Cd005 Ground Level: 3.75m Inv: 1.7m
CZ-Wd006 Ground Level: 4m Inv: 2.8m
CZ12o Ground Level: 2.5m Inv: 0.55m
P-01
P-02
P-03
P-04
C-01
C-02
C-03
C-04
A-01
A-02
A-03
A-04
A-05
A-06
A-07
A-08
A-09
A-10
A-11
A-12
A-13
A-14

2.2.6 Renewable/ Clean Energy Options

IDG investigated a number of renewable/clean energy options for the CSEZ. They are as follows:

- **A Solar Panel System.** The physical location and topography of the CSEZ allows for solar energy to be a viable option for the CSEZ project. If approximately 30 percent of the buildings within the CSEZ have roofs available for the installation of a Grid Tie Solar Photovoltaic system, then some 13 MW of power can be produced and sent back to the national grid on a daily basis.

  This option would make use of JPS's existing standard offer of a grid tie contract facility, which allows individual commercial customers to install up to 100 KW through a Grid Tie Pv Solar system within a project. This renewable generation would then reduce the tenant's overall daily demand, which would in turn reduce the cost of the tenant's monthly energy bill, under a net billing arrangement. The individual tenant in the CSEZ however, would have to undertake the initial Grid Tie system installation cost. A Solar PV technology system lead by tenants within the CSEZ would reduce the overall daily, daytime power demand within the zone, at minimum, by approximately 50%.

- **Liquefied Natural Gas.** Jamaica is the first country in the English-speaking Caribbean to utilize LNG for base load power generation, standby power, and vehicle fuel. The American company, New Fortress Energy has established off loading and re-gasification facilities in Montego Bay and presently supplies LNG to customers throughout the island. New Fortress Energy has further plans to construct a much larger floating facility within the Portland Bight Clarendon area, which will serve as a Caribbean wide LNG supply hub. The construction of this hub is scheduled to be completed by 2019. This floating facility will be replenished with gas from ships and will supply a shore side distribution/storage facility through the use of underwater pipes. The timing of this LNG facility is ideal for the CSEZ project. A developer has two options to reduce his cost of providing an LNG generation plant within the CSEZ: i) negotiate directly with New Fortress Energy to construct the power infrastructure under a PPP or under negotiated terms, or ii) use JPS's new LNG option, where the LNG generation plant is constructed at no initial cost but the CSEZ would have to enter into an exclusive, long-term power purchase agreement with JPS at a fixed cost per Kilo watt hour (KWH). The developer would however, be responsible for constructing the substation and underground distribution lines. The advantage of an LNG power system would be that gensets are modular, scalable, (may be increased

over time with demand) and are able to provide the CSEZ with power as well as steam for commercial /industrial uses, such as hot water production and absorption cooling.

2.2.7 Backup Power, Peak Shaving, and Net Metering

- **Backup Power.** Backup power is required for the CSEZ. Each tenant in the zone should have a stand-alone backup micro generator fueled by LNG to keep power going in the zone during periods when JPS is unable to deliver grid power. I.E. Immediately after a hurricane or when transmission lines are de-energized due to various technical system problems and/or natural phenomena, such as lightning.

- **Peak Shaving.** Micro generators could also operate during a peak shaving mode, where the generators are brought online in parallel with the JPS supply, during times of the day when the zone is at its peak electricity demand. Savings may be achieved during such periods because LNG prices are generally less costly than electrical energy purchased from JPS.

- **Net Metering.** Micro generators could also be used during periods when the CSEZ is lightly loaded so the energy produced could be "sold back" to JPS under a "Net billing" Power Purchase agreement. This could be a good revenue earner for the CSEZ, if a good "buy back" rate was negotiated.

2.2.8 Attributes of Micro Turbine Technology

The following are the key attributes of micro generators for the CSEZ. It has:

- Available electrical output from integrated modular packages up to 1,000 kW.

- Thermal output exhaust temperatures in the range of 500 to 600 °F, suitable for supplying a variety of thermal needs, including hot water, steam, and chilled water (using an absorption chiller).

- Fuel flexibility, which can utilize a number of different fuels, including natural gas, sour gas (high sulfur, low Btu content), and liquid fuels. (I.E. Gasoline, kerosene, diesel fuel, and heating oil.)

- Reliability and design life, which is estimated to be 40,000 to 80,000 hours with overhaul.
- Emissions low NOx combustion when operating on natural gas; capable of meeting stringent standards with carbon monoxide/volatile organic compound (CO/VOC) oxidation catalyst.
- Modularity Units may be connected in parallel to serve larger loads and to provide power reliability.
- Part-loaded operation units can be operated to follow load with some efficiency penalties. Dimensions are compact and light weight, 2.3-2.7 cubic feet (cf) and 40-50 pounds per kW.

Because the CSEZ is relatively close to the Old Harbour New Fortress Hub, the zone could be quickly replenished especially if an LNG storage facility was constructed at the rear of the CSEZ site (See Power Plan). The gas from this area would also be a dedicated feed for the micro generators within the CSEZ.

2.2.9 Biogas

The CSEZ is bordered to the south by the Soapberry Wastewater Treatment Plant (WWTP), which receives over 20,000 gallons of raw sewage daily. The chemical breakdown and treatment of the sewage is based on a natural anaerobic digestion process, which releases methane into the atmosphere. It has been demonstrated that the methane derived from Soapberry can be used to fire micro turbine generators to produce electricity and heat.

Although there may be some factors to consider, which are negative, such as increased maintenance costs for harnessing the methane, as well as the cost associated with filtering (scrubbing) of the input methane to reduce damaging constituents (such as moisture, H2S (Hydrogen Sulfide) and Carbon Dioxide), the potential use of methane should at least be studied further as a possible power supply for the CSEZ. If found to be a viable option, methane could easily be piped from Soapberry to the CSEZ to off-set the power costs of the project. It should be noted that LNG possesses methane of a much higher energy value and is cleaner than via Soapberry, but LNG would have to be procured at world market prices, and regularly transported to the CSEZ.

2.3 Water Plan

2.3.1 Water Demand for the CSEZ

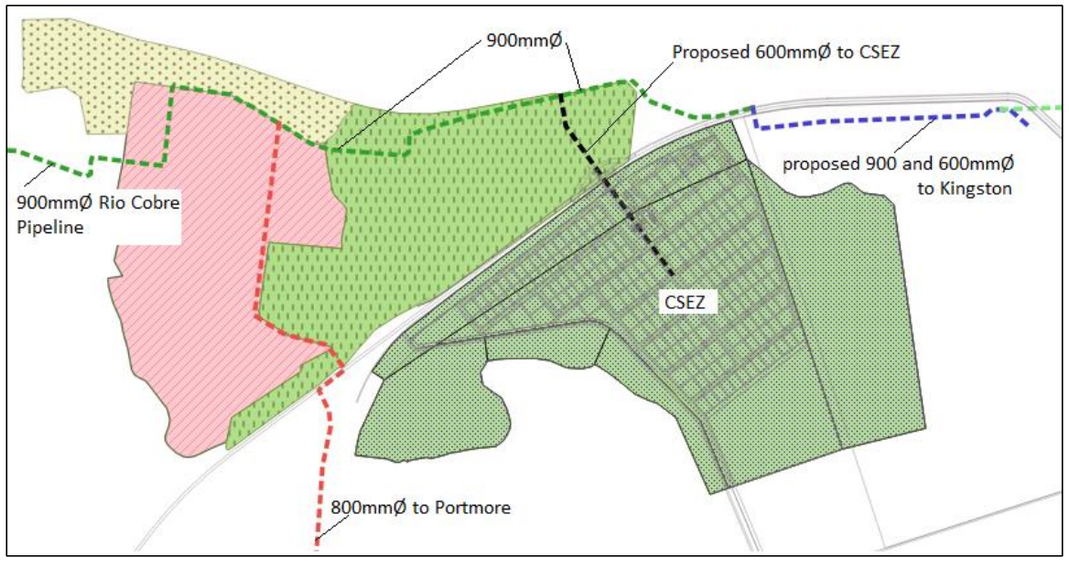
The water supply requirement for the CSEZ has been identified from the project's demand forecast. The water supply requirement for the CSEZ to "Year 5" under the base case scenario is 276,000m³/month or approximately 9,200m³/day.

2.3.2 Existing Water Infrastructure

The principal source of water for the Greater Kingston Region comes from ground and surface water production facilities, which are located throughout the demand areas. The water supply networks servicing the Greater Kingston Region are linked by a major, west to east 900mmØ transfer main, which traverses approximately 1-km north of the CSEZ. This transfer main is part of the Rio Cobre Water Supply Scheme, which has a licensed and installed capacity of approximately 75,000m³/day. This transmission main currently transfers approximately 40,000m³/day to the Kingston supply network.

It should be noted that historically, during periods of extended dry climatic conditions, the availability of the above water quantities has been compromised. To improve the reliability of Kingston and Portmore's water supply, the National Water Commission (NWC) is currently undertaking several water improvement projects. The most significant improvement project is the J$5 billion, 'Kingston and St. Andrew Non-Revenue Water Reduction Co-Management Program (2015-2020)' being co-managed by NWC and Miya (water efficiency experts), which was initiated in late 2016. This project aims to cut by half, the assessed 60% level of Non-Revenue Water (NRW). I.E. if Kingston requires approximately 200,000m^3/day of water, then NRW is estimated at 120,000m^3/day. If water losses due to physical infrastructure deficiencies are taken at 50% of NRW, and the 50% target of the project is achieved, then an additional 30,000m^3/day of water would become available and would by itself, address the water demand for the CSEZ.

In addition to the above water program, new transmission mains are currently being installed to provide more flexibility in the water supply arrangements between the Spanish Town and Greater Portmore Water Systems. These



Source: IDG
Figure 10-2. Location of Existing Water Supply Infrastructure

improvements will result in improved water supply network reliability for the Kingston water network and improved water supply from the 900mmØ transfer main, earmarked to supply the CSEZ.

2.3.3 Location of Existing Water Supply Infrastructure

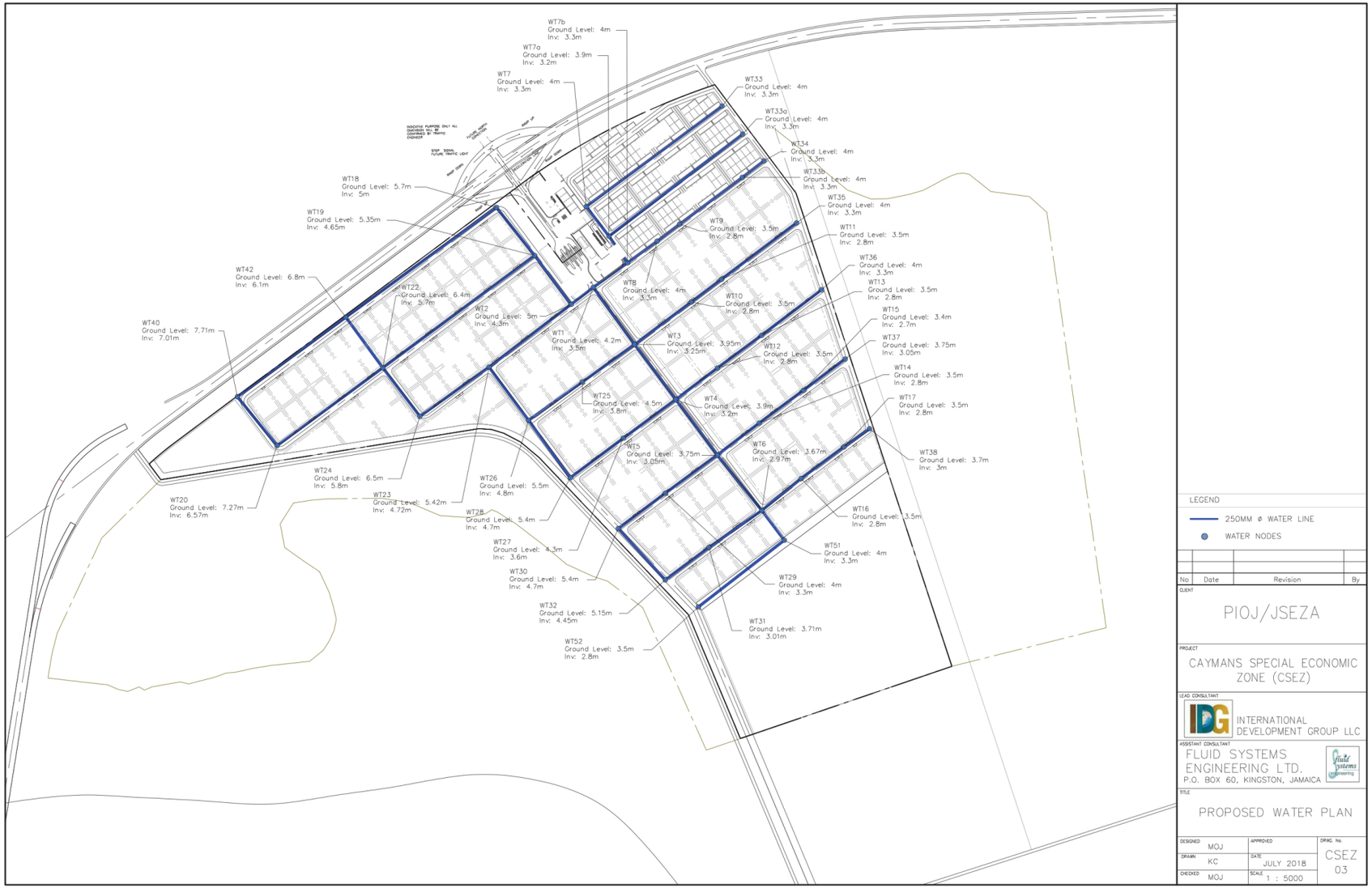
The illustration on the left sets out the relative location and sizes of existing and proposed water truck mains in the vicinity of the CSEZ. (Figure 10-2). The existing mains are all new installations being less than 5 years old and represent infrastructure needs assessed over the next 25 years and beyond. The proposed 900 and 600mmØ mains to Kingston (shown in blue) are currently under construction.

2.3.4 Future Water Supply Infrastructure

Beyond "Year 5", the NWC and the Development Bank of Jamaica (DBJ) are also preparing projects that will further improve the supply to the Kingston and Portmore areas. A PPP project for an additional 65,000m³/day to be located in Spanish Town intended to augment water supply to the Rio Cobre Water Scheme, is in an advanced stage of negotiation and could see construction initiated by the end of 2019.

2.3.5 Water Supply Plan for the CSEZ

The internal potable water supply infrastructure for the CSEZ has been designed to meet the needs of the base case water supply requirement in accordance with the 20-year demand.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WT7a Ground Level: 3.9m Inv: 3.2m
WT7 Ground Level: 4m Inv: 3.3m
WT33 Ground Level: 4m Inv: 3.3m
WT33a Ground Level: 4m Inv: 3.3m
WT34 Ground Level: 4m Inv: 3.3m
WT33b Ground Level: 4m Inv: 3.3m
WT35 Ground Level: 4m Inv: 3.3m
WT18 Ground Level: 5.7m Inv: 5m
WT19 Ground Level: 5.35m Inv: 4.65m
WT9 Ground Level: 3.5m Inv: 2.8m
WT11 Ground Level: 3.5m Inv: 2.8m
WT42 Ground Level: 6.8m Inv: 6.1m
WT36 Ground Level: 4m Inv: 3.3m
WT22 Ground Level: 6.4m Inv: 5.7m
WT8 Ground Level: 4m Inv: 3.3m
WT13 Ground Level: 3.5m Inv: 2.8m
WT10 Ground Level: 3.5m Inv: 2.8m
WT2 Ground Level: 5m Inv: 4.3m
WT15 Ground Level: 3.4m Inv: 2.7m
WT40 Ground Level: 7.71m Inv: 7.01m
WT1 Ground Level: 4.2m Inv: 3.5m
WT3 Ground Level: 3.95m Inv: 3.25m
WT37 Ground Level: 3.75m Inv: 3.05m
WT12 Ground Level: 3.5m Inv: 2.8m
WT14 Ground Level: 3.5m Inv: 2.8m
WT25 Ground Level: 4.5m Inv: 3.8m
WT4 Ground Level: 3.9m Inv: 3.2m
WT17 Ground Level: 3.5m Inv: 2.8m
WT5 Ground Level: 3.75m Inv: 3.05m
WT6 Ground Level: 3.67m Inv: 2.97m
WT38 Ground Level: 3.7m Inv: 3m
WT24 Ground Level: 6.5m Inv: 5.8m
WT26 Ground Level: 5.5m Inv: 4.8m
WT20 Ground Level: 7.27m Inv: 6.57m
WT23 Ground Level: 5.42m Inv: 4.72m
WT28 Ground Level: 5.4m Inv: 4.7m
WT16 Ground Level: 3.5m Inv: 2.8m
WT27 Ground Level: 4.3m Inv: 3.6m
WT51 Ground Level: 4m Inv: 3.3m
WT30 Ground Level: 5.4m Inv: 4.7m
WT29 Ground Level: 4m Inv: 3.3m
WT32 Ground Level: 5.15m Inv: 4.45m
WT31 Ground Level: 3.71m Inv: 3.01m
WT52 Ground Level: 3.5m Inv: 2.8m
LEGEND
250MM Ø WATER LINE
WATER NODES
No Date Revision By
CLIENT
PIOJ/JSEZA
PROJECT
CAYMANS SPECIAL ECONOMIC ZONE (CSEZ)
LEAD CONSULTANT
INTERNATIONAL DEVELOPMENT GROUP LLC
ASSISTANT CONSULTANT
FLUID SYSTEMS ENGINEERING LTD.
P.O. BOX 60, KINGSTON, JAMAICA
TITLE
PROPOSED WATER PLAN
DESIGNED MOJ
DRAWN KC
CHECKED MOJ
APPROVED
DATE JULY 2018
SCALE 1 : 5000
DRNG. No. CSEZ 03

Subcatchment	Area (Ha)	Description	Land_Use
40 CSEZ	196.5	Urban_85%_imperv	12
41 RioC	14.9	Sagebrush	323
43 RioC	48.1	Sagebrush	323
44 RioC	17.1	Sagebrush	323
CSEZ 42<2.5m	104.0	Sagebrush	323
Setback	52.9	Urban_85%_imperv	12

Source: IDG/FSE
Figure 10-3. CSEZ land boundaries

2.4 Drainage Plan

2.4.1 Drainage Requirements

IDG's hydrology and drainage evaluation of the CSEZ lands identified 236-ha of land, which are generally well protected from flooding and can be used, with drainage infrastructure, to support the requirements of the CSEZ. To make these lands viable IDG has made all finished floor levels within the CSEZ above 4.0-m AMSL. This is the area denoted in gray in Figure 10-3 (to the left).

2.4.2 The Drainage Plan for the CSEZ

The following drainage plan has been prepared for the CSEZ. It is based on the topography, drainage requirements, and the type and density of the development proposed for the zone. This plan was derived from the drainage model prepared by Fluid Systems Engineering Ltd.

2.4.3 Main Features of Drainage Systems

The drainage systems within the CSEZ consists of a series of tertiary, secondary and primary sub-division drains, which discharge ultimately to sub-regional drainage features, which then lead to the sea. All lands within the CSEZ will be raised to a minimum of 3.75-m AMSL. The following is an overview of each drain type and system:

Tertiary Drains: Plots will discharge surface flows to the roads, which have tertiary drains or directly to the drainage channels that might be adjacent to some plots. The tertiary drains, channels, and roads will accommodate design storm flows to a minimum of 1:2 years return period to the crown of the road.

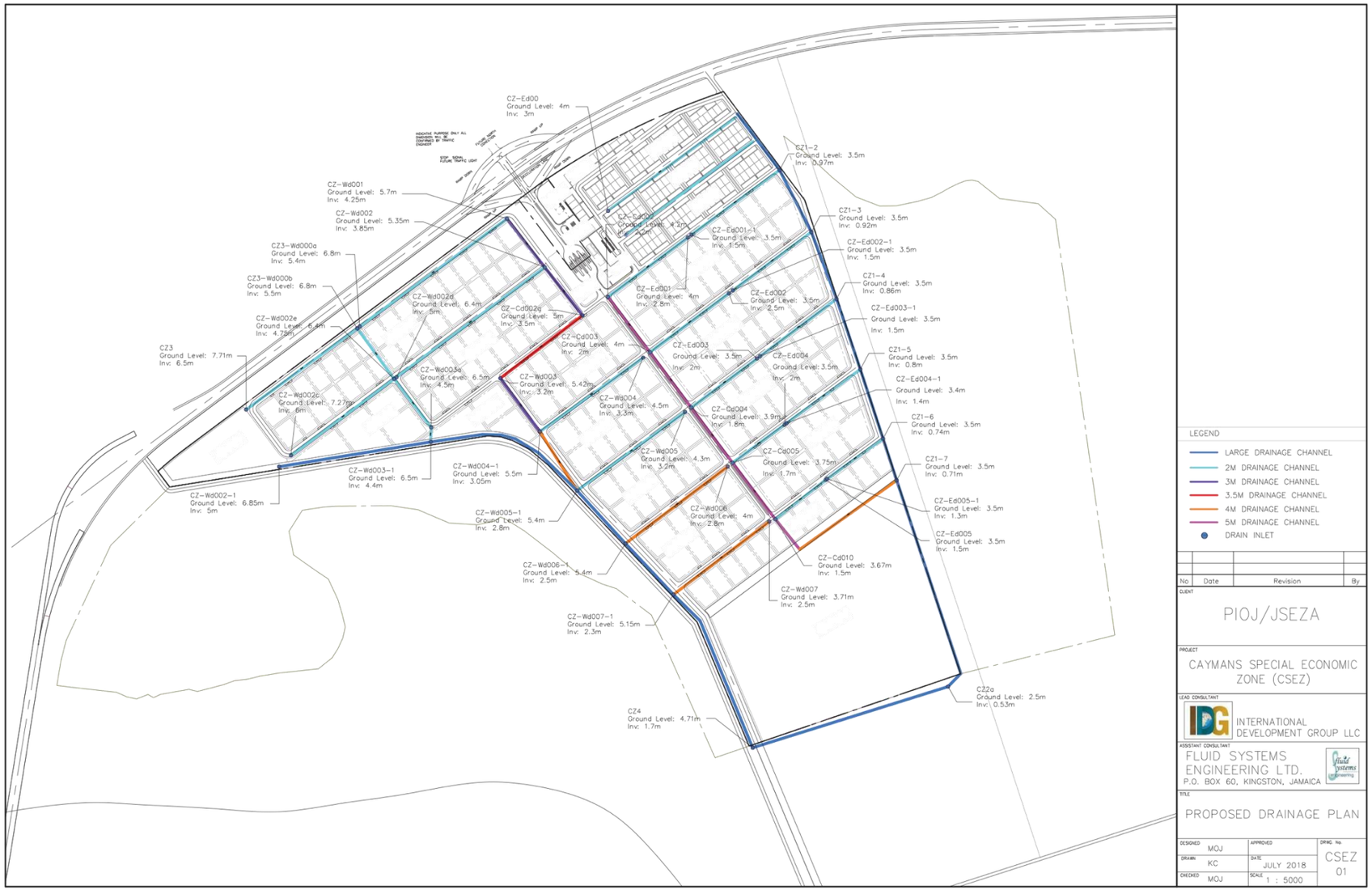
Secondary Drains: Concrete culverts have been provided under the roadway, serviced by regularly spaced catch basins (30-m) with gratings and curb inlets. These concrete culverts vary in size from 2 to 5-m in width and are generally 2-m deep. The culverts have been designed to accommodate storms of 1:10 to 1:25 years return period, with a freeboard provision of 25% depth of flow depending on if they intercept other drains.

Primary Drains: To the west and east of the CSEZ, major primary drains have been provided, which are in the form of 30-m and 40-m wide earth drains. These drains have 4-m wide paved inverts to provide access for the maintenance of these drains and also to provide a preferred drainage path for periods of low flow. The primary drains have capacity for the 1:100 years design storm at top bank levels.

Sub-Regional Drainage Features: In order to protect the CSEZ from extreme storm events, which might be compounded by the coinciding occurrence of a high storm surge (elevated water over 2-m AMSL), a flood regulation area has been proposed in the south portion of the CSEZ site. This flood regulation area covers 55-ha of land and will provide a minimum of 675,000m³ of regulation storage, which will contain/regulate storm runoff from the CSEZ until storm surges subside.

2.4.4 External Drainage Features

It should be noted that the CSEZ's drainage system will operate independently of any other adjacent drainage areas, which might have their own set of drainage issues. This is particularly so for the subsequent efforts that might be required and implemented to drain the CEDA North lands, where high flood water levels could be created in the Duhaney River basin south of the highway.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Ground Level: 4m
Inv: 3m
CZ-Wd001
Ground Level: 5.7m
Inv: 4.25m
CZ-Wd002
Ground Level: 5.35m
Inv: 3.85m
CZ3-Wd000a
Ground Level: 6.8m
Inv: 5.4m
CZ3-Wd000b
Ground Level: 6.8m
Inv: 5.5m
CZ-Wd002e
Ground Level: 6.4m
Inv: 4.75m
CZ3
Ground Level: 7.71m
Inv: 6.5m
CZ-Wd002c
Ground Level: 7.27m
Inv: 6m
CZ-Wd002d
Ground Level: 6.4m
Inv: 5m
CZ-Cd002g
Ground Level: 5m
Inv: 3.5m
CZ-Wd003a
Ground Level: 6.5m
Inv: 4.5m
CZ-Cd003
Ground Level: 4m
Inv: 2m
CZ-Wd003
Ground Level: 5.42m
Inv: 3.2m
CZ-Wd004
Ground Level: 4.5m
Inv: 3.3m
CZ-Wd002-1
Ground Level: 6.85m
Inv: 5m
CZ-Wd003-1
Ground Level: 6.5m
Inv: 4.4m
CZ-Wd004-1
Ground Level: 5.5m
Inv: 3.05m
CZ-Wd005-1
Ground Level: 5.4m
Inv: 2.8m
CZ-Wd006-1
Ground Level: 5.4m
Inv: 2.5m
CZ-Wd007-1
Ground Level: 5.15m
Inv: 2.3m
CZ4
Ground Level: 4.71m
Inv: 1.7m
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Ground Level: 3.5m
Inv: 2.5m
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Inv: 2.8m
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Inv: 2m
CZ-Cd004
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Inv: 3.2m
CZ-Cd005
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Inv: 1.7m
CZ-Wd006
Ground Level: 4m
Inv: 2.8m
CZ-Cd010
Ground Level: 3.67m
Inv: 1.5m
CZ-Wd007
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Inv: 0.97m
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CZ-Ed004-1
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CZ1-7
Ground Level: 3.5m
Inv: 0.71m
CZ-Ed005-1
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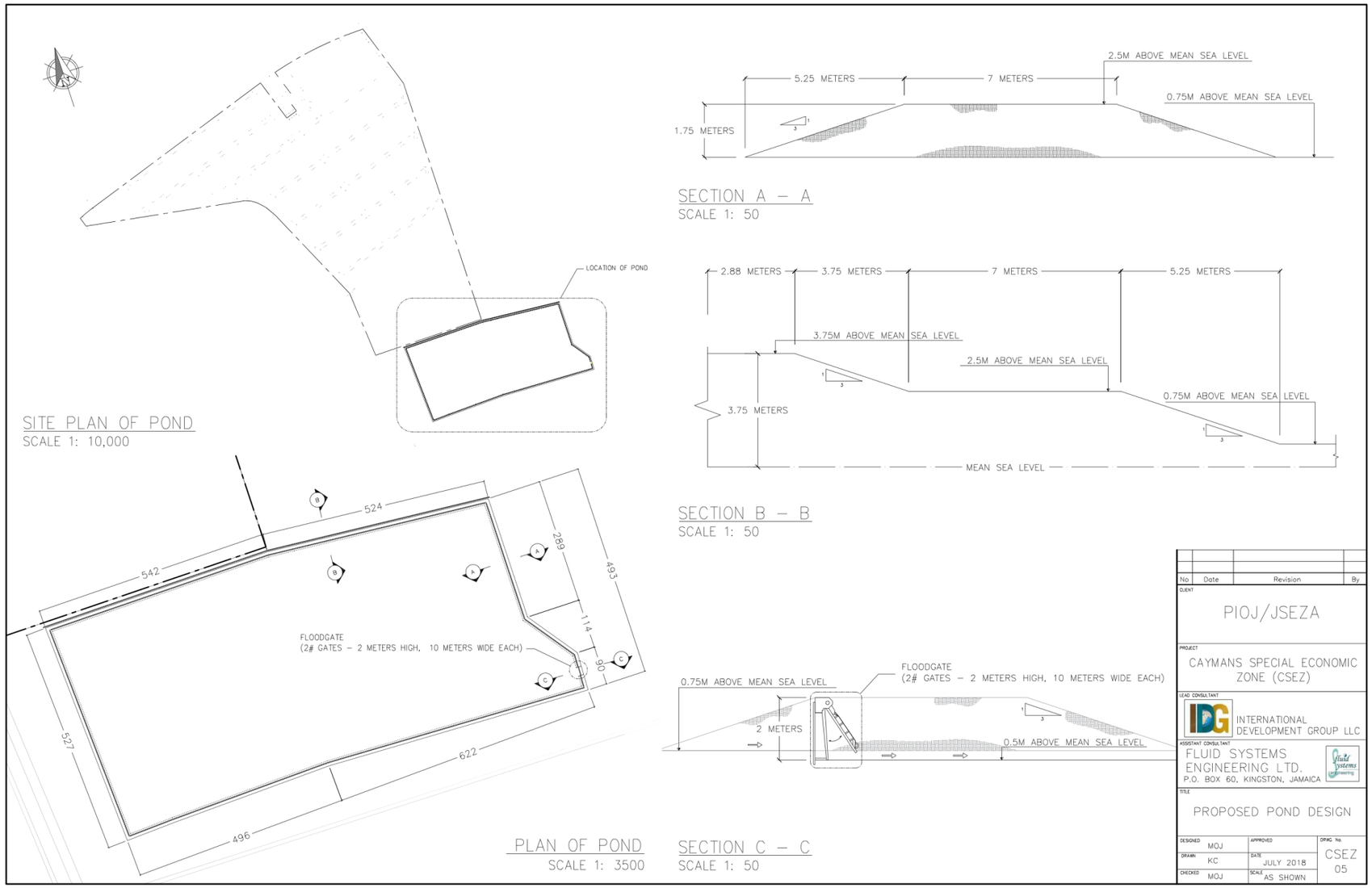
Inv: 1.3m
CZ-Ed005
Ground Level: 3.5m
Inv: 1.5m
CZ2a
Ground Level: 2.5m
Inv: 0.53m
LEGEND
LARGE DRAINAGE CHANNEL
2M DRAINAGE CHANNEL
3M DRAINAGE CHANNEL
3.5M DRAINAGE CHANNEL
4M DRAINAGE CHANNEL
5M DRAINAGE CHANNEL
DRAIN INLET
No. Date Revision By
CLIENT
PIOJ/JSEZA
PROJECT
CAYMANS SPECIAL ECONOMIC ZONE (CSEZ)
LEAD CONSULTANT
INTERNATIONAL DEVELOPMENT GROUP LLC
ASSISTANT CONSULTANT
FLUID SYSTEMS ENGINEERING LTD.
P.O. BOX 60, KINGSTON, JAMAICA
TITLE
PROPOSED DRAINAGE PLAN
DESIGNED MOJ
DRAWN KC
CHECKED MOJ
APPROVED
DATE JULY 2018
SCALE 1 : 5000
DRWG No. CSEZ 01


LOCATION OF POND
SITE PLAN OF POND
SCALE 1: 10,000
2.5M ABOVE MEAN SEA LEVEL
5.25 METERS
7 METERS
0.75M ABOVE MEAN SEA LEVEL
1.75 METERS
SECTION A – A
SCALE 1: 50
2.88 METERS
3.75 METERS
7 METERS
5.25 METERS
3.75M ABOVE MEAN SEA LEVEL
2.5M ABOVE MEAN SEA LEVEL
0.75M ABOVE MEAN SEA LEVEL
3.75 METERS
MEAN SEA LEVEL
SECTION B – B
SCALE 1: 50
524
289
493
542
114
90
FLOODGATE
(2# GATES – 2 METERS HIGH, 10 METERS WIDE EACH)
527
622
496
PLAN OF POND
SCALE 1: 3500
0.75M ABOVE MEAN SEA LEVEL
FLOODGATE
(2# GATES – 2 METERS HIGH, 10 METERS WIDE EACH)
2 METERS
0.5M ABOVE MEAN SEA LEVEL
SECTION C – C
SCALE 1: 50
No Date Revision By
CLIENT
PIOJ/JSEZA
PROJECT
CAYMANS SPECIAL ECONOMIC ZONE (CSEZ)
LEAD CONSULTANT
INTERNATIONAL DEVELOPMENT GROUP LLC
ASSISTANT CONSULTANT
FLUID SYSTEMS ENGINEERING LTD.
P.O. BOX 60, KINGSTON, JAMAICA
TITLE
PROPOSED POND DESIGN
DESIGNED MOJ
DRAWN KC
CHECKED MOJ
APPROVED
DATE JULY 2018
SCALE AS SHOWN
DRWG No. CSEZ 05

2.5 Sewerage Plan

2.5.1 Sewerage Demand and Scheduling for the CSEZ

The sewerage requirement for the CSEZ has been identified from the project's demand forecast. The water supply requirement for the CSEZ to "Year 5" under the base case scenario is 276,000m³/month or approximately 9,200m³/day. Typically, for industrial uses, the relationship between water supply and sewerage production is between 75% and 90% depending on the profile of the industries being served. As such, IDG has developed the sewerage services for the CSEZ based on the assumption of 90% water use, which represents sewerage production of 8,280m³/day. At best, sewerage services would be required two years after project initiation. The typical preparation period of a zone is eighteen to twenty-four months to undertake geotechnical surveys, construction drawings for the zone, implementation of the land preparation and site drainage protection, and the procurement of on-site infrastructure works. This schedule is considered aggressive, even if some of the activities outlined were consolidated.

2.5.2 Existing Sewerage Infrastructure

The CSEZ is located strategically between two major urban centers (Kingston and Portmore), each with populations of approximately 700,000 and 300,000 persons respectively. Existing sewerage treatment infrastructure exists for these urban areas and as such, the CSEZ is to be connected to existing facilities using a pre-treatment system within the CSEZ to ensure that the industrial waste has been brought within discharge regulations before entering the utility wastewater treatment network.

2.5.3 Sewerage Treatment Facilities Around the CSEZ

The Soapberry WWTP is the principal sewerage treatment facility for the Greater Kingston area. Soapberry is located south of the CSEZ site. This facility has a licensed and installed capacity of approximately 75,000m³/day. For the Greater Portmore urban center, the treatment facility is to the south west of the Greater Portmore development area and is quite distant from the CSEZ site. The Portmore facility currently has a licensed and installed capacity of approximately 15,000m³/day. However, there is a current project underway to upgrade the Portmore facility. The project is expected to increase the capacity of the WWTP by 40% and this will occur in two phases. This will ultimately

result in a capacity of 21,000m³/day for the Portmore facility. Due to proximity, the Soapberry WWTP would be used for the CSEZ project.

The existing sewerage flows to the Soapberry WWTP is estimated at 60,000m³/day. This means that the current reserve capacity at this facility is 15,000m³/day, which is more than the reserve required for the CSEZ's "Year 5" base case scenario of 8,280m³/day. Some of the reserve capacity at the Soapberry WWTP (4,500m³/day) has been blocked out for the CEDA. That said, there are a number of other major development projects being undertaken under the Major Infrastructure Development Project (MIDP) in the catchment area of the Soapberry WWTP, which when commissioned, will lead to increased sewerage flows to the Soapberry WWTP. Hence, it will be important that the GoJ ensures that the expansion of the Soapberry facility over the coming years occurs and is properly designed to accommodate the CSEZ, other development projects on the CEDA North lands and within the catchment area. It should be noted that various parts of the collection system in Soapberry's catchment area are known to be significantly impacted by infiltration from rainfall events. The impact of this infiltration can exceed the rated capacity of the Soapberry WWTP. This too should be considered when the Soapberry expansion is negotiated.

2.5.4 Future Sewerage Treatment Infrastructure

If the Soapberry expansion does not occur in the near term, a collaborative effort between the CSEZ Project and NWC could be arranged to manage the wastewater treatment for the CSEZ in a private manner. If this was necessary, a compact 8,280m³/day active sludge WWTP for the CSEZ could be constructed on a relatively small plot of land (5 ha) within or adjacent the site to establish a natural based waste water system. The cost of this infrastructure would be approximately USD$15,000,000.00.

2.5.5 Sewerage Plan for the CSEZ

The following sewerage plan has been designed for the CSEZ's 20-year sewage requirement. It connects into the Soapberry WWTP and provides pre-treatment for the zone's industrial sewerage.


MH8 Ground Level: 4m Invc: 1.4m
MH7b Ground Level: 4m Invc: 1.03m
MH7a Ground Level: 3.9m Invc: 1.27m
MH7 Ground Level: 4m Invc: 1.55m
MH33 Ground Level: 4m Invc: 2.5m
MH33a Ground Level: 4m Invc: 2.5m
MH34 Ground Level: 4m Invc: 2.5m
MH33b Ground Level: 4m Invc: 2.25m
MH35 Ground Level: 4m Invc: 2.5m
MH18 Ground Level: 5.7m Invc: 3.65m
MH19 Ground Level: 5.35m Invc: 2.95m
MH2 Ground Level: 5m Invc: 2.55m
MH9 Ground Level: 3.5m Invc: 1.68m
MH11 Ground Level: 3.5m Invc: 1.75m
MH42 Ground Level: 6.8m Invc: 5m
MH12 Ground Level: 6.4m Invc: 1.3m
MH3 Ground Level: 3.95m Invc: 0.6m
MH36 Ground Level: 4m Invc: 2m
MH10 Ground Level: 3.5m Invc: 1.47m
MH13 Ground Level: 3.5m Invc: 1.4m
MH23 Ground Level: 5.42m Invc: 2.55m
MH40 Ground Level: 7.71m Invc: 6m
MH1 Ground Level: 4.2m Invc: 0.65m
MH12 Ground Level: 3.5m Invc: 0.55m
MH15 Ground Level: 3.4m Invc: 1.6m
MH37 Ground Level: 3.75m Invc: 2m
MH17 Ground Level: 3.5m Invc: 1.2m
MH27 Ground Level: 4.3m Invc: 2.05m
MH4 Ground Level: 3.9m Invc: 0.1m
MH38 Ground Level: 3.7m Invc: 2m
MH29 Ground Level: 4m Invc: 1.75m
MH14 Ground Level: 3.5m Invc: 1m
MH26 Ground Level: 5.5m Invc: 2.7m
MH24 Ground Level: 6.5m Invc: 4.06m
MH25 Ground Level: 4.5m Invc: 2.22m
MH20 Ground Level: 7.27m Invc: 5.3m
MH28 Ground Level: 5.4m Invc: 2.18m
MH5 Ground Level: 3.75m Invc: -0.4m
MH16 Ground Level: 3.5m Invc: 0.8m
MH30 Ground Level: 5.4m Invc: 2.35m
MH6 Ground Level: 3.67m Invc: -0.9m
PS0 Ground Level: 4m Invc: -1.3m
MH31 Ground Level: 3.71m Invc: 0.6m
MH32 Ground Level: 5.15m Invc: 1.2m
PS1 Ground Level: 3.5m Invc: 0m
PM2 Ground Level: 2m Invc: 0m
LEGEND
315MM ø SEWER LINE
EXISTING LOCATION OF 16" ø HDPE SEWER FORCE MAIN
PROPOSED LOCATION OF 16" ø HDPE SEWER FORCE MAIN
MANHOLE
No. Date Revision By
CLIENT
PIOJ/JSEZA
PROJECT
CAYMANS SPECIAL ECONOMIC ZONE (CSEZ)
LEAD CONSULTANT
INTERNATIONAL DEVELOPMENT GROUP LLC
ASSISTANT CONSULTANT
FLUID SYSTEMS ENGINEERING LTD.
P.O. BOX 60, KINGSTON, JAMAICA
TITLE
PROPOSED SEWAGE PLAN
DESIGNED MOJ
DRAWN KC
CHECKED MOJ
APPROVED
DATE JULY 2018
SCALE 1 : 5500
DRNG No. CSEZ 02

2.6 Telecommunications

Telecom for the CSEZ will consist of an on-site backbone system and network of underground distribution lines, which will support all industry/manufacturing/logistics/service sectors and will allow the tenants of the CSEZ to have: i) land/fax lines, ii) mobile service, iii) a full package of fiber-optics internet services, and iv) Voice over Internet Protocol (VoIP). The telecom system will also support an on-site, security network, utilizing closed-circuit television (CCTV) cameras placed strategically around the CSEZ and monitored from the administrative building at the entrance of the zone. This system will: i) maintain perimeter security, ii) monitor traffic and public spaces, and iii) obtain a visual record of human activity to add an additional layer of security within the CSEZ.

2.7 Solid Waste

The collection and removal of solid waste within the CSEZ will be outsourced. There are a number of companies in the Kingston area, which provide specialized, comprehensive collection, disposal and recycling of industrial/commercial waste such as Premier Waste Management Limited, Minott Services and Pro S.W.A.T Ltd. Solid waste collection is traditional funded by the developer of the CSEZ and this cost is normally included as part of the tenant's maintenance fees.

2.8 Buildings and Support Amenities

A number of core buildings will be constructed and funded by the developer as part of the CSEZ's Phase I. This includes the Administrative/Customs building, the pre-built factories/warehouses and the entry gate.

The Administration/Customs building should have a floorplate of approximately 1,000-square meters to house the administrative functions for the CSEZ. Besides being the headquarters for the developer, the one-stop shop, after care facilities, and the customs offices, this building will also contain meeting rooms, a training center, and other supporting amenities. It will be up to the developer to prepare the detailed facility program for this building.

There will be 156 pre-built factories/warehouses within the CSEZ. The floorplate for these pre-built facilities will be 600-square meters. The pre-built facilities will be a flexible design to allow for variations in the size of factory in order

to serve a wide range of tenants. These pre-built facilities will be leased rather than sold, to allow them to be available to small and medium enterprises, who require factory/warehouse space but do not have the capital to construct their own facilities.

The Customs gate will be a secure entrance way, which will have customs booths at each lane. The gate will also have a sign for the CSEZ to denote the facilities within.

Table 10-1. List of Support Facilities for the CSEZ

Type of Support Facilities	Floor Plate Size (M^2)	Cost per M^2	Total Cost (JD/USD)
Administrative/Customs Building	1000	$1,500	$195,000,000/$1,500,000
Pre-Built Facilities	600	$600	$46,800,000/$360,000
Entry Gate	400	$800	$41,600,000/$320,000

3.0 Cost Estimates for the CSEZ

The cost estimates were developed based on the master plan for the CSEZ and are calculated at a +/-15% rate, as outlined in the project's TOR. The costs include: i) site preparation/earthworks, iii) on infrastructure and utilities, iv) pre-built facilities, v) core administrative/customs buildings and vi) off-site infrastructure and utilities. Since the land for the CSEZ is already in the GoJ's possession, there is no cost to obtain the land. It should be noted that all assumptions made for infrastructure/utility costs were prepared in a conservative manner.

The following table outlines the total on and off-site project costs for the CSEZ and breaks the cost estimates down further into phasing costs. Costs have also been separated into: i) on-site infrastructure/utilities, ii) core buildings and iii) off-site infrastructure/utilities. For the convenience of the reader, all project costs are presented in both Jamaican and US dollars, at the exchange rate of August 2018[1].

The total on-site costs for the CSEZ project is estimated at **JD$23,828,111,549** or **USD$183,293,166.** Of this amount, the total on-site core infrastructure/utilities costs are estimated at **JD$15,052,461,549** or **USD$115,788,166.**

[1] Exchange rate used is USD$1=JD$130.00

The construction of infrastructure/utilities for Phase I will be **JD$10,516,045,957** or **USD$80,892,661** and Phase II will be **JD$4,536,415,592** or **USD$34,895,505**. Hence, key on-site infrastructure and utility infrastructure for the CSEZ will cost approximately **JD$6,461.78/m^2** or **USD$49.706/m^2**, which is indicative for developing a zone on an island. The core buildings and pre-built factories/warehouses will be constructed under Phase I at an estimated cost of **JD$8,775,650,000** or **USD$67,505,000.**

In Table 10-2 below, the power scenario presented is power from the national grid. However, if a developer were to construct a 20-MVA, LNG power generation plant with steam within the CSEZ under JPS's new program, the capital costs for this power infrastructure would be **JD$ 981,164,860** or **USD$8,679,535**. This is a decrease of **JD$327,331,810 or USD$2,517,937** for power to the CSEZ**.** If a developer were to construct an LNG generation plant without steam in the CSEZ, then the capital costs for power infrastructure would be **JD$4,118,339,589** or **USD$31,679,535,** which is an increase of **JD$2,662,668,190 or USD$20,482,063.** If a developer were to construct an LNG plant with steam in the CSEZ, then the infrastructure capital costs for power would be **JD$10,098,339,589** or **USD$77,679,535,** which is an increase of **JD$8,642,668,190 or USD$66,482,063** over the CSEZ receiving power from the national grid.

With regard to off-site infrastructure/utilities costs, the CSEZ site is well situated, as most of the utility networks have been placed within the new Mandela Highway right-of-way, adjacent the boundary of the CSEZ. Hence, there are limited costs related to bringing utilities to the property line of the CSEZ. The only off-site infrastructure costs will be the water supply connection and the relocation of the existing sewer force main, which have been costed in Table 10-3. In addition, there will be some improvements to the Mandela Highway, in order to allow traffic to easily enter/exit the CSEZ. The design of the new entrance into the CSEZ allows for a smooth transition from the highway into the zone, ensuring that traffic is not impacted on the Mandela Highway. The entrance's configuration also allows for a seamless connection/linkage with the CEDA North Lands in order to encourage synergies between the two projects[2]. With all the above considerations, the off-site infrastructure/utility costs come to **JD$4,950,299,909** or **USD$38,079,230**, which will all happen within the first phase of the project. When all on and off-site costs are examined, the total project costs are **JD$28,778,411,457** or **USD$221,372,396**.

[2] The cost of a dedicated road connecting the CSEZ to the port of Kingston along the rail right-of-way requires a detailed study before cost estimates can be obtained.

Table 10-2. Project Costs: On-Site Infrastructure and Utilities						
Project Costs: On-Site Infrastructure and Utilities						
Earthworks						
Description of Items	**Total Costs Without Taxes (JD)**	**Total Costs Without Taxes (USD)**	**Phase I: Cost Breakdown (JD)**	**Phase I: Cost Breakdown (USD)**	**Phase II: Cost Breakdown (JD)**	**Phase II: Cost Breakdown (USD)**
Cut and Fill	$1,142,168,170	$8,785,909	$1,142,168,170	$8,785,909		
Total	**$1,142,168,170**	**$8,785,909**	**$1,142,168,170**	**$8,785,909**	**$0**	**$0**
Road Network						
Description of Items	**Total Costs Without Taxes (JD)**	**Total Costs Without Taxes (USD)**	**Phase I: Cost Breakdown (JD)**	**Phase I: Cost Breakdown (USD)**	**Phase II: Cost Breakdown (JD)**	**Phase II: Cost Breakdown (USD)**
Road Type 1	$364,640,900	$2,804,930	$153,349,300	$1,179,610	$211,291,600	**$1,625,320**
Road Type 2	$785,592,990	$6,043,023	$429,193,050	$3,301,485	$356,399,940	**$2,741,538**
Road Type 3	$1,844,633,700	$14,189,490	$1,040,421,200	$8,003,240	$804,212,500	**$6,186,250**
Total	**$2,994,867,590**	**$23,037,443**	**$1,622,963,550**	**$12,484,335**	**$1,371,904,040**	**$10,553,108**
Power Network						
Description of Items	**Total Costs Without Taxes (JD)**	**Total Costs Without Taxes (USD)**	**Phase I: Cost Breakdown (JD)**	**Phase I: Cost Breakdown (USD)**	**Phase II: Cost Breakdown (JD)**	**Phase II: Cost Breakdown (USD)**
Relocation of the Power Transmission Lines	$280,316,400	$2,156,280	$280,316,400	$2,156,280		
Installation of 69 Kv Transmission Line	$52,624,000	$404,800	$52,624,000	$404,800		
Installation of 20MW Substation	$437,846,370	$3,368,049	$437,846,370	$3,368,049		
Installation of 24 Kv Medium Voltage System	$684,884,590	$5,268,343	$684,884,590	$5,268,343		
Total	**$1,455,671,360**	**$11,197,472**	**$1,455,671,360**	**$11,197,472**	**$0**	**$0**

Water Network						
Description of Items	**Total Costs Without Taxes (JD)**	**Total Costs Without Taxes (USD)**	**Phase I: Cost Breakdown (JD)**	**Phase I: Cost Breakdown (USD)**	**Phase II: Cost Breakdown (JD)**	**Phase II: Cost Breakdown (USD)**
Potable Water						
Pipe and Appurtenance Supply	$121,379,246	$933,687	$65,689,716	$505,306	$55,689,530	$428,381
Pipe and Appurtenance Installation	$24,232,132	$186,401	$13,306,412	$102,357	$10,925,720	$84,044
Earthworks Involved with Pipeline Works	$32,586,813	$250,668	$17,217,953	$132,446	$15,368,860	$118,222
Wastewater						
Provisional Sums (Includes Lateral Supply & Installation)	$87,866,508	$675,896	$59,489,198	$457,609	$28,377,310	$218,287
Sewer Manhole Supply and Installation (44#)	$9,409,920	$72,384	$5,397,730	$41,521	$4,012,190	$30,863
Installation of Pipes	$25,279,800	$194,460	$15,880,930	$122,161	$9,398,870	$72,299
Earthworks Involved with Pipeline Works	$179,053,680	$1,377,336	$127,838,750	$983,375	$51,214,930	$393,961
Wastewater Plant	$1,950,000,000	$15,000,000	$1,950,000,000	$15,000,000	$0	
Total	**$2,429,808,099**	**$18,690,832**	**$2,254,820,689**	**$17,344,775**	**$174,987,410**	**$1,346,057**
Drainage/Storm Water Networks						
Description of Items	**Total Costs Without Taxes (JD)**	**Total Costs Without Taxes (USD)**	**Phase I: Cost Breakdown (JD)**	**Phase I: Cost Breakdown (USD)**	**Phase II: Cost Breakdown (JD)**	**Phase II: Cost Breakdown (USD)**
Precast Units and Material Supply	$4,005,456,390	$30,811,203	$1,813,689,670	$13,951,459	$2,191,766,720	**$16,859,744**

Precast Units and Material Installation	$8,891,090	$68,393	$3,865,810	$29,737	$5,025,280	**$38,656**
Earthworks Involved with Laying of Units	$633,010,300	$4,869,310	$543,628,540	$4,181,758	$89,381,760	**$687,552**
Flood Regulation, Earthworks and Equipment	$58,500,000	$450,000	$58,500,000	$450,000	$0	
Total	**$4,705,857,780**	**$36,198,906**	**$2,419,684,020**	**$18,612,954**	**$2,286,173,760**	**$17,585,952**
Telecommunications						
Description of Items	**Total Costs Without Taxes (JD)**	**Total Costs Without Taxes (USD)**	**Phase I: Cost Breakdown (JD)**	**Phase I: Cost Breakdown (USD)**	**Phase II: Cost Breakdown (JD)**	**Phase II: Cost Breakdown (USD)**
Telecom Backbone and Distribution Lines	$256,620,000	$1,974,000	$171,080,000	$1,316,000	$85,540,000	$658,000
Total	**$256,620,000**	**$1,974,000**	**$171,080,000**	**$1,316,000**	**$85,540,000**	**$658,000**
Fencing/Open Space/Landscaping						
Description of Items	**Total Costs Without Taxes (JD)**	**Total Costs Without Taxes (USD)**	**Phase I: Cost Breakdown (JD)**	**Phase I: Cost Breakdown (USD)**	**Phase II: Cost Breakdown (JD)**	**Phase II: Cost Breakdown (USD)**
Perimeter Fencing and Landscaping Throughout the CSEZ	$104,104,000	$800,800	$78,000,000	$600,000	$26,104,000	**$200,800**
Total	**$104,104,000**	**$800,800**	**$78,000,000**	**$600,000**	**$26,104,000**	**$200,800**
Total Onsite Infrastructure before Contingency	**$13,089,096,999**	**$100,685,362**	**$9,144,387,789**	**$70,341,445**	**$3,944,709,210**	**$30,343,917**
Contingency (15%)	$1,963,364,550	$15,102,804	$1,371,658,168	$10,551,217	$591,706,382	$4,551,588
Total Onsite Infrastructure with Contingency	**$15,052,461,549**	**$115,788,166**	**$10,516,045,957**	**$80,892,661**	**$4,536,415,592**	**$34,895,505**
Core Buildings/Entry Gate						

Description of Items	Total Costs Without Taxes (JD)	Total Costs Without Taxes (USD)	Phase I: Cost Breakdown (JD)	Phase I: Cost Breakdown (USD)	Phase II: Cost Breakdown (JD)	Phase II: Cost Breakdown (USD)
Administration Building	$195,000,000	$1,500,000	$195,000,000	$1,500,000		
Pre-Built Factories/Warehouses	$7,394,400,000	$56,880,000	$7,394,400,000	$56,880,000		
Entry Gate	$41,600,000	$320,000	$41,600,000	$320,000		
Total	**$7,631,000,000**	**$58,700,000**	**$7,631,000,000**	**$58,700,000**	**$0**	**$0**
Contingency (15%)	$1,144,650,000	$8,805,000	$1,144,650,000	$8,805,000	$0	$0
Total Core Building with Contingency	**$8,775,650,000**	**$67,505,000**	**$8,775,650,000**	**$67,505,000**	**$0**	**$0**
Total Onsite Infrastructure & Core Building with Contingency	**$23,828,111,549**	**$183,293,166**	**$19,291,695,957**	**$148,397,661**	**$4,536,415,592**	**$34,895,505**

Table 10-3. Project Costs: Off-Site Infrastructure and Utilities

Project Costs: Off-Site Infrastructure and Utilities

Water Network

Description of Items	Total Costs Without Taxes (JD)	Total Costs Without Taxes (USD)	Phase I: Cost Breakdown (JD)	Phase I: Cost Breakdown (USD)	Phase II: Cost Breakdown (JD)	Phase II: Cost Breakdown (USD)
Potable Water						
Off-site: Supply connection into water network	$107,859,738	$829,690	$107,859,738	$829,690	$0	$0
Non-Potable Water (Grey Water)						
Off-site: Relocation of Existing Sewer Force Main	$36,748,878	$282,684	$36,748,878	$282,684	$0	$0

Total	**$144,608,616**	**$1,112,374**	**$144,608,616**	**$1,112,374**	**$0**	**$0**
Road Network						
Description of Items	**Total Costs Without Taxes (JD)**	**Total Costs Without Taxes (USD)**	**Phase I: Cost Breakdown (JD)**	**Phase I: Cost Breakdown (USD)**	**Phase II: Cost Breakdown (JD)**	**Phase II: Cost Breakdown (USD)**
Road Type 1	$4,160,000,000	$32,000,000	$4,160,000,000	$32,000,000	$0	$0
Total	**$4,160,000,000**	**$32,000,000**	**$4,160,000,000**	**$32,000,000**	**$0**	**$0**
Contingency (15%)	$645,691,292	$4,966,856	$645,691,292	$4,966,856	$0	$0
Total Offsite Infrastructure	**$4,950,299,909**	**$38,079,230**	**$4,950,299,909**	**$38,079,230**	**$0**	**$0**

Total Capex	**$28,778,411,457**	**$221,372,396**	**$24,241,995,866**	**$186,476,891**	**$4,536,415,592**	**$34,895,505**

Chapter Eleven
Financial Analysis

1.0 Overview

This chapter examines the financial and economic feasibility of the CSEZ from the perspective of the GOJ and the developer. The data/information used for the modeling and analysis was extracted from the outcomes/findings set out in Chapters 2-12 in this feasibility study. This chapter includes: i) key assumptions/variables used to populate the financial/economic model, ii) financial and economic analysis of the CSEZ using the base case demand scenario, iii) identification of the 'preferred development scenario', and iv) sensitivity testing/analysis on the preferred scenario to identify possible pressures/stresses to the project's internal rate of return (IRR) and economic rate of return (ERR).

2.0 The Financial and Economic Model

IDG has prepared a linked financial and economic model for the CSEZ. The model contains a list of assumptions and project variables, which the model uses to examine different development scenarios for the CSEZ. From this data, the model automatically prepares financial/economic analysis for each scenario and compares the GoJ and the developer's direct financial revenues and costs, as well as, calculates the project's IRR, ERR, and NPV. The project is considered financially viable if it achieves a 12% IRR or higher and has a positive NPV.

The model also looks at the economic cost/benefits of the CSEZ project to the country. It provides an economic analysis, which compares direct and indirect economic benefits and costs of the project to the Jamaican economy. The project is considered economically viable if it achieves an ERR above 20% and has a positive NPV. Hence, the model provides a comprehensive analysis of all revenues, benefits, costs, and cash outflows. These figures are presented in US dollars.

The financial/economic model also allows the GoJ to test/compare different scenarios for the CSEZ project to show the impact of any changes to the:

- Demand scenarios
- Land details
- Revenues, expenditures and expenses
- Different power options and
- Different financing options for each phase

- Other effects on other economic variables.

2.1 Assumptions and Limitations to the Model Results

The data information and inputs into the financial/economic model are based on the Phase I report findings, the master plan prepared by Gensler, and the infrastructure costs outlined in Chapter 10, which were prepared during– March through October 2018. IDG has made the financial/economic model a live tool, which means that the GoJ is able to adjust/change the core data/information in the model, if the CSEZ project is delayed and/or the project demand, costs, or assumptions change in the short, medium or long-term. If changes are made to the key assumptions or variables, it will change/impact the project's revenues and costs either negatively or positively. (See the financial/economic model manual in the Annex.)

2.2 Key Assumptions

The following assumptions were used in the financial/economic model:

- The CEDA south site was used for the modelling/analysis.
- The 'base case' demand scenario was used to forecast the demand for tenants, number and size of land plots and infrastructure/utilities.
- The on and off-site infrastructure costs for the project were determined from the CSEZ master plan.
- Off-site infrastructure networks such as water, drainage and wastewater systems will be available or brought to the boundaries of the CSEZ. In addition, the CSEZ will not be required to provide its own water network or wastewater treatment facilities, and as such, no revenues will be generated from these services.
- A number of power options have been presented in this model - from power obtained from JPS to LNG power via self-contained plants.

- The CSEZ project will be implemented in two phases. Phase II is expected to start 8 years after Phase I is initiated.

- The financial/economic model examines a 22-year timeframe along with terminal values for the remaining duration of the concession. This includes the construction phase plus the leasing/operational phase of the project.

- In each phase of the project, the construction phase will take approximately 2 years to complete, and a 3 years construction period has been tested in the scenarios, as requested by the GoJ.

- Phase I lease revenues are assumed to start at the end of the construction phase. For Phase II, revenues start one year after the construction start date.

- Tenant operations in the CSEZ are assumed to start one year after the serviced land is leased. At the start of the project – before the construction of the CSEZ - tenants will require three years to become fully operational (50% first year, 25% second year and 25% third year).

- In the main analysis, a US$ 2 per m^2 land lease will be charged to the developer by the GoJ for the duration of the project. In addition, the impact of a higher lease rate of US$ 4 per m^2 was also analyzed in the scenarios.

- Economic benefits were calculated on all project revenues from land leases, power, taxes on CSEZ tenants, corporate taxes, the impact on direct and indirect salaries, suppliers' profits from CSEZ investments and revenues.

- Economic costs did not include the opportunity lost from the use of the CSEZ land, but did included CSEZ operations and maintenance expenses, administrative expenses, and capital expenditures.

- The initial investment capital infrastructure was exempted from customs duties and taxes.

2.3 Key Variables

The following variables were used in the financial/economic model:

Table 11-1. Key Variables

Variables	Values
Land Details	
Land Area	**Phase I**: 186.187 Hectares **Phase II**: 49.641 Hectares **Total: 235.828 Hectares**
Industrial Land	**Phase I**: 98.562 Hectares **Phase II**: 41.716 Hectares **Total: 140.278 Hectares**
Land for Pre-Built Factories/Warehouses	**Phase I:** 16.675 Hectares **Phase II:** 0.000 Hectares **Total: 16.675 Hectares**
Land for Commercial Buildings	**Phase I:** 16.675 Hectares **Phase II:** 0.000 Hectares **Total: 16.675 Hectares**
Capital Infrastructure	
Earthworks	**Phase I:** USD$ 8.786 Million **Phase II:** USD$ 0.000 Million **Total: USD$ 8.786 Million**
On-Site Infrastructure	**Phase I:** USD$ 139.612 Million **Phase II:** USD$ 34.895 Million **Total: USD$ 174.507 Million**
Off-Site Infrastructure	**Phase I:** USD$ 38.079 Million **Phase II:** USD$ 0.000 Million **Total: USD$ 38,079 Million**
Financial Analysis	

Table 11-1. Key Variables	
Variables	**Values**
General Inflation Rate	4%
Power Inflation Rate	2%
Discount Rate	12% Base, and Tested 15%
Developer Equity	50% and 70% in Sensitivity Analysis
Interest Rate	7% and tested 9% in Sensitivity Analysis
Repayment Period	10 Years and tested 15 and 20 years for phase I
Lease Variables	
Land Annual Lease from GoJ to Developer	USD$ 2
Land Annual Lease per m^2	USD$ 13.5 (Starting Rate)
Pre-built Annual Lease per m^2	USD$ 85.0 (Starting Rate)
Lease Inflation Rate	4%
Power Variables	
JPS Power Grid	Margin: 0%
JPS LNG Plant	Margin: 10%
CSEZ Own LNG Power Plant	Margin: 15%

3.0 Development Scenarios

IDG examined many development scenarios for the CSEZ. The financial/economic model however, analyzed ten of the most advantageous development scenarios for the CSEZ:

Scenarios 1-3 Examine Power Options:

These scenarios address the top three power options:

- **Scenario One:** Analysis of the CSEZ using electrical power from the national grid.
- **Scenario Two:** Analysis of the CSEZ using JPS's LNG power plant.

- **Scenario Three:** Analysis of the CSEZ using its own LNG power plant.

Scenarios 4-7 Examine Possible Risks:

These scenarios address risk issues that could impact the viability of the project:

- **Scenario Four:** Analysis of the CSEZ if the developer required a higher discount rate of 15%, rather than the suggested 12%, due to unknown reasons or unexpected competition.

- **Scenario Five:** Analysis of the CSEZ using a higher interest rate of 9% instead of the suggested 7%, due to the project's assessed risk by a bank or because of the developer's inability to get a project loan with a 7% interest rate.

- **Scenario Six:** Analysis of the CSEZ using a 20-year financing term in Phase I instead of a 10-year term. IDG also checked the impact of acquiring a longer-term loan. This would increase the project's cash flow in the first 10-years, but would increase interest costs, at the same time, for the duration of the project.

- **Scenario Seven:** Analysis of the CSEZ using a 10% increase in infrastructure and O&M costs and a 10% decrease in lease rates, in order to address project sensitivities to changes in revenues and costs due to inflation or change in market conditions.

Scenarios 8-10 Examines Concession Terms:

These scenarios address changes in the terms of a concession agreement:

- **Scenario Eight:** Analysis of the CSEZ where the GoJ pays for the project's offsite infrastructure but the lease rate paid to the GoJ by the developer is increased to USD$4 per m^2 instead of a USD$2 per m^2. This was examined in order to lower the 'developer's risk for the initial investment of the project, while allowing the GoJ to recover their initial investment through the increased lease rate. It is a shared risk scenario.

- **Scenario Nine:** Analysis of the CSEZ to assess the impact of any change in the developer's investment structure, (by investing 50% (50% loan) verses 30% (70% loan)), due to market and bank conditions.

- **Scenario Ten:** Analysis of the CSEZ if the GoJ receives 20% of the Annual Net Profits (Losses) from the developer. (This would be from profits and not cashflow, since the GoJ is not investing in the infrastructure), This is examined to assess the impact on both the GoJ and the developer.

3.1 Development Scenario Analysis

The above development scenarios were analyzed to determine the following factors:

- **Project ERR and Project Economic NPV:** This is the economic rate of return and economic net present value for the CSEZ project over a 22-year period.

- **Project IRR and NPV for the Developer:** The project's internal rate of return and net present value for the private developer over a 22-year period.

- **Project IRR and NPV for the GoJ:** The project's internal rate of return and net present value to the GoJ over a 22-year period.

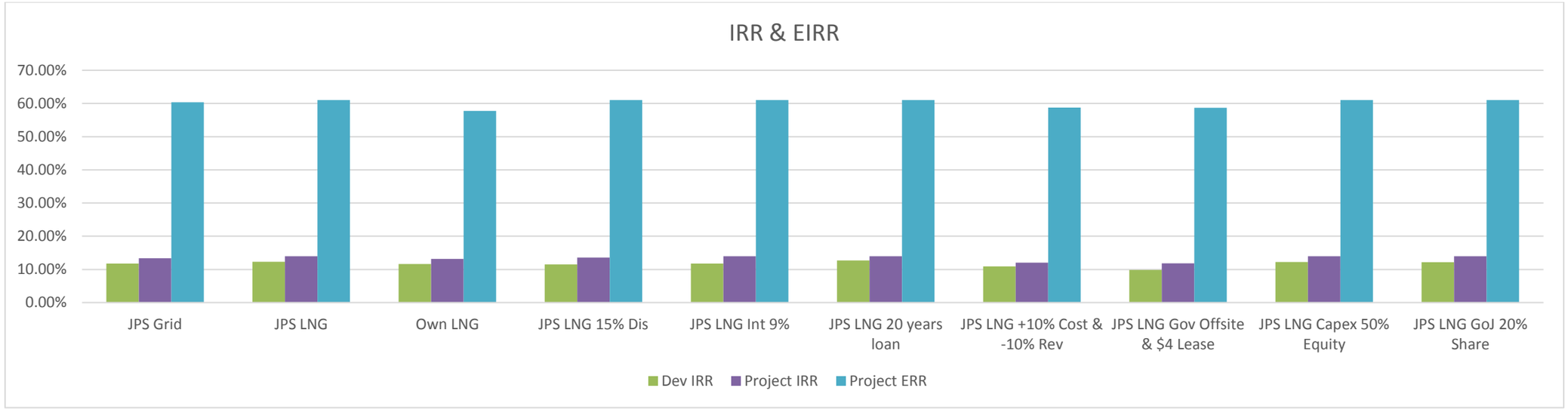
- **Onsite Infrastructure:** The amount of money required to be invested in onsite, capital infrastructure.

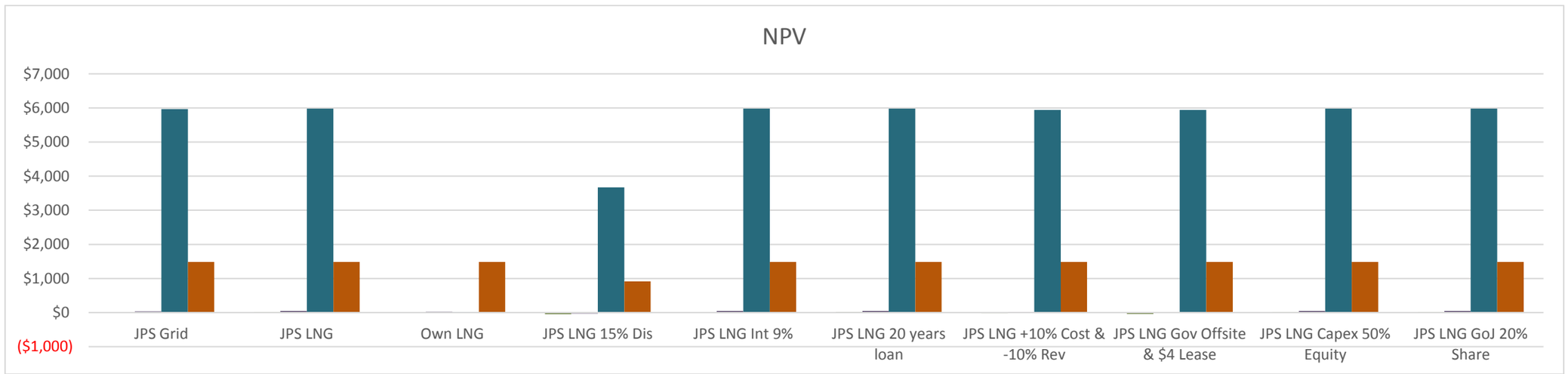
3.2 Development Scenario Analysis Results

The following represents the results of the scenario analysis, as per assumptions and variables mentioned above:

Table 11-2. Development Scenario Results										
Factors	**Scenario 1**	**Scenario 2**	**Scenario 3**	**Scenario 4**	**Scenario 5**	**Scenario 6**	**Scenario 7**	**Scenario 8**	**Scenario 9**	**Scenario 10**
Demand	Base Case	Base Case	Base Case	Base Case	Base Case	Base Case	Base Case	Base Case	Base Case	Base Case
Power Scenarios	JPS Grid	JPS LNG	Own LNG	JPS LNG	JPS LNG	JPS LNG	JPS LNG	JPS LNG	JPS LNG	JPS LNG
Additional Variables Tested				15% Discount Rate	9% Interest Rate on Loan	20% Loan Term for Phase I	10% Decrease in Lease Rates & Infrastruct-ure and O&M Costs Increase by 10%	GoJ Pays for Offsite Infrastructure and Leases Land to the Developer at USD$ 4/m^2	Increased Developer's Investment from 30% to 50% for Onsite Infrastruct-ure	GoJ Gets 20% Profit Share
Viability										
Is this scenario viable?	**No**	**Yes**	**No**	**No**	**No**	**Yes**	**No**	**Yes**	**Yes**	**Yes**
IRR/ERR										
Developer IRR	**11.78%**	**12.33%**	**11.61%**	**11.48%**	**11.79%**	**12.73%**	**9.85%**	**12.61%**	**12.24%**	**12.14%**
Project IRR	**13.36%**	**13.97%**	**13.16%**	**13.59%**	**13.97%**	**13.97%**	**11.84%**	**14.99%**	**13.97%**	**13.97%**
Project ERR	**60.33%**	**61.03%**	**57.74%**	**61.01%**	**61.03%**	**61.03%**	**58.67%**	**61.03%**	**61.03%**	**61.03%**
NPV										
Dev NPV	**-$4**	**$6**	**-$8**	**-$43**	**-$4**	**$12**	**-$41**	**$10**	**$5**	**$2**
Project NPV	**$30**	**$43**	**$28**	**-$23**	**$43**	**$43**	**-$4**	**$65**	**$43**	**$43**
Project Eco. NPV	**$5,966**	**$5,979**	**$5.964**	**$3,669**	**$5,979**	**$5,979**	**$5,937**	**$5,979**	**$5,979**	**$5,979**
GoJ NPV	**$1,487**	**$1,487**	**$1,487**	**$913**	**$1,487**	**$1,487**	**$1,487**	**$1,449**	**$1,487**	**$1,484**
Discount Rate for NPV	**12%**	**12%**	**12%**	**15%**	**12%**	**12%**	**12%**	**12%**	**12%**	**12%**
Scenario Analysis for Revenues and Costs										
Change in Land Lease Revenues	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**-10%**	**0%**	**0%**	**0%**
Change in O&M Costs	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**10%**	**0%**	**0%**	**0%**

Table 11-2. Development Scenario Results										
Factors	**Scenario 1**	**Scenario 2**	**Scenario 3**	**Scenario 4**	**Scenario 5**	**Scenario 6**	**Scenario 7**	**Scenario 8**	**Scenario 9**	**Scenario 10**
Change in Infrastructure Costs	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%
Scenario Analysis for Revenues and Costs										
Annual Lease Rate to GoJ	2/m^2	2/m^2	2/m^2	2/m^2	2/m^2	2/m^2	2/m^2	4/m^2	2/m^2	2/m^2
Percentage of Profit to GoJ	0%	0%	0%	0%	0%	0%	0%	0%	0%	20%
Financing Terms										
Interest: Phase I	7%	7%	7%	7%	9%	7%	7%	7%	7%	7%
Repayment Period: Phase I	10 Years	10 Years	10 Years	10 Years	10 Years	20 Years	10 Years	10 Years	10 Years	10 Years
Interest: Phase II	7%	7%	7%	7%	9%	7%	7%	7%	7%	7%
Repayment Period: Phase II	10 Years	10 Years	10 Years	10 Years	10 Years	10 Years	10 Years	10 Years	10 Years	10 Years
Onsite Infrastructure										
Loan on Developer	70.00%	70.00%	70.00%	70.00%	70.00%	70.00%	70.00%	70.00%	50.00%	70.00%
GoJ	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Grant	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Developer	30.00%	30.00%	30.00%	30.00%	30.00%	30.00%	30.00%	30.00%	50.00%	30.00%
Offsite Infrastructure										
Loan on Developer	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%	0.00%	50.00%	50.00%
Developer	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%	0.00%	50.00%	50.00%
GoJ	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%


IRR & EIRR
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
JPS Grid
JPS LNG
Own LNG
JPS LNG 15% Dis
JPS LNG Int 9%
JPS LNG 20 years loan
JPS LNG +10% Cost & -10% Rev
JPS LNG Gov Offsite & $4 Lease
JPS LNG Capex 50% Equity
JPS LNG GoJ 20% Share
Dev IRR
Project IRR
Project ERR


NPV
$7,000
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
($1,000)
JPS Grid
JPS LNG
Own LNG
JPS LNG 15% Dis
JPS LNG Int 9%
JPS LNG 20 years loan
JPS LNG +10% Cost & -10% Rev
JPS LNG Gov Offsite & $4 Lease
JPS LNG Capex 50% Equity
JPS LNG GoJ 20% Share

3.3 Factors Most Affected in the Development Scenarios

The following factors are most affected in the development scenario analysis:

- Power options have a major impact on the developer's IRR, as we can see from the first three scenarios above. For example, the JPS LNG scenario provides the developer with a 12.33% IRR, while JPS's Grid scenario provides the developer with only a 11.78% IRR, which makes the project not viable under the terms outlined. Creating a steam LNG plant, will achieve an even lower IRR.

- A change in lease rates and in capital infrastructure and/or O&M costs will impact the developer's IRR.

- If the GoJ pays for offsite infrastructure in order to lower the developer's initial risk, the CSEZ project will be more attractive to a developer. The project will still be viable for both the developer and the GoJ even if the developer pays a land lease rate of US$4 per m^2 instead of US$ 2 per m^2. This will allow the GoJ to recover their initial investment through the increased lease land rate.

- Having the developer pay US$4 per m^2 instead of US$ 2 per m^2 will have a major impact on the developer's IRR, if the developer is paying for off-site infrastructure.

- A change in a loan interest rate will have a major impact on project viability, and a lesser impact from the change in loan term.

- If the GoJ shares in profits, this will have a very low impact on the project. This is because the first few years of the project, the zone will incur losses and because the project IRR results from cashflows and not from profits.

- The project's economic benefits remain extremely high due to the direct and indirect salaries from jobs created within the CSEZ.

Table 11-3. Preferred Development Scenario		
Details	**Scenario 2**	**Scenario 8**
Demand	**Base Case**	**Base Case**
Power Scenario	**JPS LNG Power Program**	**JPS LNG Power Program**
IRR/ERR		
Dev IRR	**12.33%**	**12.61%**
Project IRR	**13.97%**	**14.99%**
Project EIRR	**61.03%**	**61.03%**
NPV		
Dev NPV	**$6**	**$10**
Project NPV	**$43**	**$65**
Project Eco. NPV	**$5,979**	**$5,979**
GoJ NPV	**$1,487**	**$1,449**
Discount Rate for NPV	**12%**	**12%**
Concession		
Lease to GoJ (US$) per m^2	**US$ 2**	**US$ 4**
Percentage of Profit to GoJ	**0.00%**	**0.00%**
Financing Terms		
Interest	**7%**	**7%**
Repayment Period	**10 Years**	**10 Years**
Onsite Infrastructure		
Loan on Developer	**70.00%**	**70.00%**
GoJ	**0.00%**	**0.00%**
Grant	**0.00%**	**0.00%**
Developer	**30.00%**	**30.00%**
Offsite Infrastructure		
Loan on Developer	**50.00%**	**0.00%**
Developer	**50.00%**	**0.00%**
GoJ	**0.00%**	**100.00%**

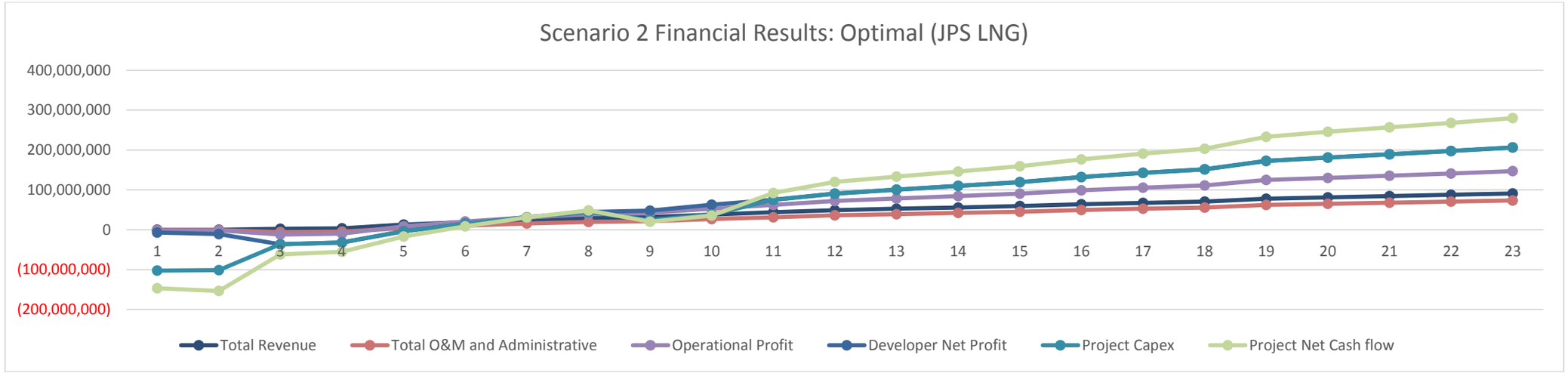
4.0 The Preferred Development Scenario for the CSEZ

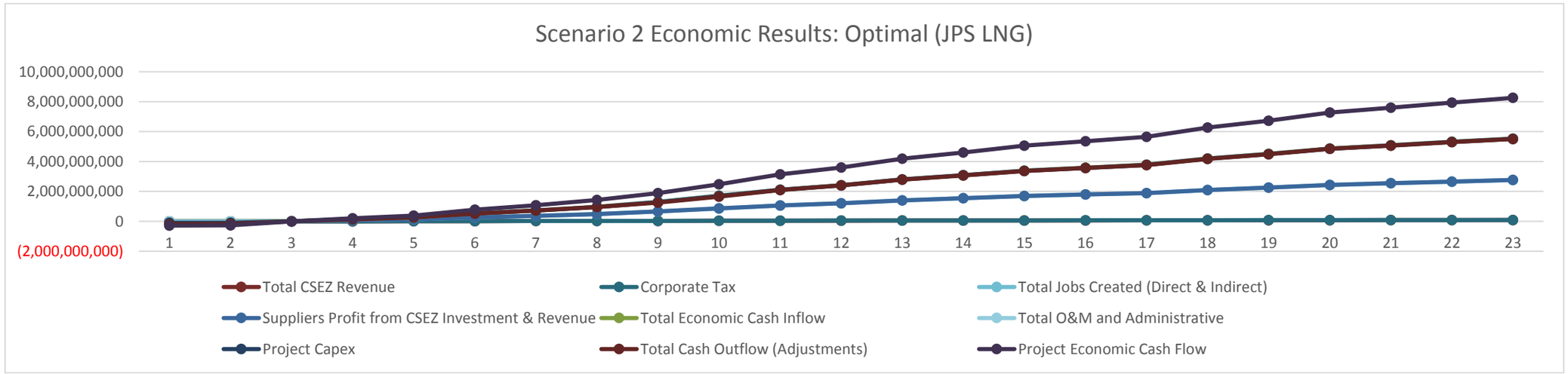
Although most development scenarios examined provided a minimum 12% IRR for the developer with a high ERR for the GoJ, the following development scenarios are the two 'preferred options' for the CSEZ.

4.1 Assumptions and Variables for the Preferred Development Scenario

It is IDG's understanding that the GoJ is not interested in providing off-site infrastructure to the project as proposed under Scenario 8. In this case, the following are the key assumptions for Scenario 2, which is then the 'preferred' development scenario for the CSEZ. Details for both options are listed in Table 11-3. An overview of the key assumptions for Scenario 2 are presented below:

- The potential developer of the CSEZ should provide power to the zone via the JPS LNG Power Plant Program and charge a 10% margin on the sale of power to the CSEZ tenants.
- The potential developer of the CSEZ should finance 30% of the on-site infrastructure costs, 50% of all off-site infrastructure costs and finance the rest of the project through loans.
- The potential developer pays the GoJ a lease rate of USD$2/$m^2$ for the use of land.
- The lease rates for the CSEZ should be USD$13.50/$m^2$ for serviced industrial land and USD$85/$m^2$ for pre-built factories.


Scenario 2 Financial Results: Optimal (JPS LNG)
400,000,000
300,000,000
200,000,000
100,000,000
0
(100,000,000)
(200,000,000)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Total Revenue
Total O&M and Administrative
Operational Profit
Developer Net Profit
Project Capex
Project Net Cash flow


Scenario 2 Economic Results: Optimal (JPS LNG)
10,000,000,000
8,000,000,000
6,000,000,000
4,000,000,000
2,000,000,000
0
(2,000,000,000)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Total CSEZ Revenue
Corporate Tax
Total Jobs Created (Direct & Indirect)
Suppliers Profit from CSEZ Investment & Revenue
Total Economic Cash Inflow
Total O&M and Administrative
Project Capex
Total Cash Outflow (Adjustments)
Project Economic Cash Flow

4.2 Preferred Development Scenario Sensitivity Analysis

Because this is only a feasibility study, several factors could change during the construction and implementation phases of the project. This section analyzes the impact of any changes to key variables in the 'preferred development Scenario 2', which could ultimately affect the viability of the CSEZ project.

The sensitivity analysis below shows the following:

- If the developer is not granted a 10% margin on the JPS LNG Power Program, the developer's IRR will decrease to 11.79% and will affect the viability of the project.

- If the developer invests 50% of the on-site infrastructure costs instead 30%, this will lower the IRR to 12.24% but will not affect project viability.

- Lease rates are presumed at USD$13.50/$m^2$ for serviced industrial land and USD$85/$m^2$ for pre-built factories/warehouses. These assumptions have a significant impact on the viability of the CSEZ project. Hence, if the CSEZ experiences competition from other SEZs, which have lower or higher lease rates, the CSEZ's lease rates will have to change and any change to the CSEZ's rates will affect the project's IRR.

  - If the lease rates are decreased by 10%, then the project IRR will be reduced to 11.09%.

  - If the lease rates are decreased by 20%, then the project IRR will be reduced to 9.74%

- A developer will assess the CSEZ project from their own prospective, taking into consideration several factors such as:

  - Country risk

  - Inflation rate

- Availability of financing for the project
- Currency exchange risk and

- Possible future competition from other SEZs.

The above could require the GoJ to:

- Provide loan guarantees and/or

- Provide lower cost of financing.

Table 11-4. Preferred Development Scenario Sensitivity Analysis				
Analysis Factor	**Developer IRR**	**Project IRR**	**Project ERR**	**Importance Level (Affects IRR)**
Demand	**Base**	**Base**	**Base**	
Scenarios/Item	**JPS LNG**	**JPS LNG**	**JPS LNG**	
Main Scenario	**12.33%**	**13.97%**	**61.03%**	
Power Margin				
Lower power margin from 10% to 0%	**11.79%**	**13.55%**	**60.99%**	**High Impact**
Infrastructure Financing				
Increase the developer's finance percentage in on-site infrastructure from 30% to 50%	**12.24%**	**13.79%**	**61.03%**	**Low Impact**
Interest rate increase to 9% instead of 7%	**11.79%**	**13.97%**	**61.03%**	**High Impact**
Repayment Period for Phase I to 20 year instead of 10 years	**12.73%**	**13.79%**	**58.73%**	**Medium Impact**
GoJ to pay for offsite infrastructure	**12.61%**	**14.99%**	**61.03%**	**Medium Impact**

Table 11-4. Preferred Development Scenario Sensitivity Analysis				
Analysis Factor	**Developer IRR**	**Project IRR**	**Project ERR**	**Importance Level (Affects IRR)**
Lease Rates & Costs				
Lower lease rate by 10%	**11.09%**	**13.09%**	**60.89%**	**High Impact**
Increase costs of CAPEX and O&M by 10%	**11.08%**	**12.80%**	**58.81%**	**High Impact**
Concession Conditions				
Increase lease from developer to GoJ to US$4 per m^2	**10.89%**	**14.99%**	**61.03%**	**High Impact**
Introduction of 20% Profit to GoJ	**12.14%**	**13.97%**	**61.03%**	**Low Impact**
Construction Period				
Increase construction period from 2 to 3 years	**11.94%**	**13.46%**	**55.44%**	**Medium Impact**

Chapter Twelve
Development Framework

1.0 Overview

This chapter sets out the appropriate development model for the CSEZ project as proven through the previous financial and economic modeling chapter. It includes: i) an examination of good governance practices for SEZ projects and ii) an overview of a concession model.

2.0 Governance

Governance is critically important to the development of the CSEZ. The following chart details the best practice governance structure for undertaking the CSEZ:

JSEZA	OWNER	DEVELOPER	OPERATOR
•Administers the SEZ Regime •Designates SEZ Locations and Approves SEZ Projects •Licenses SEZs •Coordinates Public Agency Inputs •Monitors Performance of SEZs •Ensures Compliance of SEZs	•A Public Sector Entity (UDC) •Legal Title to the SEZ Lands/Site	•Separate Entity Under Contract to the GoJ •Physically develops the CSEZ •Finances the design and construction of the CSEZ (Serviced land and infrastructure/ utilities)	•Developer or Third Party Entity Under Contract •Responsible for the Day-to-Day Management of the CSEZ •Leases land plots/buildings to tenants/investors •Operates facilities, one-stop shop unit and provides support/after care services for a fee

The above structure allows for the proper separation of responsibilities without any conflict of interest. Hence, the GoJ (JSEZA) is the 'regulator' and responsible for regulating activities within the CSEZ and the private sector is the developer/operator responsible for designing, constructing, financing and operating/managing the zone and its facilities on a cost-recovery basis.

3.0 Concession Model

According to the financial modeling, there are only two development options recommended for the CSEZ and both are a concession model, which is a form of a PPP. The recommended model is as follows:

- **A Concession Agreement.** This agreement could be designed in two ways:

  Option 1

  – The developer would enter into a 30-year concession agreement with the GoJ for the rights to develop/operate the CSEZ project. The developer would be responsible for planning, designing, funding, and constructing both the on and off-site infrastructure for the project and operating the zone. The developer could also be asked to pay the GoJ a lease rate for the land or not, depending on the requirements of the GoJ. (IDG examined both options and the CSEZ project was viable under both alternatives – Developer providing the GoJ with a land lease.)

  This concession agreement could have a lease renewable option or the CSEZ could be transferred back to the GoJ under a Build-Operate-Transfer framework after a 30-year period. Both options are available under this scenario. This is a very common and straight forward way of undertaking a zone project. According to the financial modeling IDG undertook, this is a viable option for a developer and would provide a +12% IRR, however it does not share the project's financial risk. Because of this, it may be harder to attract a developer to the project. (Financial details of this development model are outlined in Scenario 2 in **Chapter 11: Financial Analysis Chapter**.)

Option 2

- This option has the GoJ providing the developer with the CSEZ land and off-site infrastructure to support the project. The developer would be responsible for planning, designing, funding and constructing the CSEZ and operating the zone for a 30-year period and the GoJ would upgrade the off-site infrastructure and bring core utilities to the boundary of the CSEZ site. (This Scenario has been detailed in Scenario 8 in the financial chapter.) This concession period could be extended after 30-years for a renewed timeframe or could be transferred to the GoJ. This may be a more attractive development model for a developer, as it shares the development and financial risks of the project.

4.0 Benefits of a Concession Model

From GoJ's perspective, a concession is the quickest and easiest type of contract agreement to implement the CSEZ project as it can be contracted at the least cost and best value. It allows for the most flexibility and least involvement by the government and is the form most efficient for implementing a zone project by the private sector. However, under this development framework it will be up to the developer solely to make the project a success. **Hence, it will be imperative that the GoJ finds a well experienced SEZ developer/operator with a proven track record and solid qualifications to undertake this project.**

Chapter Thirteen
Implementation Action Plan

1.0 Overview

This chapter sets out a 24-year Implementation Action Plan for the development of the CSEZ. The plan identifies: i) the key steps, ii) actions/activities, iii) timeframes, iv) responsibilities and v) milestones, which are required by the GoJ and the developer in order to effectively and efficiently implement the CSEZ project. The Implementation Action Plan has been prepared based on the outcomes/findings of Chapters 2-12 in this feasibility study.

2.0 The Implementation Action Plan

The Implementation Action Plan is a roadmap for the development of the CSEZ and identifies the necessary steps, actions/activities, timeframes, responsibilities and milestones required during the life-cycle of the project. The Implementation Action Plan for the CSEZ has been developed using a three-phased approach – i) a Developer Search/Selection Phase, ii) a Transitional Phase, and iii) an Operational Phase.

- **The Developer Search/Selection Phase** covers Years -4 to -2, when developers are identified and selected through a transparent and accountable tender process and pre-construction requirements for the CSEZ are undertaken.

- **The Transitional Phase** covers Years -2 to 0 when the construction of the CSEZ is undertaken and the developer is able to start leasing the land within the CSEZ to investors/tenants.

- **The Operational Phase** starts in Year 0 and denotes the activities required during the short, medium and long-term of the CSEZs life-cycle. In Year 0 through 1, the initial tenants of the CSEZ are able to begin construction of their facilities.

During the Developer Search/Selection Phase and for the first 2-years of the Transitional Phase and Operational Phase, timeframes are delineated quarterly. Subsequent Years (2-20), are shown on an annual basis.

It should be noted that the timeframes proposed below are 'only indicative or average timeframes', in accordance with best practice procedures. In reality, the timeframes may vary (shorter/longer) depending upon the rigor of project start up and/or the implementation of the project by the Developer.

The Implementation Action Plan has been divided into the following programs:

- The Developer Search Program
- The Developer Selection and Institutional Strengthening Program
- The Pre-Construction Program
- The CSEZ's Site Development Program
- The Off-Site Infrastructure Program
- The Marketing and Promotions Program
- The Communications Program

It is recommended that the GoJ reviews this Implementation Action Plan on a quarterly basis during the Developer Search/Selection and Transitional Phases and revises it accordingly, if necessary. During the Operational Phase, the Implementation Action Plan should be updated every 5-years.

In the tables on the following pages, the dark brown shading indicates the timeframes for key steps, actions and activities. Milestones in the tables are denoted with asterisks. New actions/activities should not be started before steps with milestones have been achieved.

2.1 The Developer Search Program

Table 13-1. The Developer Search Program

Steps	Actions/Activities	Key Responsibility	Year -4				Year -3				Year -2				Year -1				Year 0			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1.	Prepare a TOR for a Consulting Firm	GoJ																				
2.	Hire a Consulting Firm to Undertake a Developer Search for the CSEZ	GoJ																				
3.	Prepare CSEZ Offerings Package	CONSULTANT		*																		
4.	Organize a Developer Conference (Location/Date)	CONSULTANT/ GoJ																				
5.	Identify List of Potential Developers	CONSULTANT																				
6.	Prepare and Send Invitations to Potential Developers with the CSEZ Offerings Package	CONSULTANT																				
7.	Track and Assist Attendees to the Developer Conference	CONSULTANT																				
8.	Prepare a PPT and Hand-Outs on the CSEZ for Developers	CONSULTANT																				
9.	Prepare Additional Promotional Materials for the Developer Conference	CONSULTANT																				
10.	Hold the Developer Conference	CONSULTANT/ GoJ			*																	

The Developer Search Program will be the GoJ's responsibility and it is the first step in finding a developer for the CSEZ. It is never an easy task to identify an experienced, private sector developer with similar vision, goals and objectives for a zone. This will be critically important for the GoJ, as this is Jamaica's flagship SEZ and the zone must be successful in the local, regional and global markets. Hence, it is imperative that the GoJ hires a firm immediately to undertake the Developer Search activities and to organize a Developer Conference. It can take 6-9 months to line up a list of credible developers with zone experience, who are willing to travel to and invest in Jamaica. To assist the GoJ, IDG has prepared an outline of a strategy to attract/locate a developer for the CSEZ as well as an outline of a Developer Prospectus to be sent to potential developers. This can be found in Appendix D.

Once a firm is hired, their first task should be to prepare 'a CSEZ offering package' for the project. This would be a short document with key information and drawings about the project to allow a potential developer to determine if the CSEZs value proposition is interesting enough to invest in. An offering package sets out the SEZ regime in Jamaica and outlines the CSEZ's size and strategic location, potential markets and demand, and the zone's physical attributes/master planning etc. It also illustrates the financial viability of the CSEZ project (project IRR) and identifies

the GoJ's commitment to partner with a developer to share the risks attached to the CSEZ project. The core information for this offering package should come from the CSEZ feasibility study. The offering package for the CSEZ will be sent to potential developers before the Developer Conference. The Developer Conference will be a 1-2-day event, when potential developers will come to Jamaica to discuss the CSEZ project, meet the GoJ, and visit the zone site. This is the GoJ's opportunity to sell the project and create buzz about the potential and possibilities of the zone.

2.2 The Developer Selection/Institutional Strengthening Program

Table 13-2. The Developer Selection and Institutional Strengthening Program

Steps	Actions/Activities	Key Responsibility	Year -4				Year -3				Year -2				Year -1				Year 0			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1.	Prepare a TOR for a Transaction Advisor	GoJ																				
2.	Issue the TOR and Hire a Transaction Advisor for the CSEZ Project	GoJ	*																			
3.	Identify the Tender Process for Selecting a Developer for the CSEZ and Prepare a Strategy Document for the GoJ's Approval	TRANSACTION ADVISOR		*																		
4.	Prepare the Legal Agreements for the Project	TRANSACTION ADVISOR																				
5.	Prepare the Tender Package for the CSEZ	TRANSACTION ADVISOR																				
6.	Prepare an Expression of Interest (EOI) and a Request for Proposals (RFP) Document for the CSEZ Project	TRANSACTION ADVISOR																				
7.	Identify a Short List of Developers to Issue the EOI to	TRANSACTION ADVISOR/ GoJ				*																
8.	Issue the EOI to a Short List of Developers	GoJ																				
9.	Review the EOI Responses and Identify a Short List of Developers to Receive the RFP	TRANSACTION ADVISOR/ GoJ REVIEW COMMITTEE																				
10.	Issue the RFP to the Short-Listed Bidders	GoJ																				
11.	Review Received Bidder Proposals for the CSEZ	TRANSACTION ADVISOR/ GoJ REVIEW COMMITTEE																				

Table 13-2. The Developer Selection and Institutional Strengthening Program																							
Steps	Actions/Activities	Key Responsibility	Year -4				Year -3				Year -2				Year -1				Year 0			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
12.	Select the Appropriate Developer for the CSEZ	TRANSACTION ADVISOR/ GoJ REVIEW COMMITTEE						*														
13.	Sign the Legal Agreement with the Developer	GoJ						*														
14.	Set Up a New Department in JSEZA to Manage/Monitor Development of the CSEZ and other SEZs in Jamaica	JSEZA																				
16.	Hire Staff for the New Department	JSEZA					*															
17.	Oversee/Monitor the CSEZ Development/Construction	JSEZA																				

The Developer Selection and Institutional Strengthening Program is the responsibility of the GoJ and runs in parallel to the Developer Search. It can take 1-1.5-years to prepare tender documents and select an experienced developer. Under this Program, a Transaction Advisor will need to be hired to: i) develop a strategy note to identify the selection/tender process for the CSEZ, ii) prepare a tender package for the project, iii) develop an EOI and RFP for the bidding process, and iv) create a template for the legal agreement with the developer. It is advisable that the GoJ hires an experienced SEZ transaction advisor[1] to: i) oversee the preparation of the bidding documents, ii) manage the competition and bidder review process, iii) assist in negotiating the legal agreement, and iv) monitor all steps throughout the entire tender process to ensure transparency. On projects of this importance, size and magnitude, a Transaction Advisor is good value for money and it will allow the GoJ to focus on key elements of the process, where their detailed attention and approvals will be required.

In addition to identifying a developer for the CSEZ, JSEZA will also have the responsibility of monitoring the construction/operations of the CSEZ. As such, it would be advisable for JSEZA to set up a small Department/Unit within their existing framework/offices to undertake these activities. The mandate of this Department/Unit will be to oversee and monitor the implementation of the CSEZ and other SEZs to be constructed in Jamaica. JSEZA should staff this Department/Unit with planners, engineers, architects, construction supervisors and JSEZA officers to ensure that the CSEZ and other zones are being implemented as per JSEZA's approvals and operated following Jamaica's SEZ regime.

[1] The Transaction Advisor **must** have SEZ experience.

2.3 The Pre-Construction Program

Table 13-3. The Pre-Construction Program

Steps	Actions/Activities	Key Responsibility	Year -4				Year -3				Year -2				Year -1				Year 0			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1.	Secure the Entire CSEZ Lands with a Fence	GoJ																				
2.	Hire Security Team to Keep the CSEZ Secure	GoJ																				
3.	Prepare a Resettlement Plan	GoJ																				
4.	Resettle all Households on the CSEZ Lands	GoJ					*															
5.	Undertake an Environmental Impact Assessment of the CSEZ Lands	GoJ																				
6.	Obtain Environmental Approvals	GoJ						*														
7.	Valuate the Site's Lands	GoJ																				
8.	Undertake Required Engineering Studies/Soil Testing of the CSEZ Lands	GoJ																				
9.	Due Diligence of the Feasibility Study and Master Plan	DEVELOPER																				
10.	Prepare Construction Drawings and Engineering Package with Specifications for the Entire CSEZ Project	DEVELOPER																				
11.	Obtain Construction Permits and Approvals for the Phase I Work	DEVELOPER									*											

The Pre-Construction Program for the CSEZ will be the responsibility of both the GoJ and the developer. To speed up the implementation of the CSEZ, the GoJ should fence the CSEZ to make sure the lands stay secure as well as start a set of engineering activities and studies to obtain more detailed information and necessary approvals ahead of selecting a developer. This includes: i) resettling households currently on the CSEZ lands and demolishing buildings on the site, ii) undertaking an EIA and acquiring environmental approvals, iii) validating the land on the CSEZ site, and iv) commencing engineering studies and soil testing to confirm the lands stability. These activities should run parallel to the Developer Search and Developer Selection Phases. These actions should also begin immediately as resettlement and environmental studies/approvals often takes up to a year to implement and achieve. It should be noted that if the GoJ does not undertake these activities and leaves it to the developer, the pre-construction timeframes will be extended and the CSEZ project will take longer to come to market.

Once a developer is selected, they will undertake a due diligence exercise, which will include a review all documents, studies and drawings prepared to date for the CSEZ. Most likely, the developer will also prepare their own master plan. From this master plan, a tender package for the construction of the CSEZ will be developed. Once completed,

construction permits must be obtained before construction can begin. The GoJ should ensure that the developer's construction permits are obtained in a timely manner.

2.4 The CSEZ's Site Development Program

Table 13-4. The CSEZ's Development Program

Steps	Actions/Activities	Key Responsibility	Year -2				Year -1				Year 0				Year 1				Year 2				3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4																		
1.	Undertake Phase I and Phase II Earthworks	DEVELOPER			*																																			
2.	Construct Phase I Onsite Roads	DEVELOPER																																						
3.	Construct Phase I Utilities (Power, Water, Drainage, Sewerage, Telecom etc.)	DEVELOPER																																						
4.	Construct Phase I Common Buildings, Customs Facility and Pre-Built Factories	DEVELOPER																																						
5.	Connect Phase I On-Site Utilities with Off-Site Utilities	DEVELOPER																																						
6.	Obtain Final Permits and Approvals for the Occupancy of Phase I	DEVELOPER								*																														
7.	Construct Pre-Built Factories	DEVELOPER											*																											
8.	Construct of Independent Factories/Warehouses	TENANTS																																						
9.	Obtain Construction Permits and Approvals for the Phase II Work	DEVELOPER																									*													
10.	Construct Phase II Roads	DEVELOPER																																						
11.	Construct Phase II Site Utilities (Power, Water, Drainage, Sewage, Telecom etc.)	DEVELOPER																																						

Table 13-4. The CSEZ's Development Program

Steps	Actions/Activities	Key Responsibility	Year -2				Year -1				Year 0				Year 1				Year 2				3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4																		
12.	Connect Phase II On-Site Utilities with Off-Site Utilities	DEVELOPER																																						
13.	Obtain Final Permits and Approvals for the Occupancy of Phase II	DEVELOPER																										*												
14.	Maintenance as required	DEVELOPER																																						
15.	Project Monitoring	GoJ																																						

The Site Development Program for the CSEZ will be the responsibility of the developer, though the GoJ will monitor the implementation of the project. This is the phase where the CSEZ project is constructed. It includes the project's earthworks and the construction of the CSEZ's on-site roads and utility networks. Typically, it takes 1.5-2-years to construct a zone, depending upon climatic conditions in a country.

During the Transitional and Operational Phases, the CSEZ project will be marketed/promoted to investors. Investors/tenants who have entered into leases prior to the completion of the CSEZ will not be able to start construction of their facilities/factories until the occupancy permits for the CSEZ have been issued, which is around Year 0. It normally takes an investor/tenant 1-year to construct their factories/warehouse facilities on zone land, so they may not be open for business until Year 1 in the above table. Construction of tenant facilities is an on-going process throughout the life-cycle of the CSEZ.

Best practice suggests that when a first phase of an SEZ project is 70% leased, then the second phase of the project should begin. According to the CSEZ's demand forecast, this would mean that between Years 7-8, Phase II of the CSEZ may be constructed. It should be noted that construction timeframes could shift depending upon the actual uptake of the CSEZ land and the success of the marketing/promotion campaign for the project.

For Phase II, the implementation of core infrastructure and utility networks and the leasing of space within the CSEZ will be as per Phase I of the project. Usually during the Phase II construction, any large-scale upgrades or improvements to the Phase I project will also be undertaken at this time.

2.5 The Off-Site Infrastructure Program

Table 13-5. The Off-Site Infrastructure Program

Steps	Actions/Activities	Key Responsibility	Year -2				Year -1				Year 0				Year 1				Year 2				3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4																		
1.	Prepare Construction Package, Drawings and Engineering Specification for all Off-Site Infrastructure/Utility Networks and Highway Improvements	DEVELOPER																																						
2.	Obtain Construction Permits and Approvals for the Off-Site Infrastructure/Utility Upgrades/Improvements	DEVELOPER			*																																		
3.	Construct the new Highway Entrance to the CSEZ	DEVELOPER																																						
4.	Bring the Existing Off-Site Utility Networks to the Boundaries of the CSEZ	DEVELOPER																																						
5.	Connect all Existing Off-Site Utility Networks to the CSEZ's On-Site Utilities	DEVELOPER																																						
6.	Obtain Final Permits and Approvals to Activate all Utility Networks	DEVELOPER								*																														
7.	Construct a Dedicated Road Link Between the CSEZ and the Port of Kingston	GoJ																																						

The Off-Site Infrastructure Program is the responsibility of the developer and should be implemented within a 2-year timeframe during the Transitional Phase of the project. Because the developer is providing both the on and off-site infrastructure/utilities for the CSEZ project, the construction of the on and off-site infrastructure/utilities can easily be undertaken in a coordinated and timely manner.

The Off-Site Infrastructure Program includes: i) an improvement to the Mandela Highway in order to access the zone and its main gate, ii) the extension of off-site utility networks and connections to the new, on-site utility networks for the CSEZ and iii) a dedicated road linking the CSEZ with the port of Kingston.

It will be the developer's responsibility to prepare construction drawings, specifications and undertake the construction work for the CSEZs new access from the Mandela Highway. In addition, the developer will be responsible for bringing the utility lines for power, water, drainage, sewerage and telecom to the boundary of the site, if they are currently not there already.

In the short to long-term, a decision may be made to construct the dedicated road from the port of Kingston to the CSEZ. If this is decided upon, the design, construction and funding of this dedicated road will be the responsibility of the GoJ. A detailed study must be first undertaken before this road project begins. Funding will have to be secured and engineering drawings will have to be prepared, if the project is to move forward.

2.6 The Marketing and Promotions Program

Table 13-6. The Marketing and Promotions Program

Steps	Actions/Activities	Key Responsibility	Year -2				Year -1				Year 0				Year 1				Year 2				3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4																		
1.	Develop/Update a Marketing Strategy and Promotional Campaign for the CSEZ	DEVELOPER			*							*					*					*			*				*						*					
2.	Brand the CSEZ	DEVELOPER																																						
3.	Place/Update the CSEZ Marketing/Promotional Campaign on the JSEZA/JAMPRO/Other Government Websites	DEVELOPER/ GoJ																																						
4.	Prepare Brochures/Printed Materials/Social Media Content to Promote the CSEZ	DEVELOPER																																						
5.	Attend Trade Shows/Trade Conferences with JSEZA/JAMPRO	DEVELOPER/ GoJ																																						
6.	Target Publications and Advertising Outlets	DEVELOPER																																						
7.	Prepare Mass Electronic and Print Mailings	DEVELOPER																																						
8.	Develop Presentations/Videos to Promote the CSEZ for Jamaican Embassies around the World	DEVELOPER/ GoJ																																						
9.	Prepare Banners/Presentations/Videos to Promote the CSEZ on Foreign Missions and at Trade Shows/Conferences	DEVELOPER/ GoJ																																						

The Marketing and Promotions Program for the CSEZ will be the shared responsibility of the developer, JSEZA, and JAMPRO. Marketing the CSEZ will be an on-going activity. It is expected that the marketing/promotional efforts prior to selecting a developer for the CSEZ will be undertaken by JSEZA and JAMPRO during the Developer Search Phase. Once the developer is on board, the core marketing and promotional activities will be mainly the developer's responsibility, with JSEZA and JAMPRO supporting and promoting the developer's marketing campaign and the CSEZ brand to potential foreign/domestic investors in Jamaica or while on outward missions.

During the Transitional Phase, the developer will prepare a marketing strategy and promotional campaign for the CSEZ, will begin branding the zone, preparing marketing/promotional materials and developing social media/videos to highlight the unique value proposition of the CSEZ. Branding the CSEZ as something **'bold, innovative and different'**, will be the critical message. The developer should also prepare market content for JSEZA and JAMPRO websites. Once the CSEZ is operational, the developer should continue its marketing efforts – refining messages and updating materials each year, as necessary. A common failing zone projects is letting promotional material become outdated. This is especially true for websites.

2.7 The Communications Program

Table 13-7. The Communications Program

Steps	Actions/Activities	Key Responsibility	Year -2				Year -1				Year 0				Year 1				Year 2				3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4																		
1.	Prepare a TOR and Hire a Communication Firm/Expert	GoJ																																						
2.	Prepare a 5-Year Communication Strategy/Communication Plan and Security Plan for the CSEZ Project	CONSULTANT		*																																			
3.	Prepare Communication Tools and Materials	CONSULTANT																																						
4.	Liaise with Parish/Municipal/ Government Officials	CONSULTANT / GoJ																																						
5.	Form a Community Leadership Group	CONSULTANT / GoJ																																						
6.	Hold Regular Community and Leadership Meetings	CONSULTANT / GoJ																																						
7.	Prepare Community Newsletters and Distribute	CONSULTANT																																						
8.	Hold Community Building Events to Bring Positive Media Attention to the CSEZ Project	CONSULTANT / GoJ																																						

The GoJ is responsible for the development and implementation of the Communication Program for the CSEZ, as this program is a public outreach initiative, which is meant to support and inform the communities around the CSEZ about the project.

Because communication programs are so critical to zones, it is advisable for the GoJ to hire a communication firm or expert to head this program. A comprehensive communication strategy and action plan is required to make the CSEZ a success. Lessons learned has illustrated that SEZs, which have a strong, long-term communication campaign will create good will, supportive neighbors, and will create local, civil champions for the project. For the CSEZ, this will be very important, as the project will rely on the surrounding communities to support the project and help keep the zone safe and secure throughout its life cycle.

The communication program should begin in the Transitional Phase. A communication strategy/plan should be developed to target the surrounding communities and municipalities/parishes directly adjacent the CSEZ as well as the Greater Kingston area (Portmore, Spanish Town etc). Since security is an issue in Jamaica, the communication program should also include a security plan and supporting messaging.

Often, the first five years of a communication program are the most active and important. For the communication program to be successful, it must both inform and engage the community as well as bring government officials and civic leaders together. This means the communication plan must include community meetings with the GoJ and the developer, presentations, events, newsletters, information brochures, printed materials, social media sites/updates, and job offerings. The purpose of the communication plan is to make all those living, working and playing in close proximity to the CSEZ, a necessary contributor to its success.

Appendices A-D

Appendix A
Transportation

I.CMA Terminals

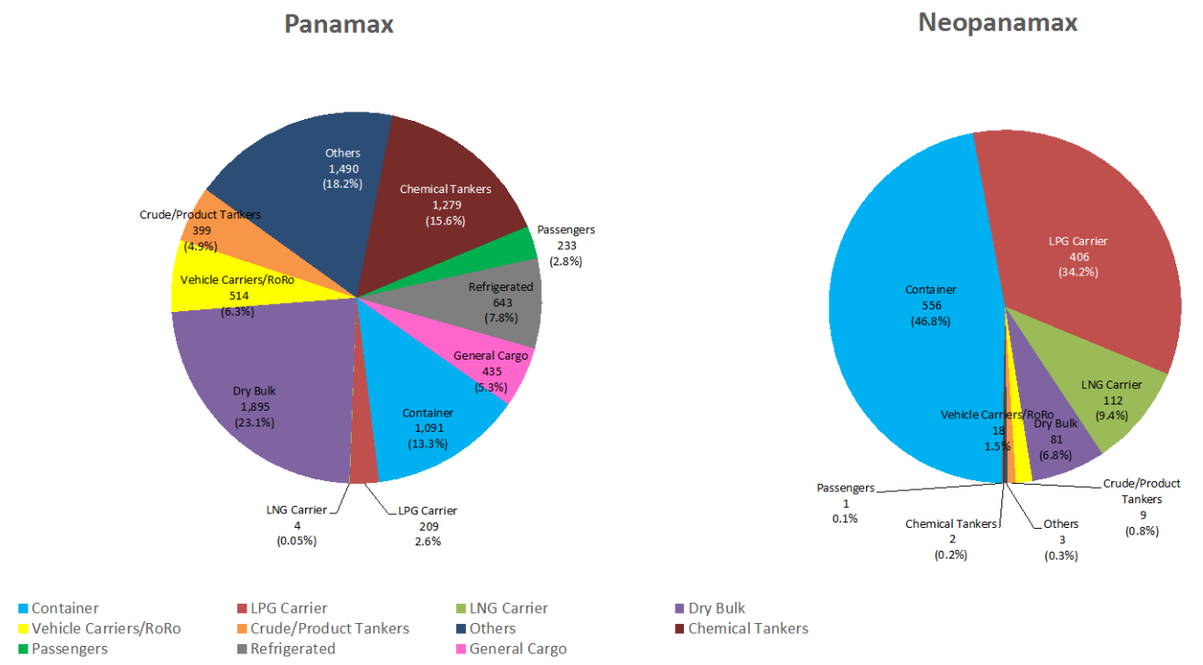
Figure A.1: Terminal Links
(51% CMA, 49% China Merchants Holding Intl)

Figure A.2: CMA Terminals

II. Panama Canal Traffic

Table A.1 Panama Canal Traffic by Origin and Destination in Million Long Tons

To From	ECUS	Europe	ECSA	ECCA	Cristobal, Panama	Africa	ATW (Atlantic)	West Indies	E.C. Canada	WCUS	Other	Total
Asia	22,728	259	1,422	1,385	2,034	21	632	442	235	435	591	30,184
WCSA	10,840	7,698	3,253	1,066	381	93	381	445	291	199	414	25,062
WCCA	2,323	1,908	1,002	1,031	126	1,063	90	315	186	55	372	8,472
WCUS	2,236	3,331	1,281	116	106	52	42	118	210	51	399	7,940
W.C. Canada	557	3,701	713	259	--	417	--	120	--	33	233	6,033
Oceania	675	306	103	253	20	--	--	34	0	29	--	1,420
ATW (Pacific)	15	20	--	39	--	--	486	--	--	--	7	567
ECUS	--	35	--	--	--	--	--	--	--	--	108	143
Other	62	--	44	6	--	--	--	59	--	--	102	273
Grand Total	39,436	17,257	7,818	4,154	2,668	1,646	1,631	1,533	922	802	2,227	80,094



Source: APC

Figure A.3: Panama Canal Vessel Traffic October 2016-May 2017

III. Feeder Services

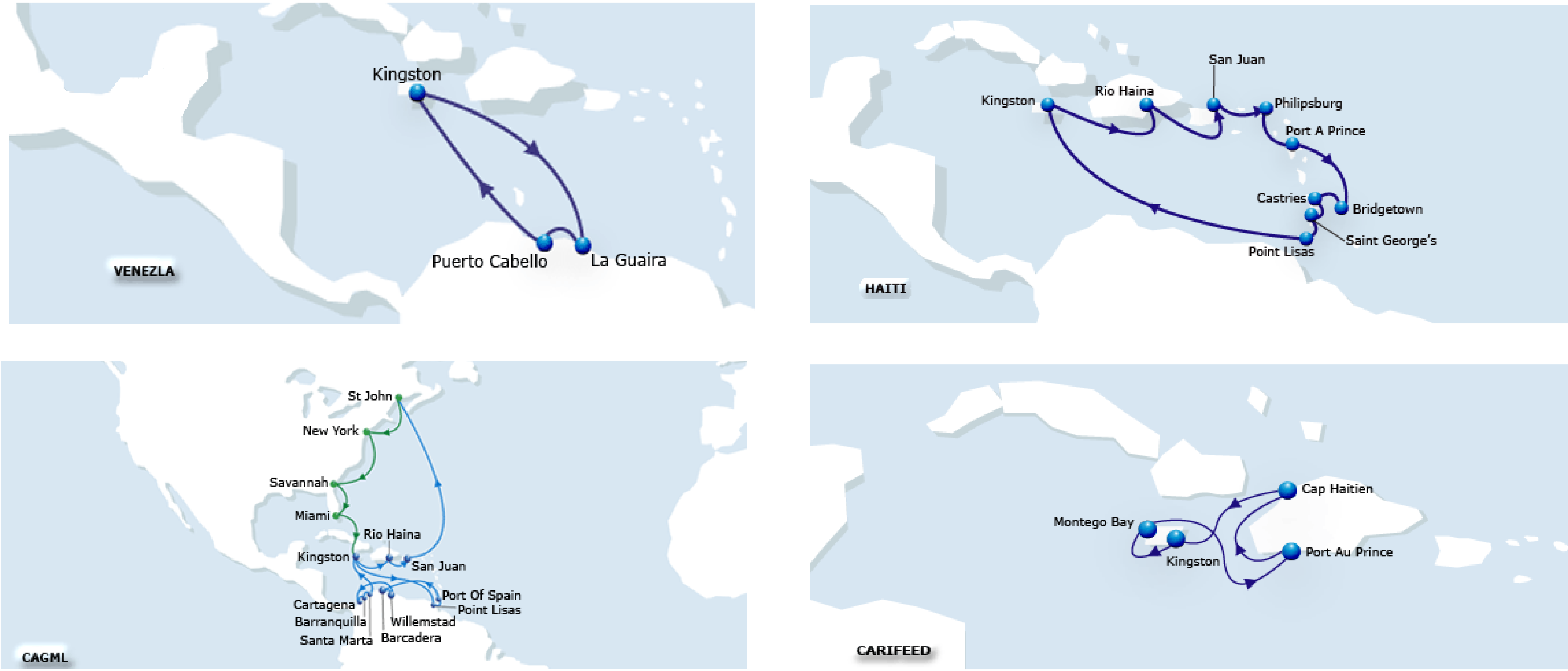


Figure A.4: CMA-CGM Caribbean Feeder Routes

Figure A.5: CMA-CGM Caribbean Feeder Routes

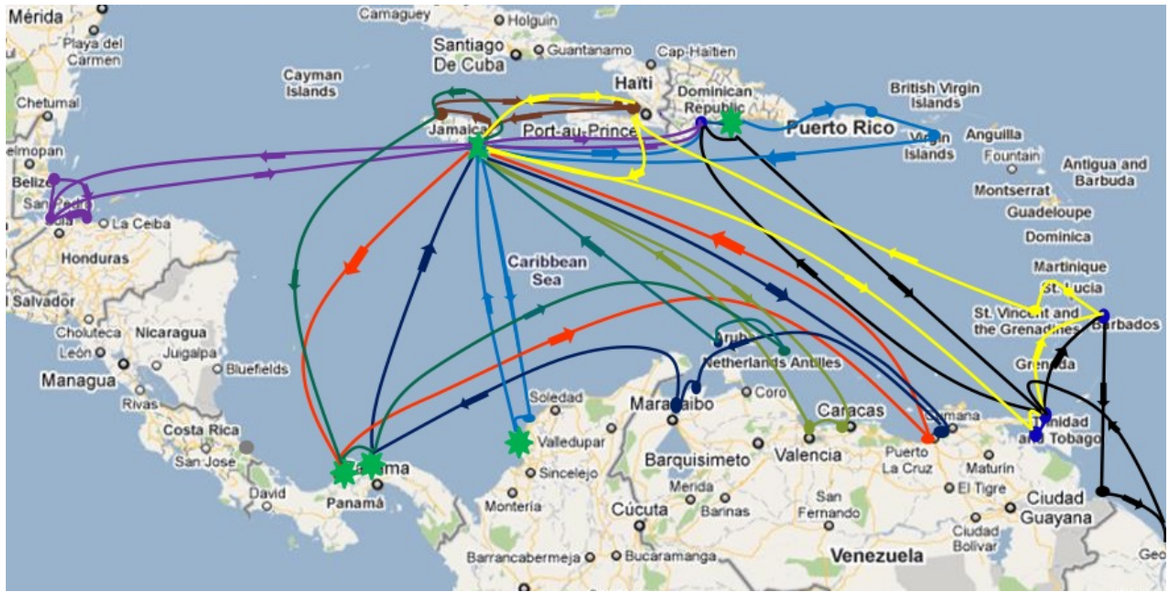


Figure A.6: CFS Common Feeder Network

Table A.2. CFS Route Schedule

CARICO I	CARICO II	NEAN	CENTRAM	ISLAND I	ISLAND II	GUAYANA	MIT- MAR	GUANTA
Weekly	Weekly	Weekly	Twice Weekly	Weekly	Weekly	Weekly	17 Day	Bi-weekly
KIN	KIN	KIN	KIN	KIN	KIN	CAU	KIN	KIN
HAI	BAQ	MBJ	MBJ	PTS	PAP	POS	EGM	MIT
CAU	CTG	MIT	MIT	POS	LFF	BGI	GUB	GUT
SJU	KIN	CCT	CCT	BGI	KIN	GEO	MAR	KIN
STT		WIL	WIL	KTN		PRM	MIT	
KIN		ORJ	ORJ	CAS		PTS	KIN	
		KIN	KIN	CAU		POS		
				KIN		HAI		

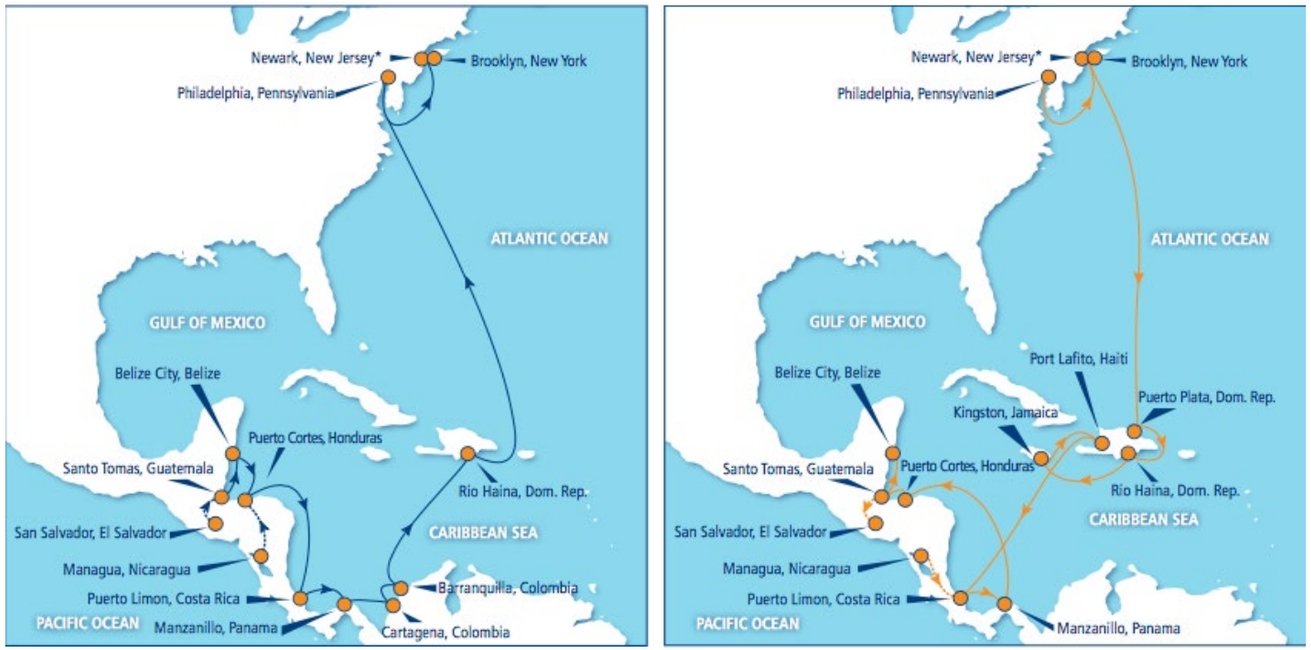


Figure A.7: Seaboard Routes

Figure A.7: Seaboard Routes (cont.)

Table A.3: SeaBoard Common Feeder Routes			
Ecuador/Peru Chile/Colombia/Venezuela/Jamaica Dom. Republic/Haiti/Suriname (Transit Time Days)			
Southbound		**Northbound**	
From Houston, Tx To		**From Callao, Peru to**	
Kingston, Jamaica	4	Cartagena, Colombia	8
Port La To, Haiti	11	Kingston, Jamaica	11
Guayaquil, Ecuador	11	Panama City, Florida	14
Callao, Peru	14	La Guaira, Venezuela	15
Rio Haina, Dom. Rep.	15	New Orleans, Louisiana	15
Paramaribo, Suriname	15	Port La To, Haiti	16
Matarani, Peru	16	Houston, Texas	16
Ilo, Peru	17	Pto. Cabello, Venezuela	17
Arica, Chile	19	Brooklyn, New York	18
Iquique, Chile	20	Miami, Florida	18
Angamos, Chile	20	Manzanillo, Panama	20
Valparaiso, Chile	23		
		From Ecuador to	
Northbound		Cartagena, Colombia	4
From Angamos, Chile to		Kingston, Jamaica	7
Houston, Texas	25	Rio Haina, Dom. Rep.	9
From Valparaiso, Chile To		La Guaira, Venezuela	10
Callao, Perú	4	Panama City, Florida	10
Cartagena, Colombia	14	New Orleans, Louisiana	11
Kingston, Jamaica	17	Manzanillo, Panama	12
La Guaira, Venezuela	19	Philadelphia, Pennsylvania	12
Pto. Cabello, Venezuela	21	Houston, Texas	12
Panama City, Florida	22	Pto. Cabello, Venezuela	12
Manzanillo, Panama	23	Port La To, Haiti	12
New Orleans, Louisiana	23	Portmiami, Florida	13
Brooklyn, New York	24	Guanta, Venezuela	13
Miami, Florida	24	Brooklyn, New York	14
Houston, Texas	27		

IV. Competing Ports

Table A.4. Competing Container Terminals

		Current					Planned Expansion				
Port	Operator	Draft m.	Berths no., length	SSG No.	Area Ha.	Capacity Mn TEU	Draft m.	Berths no., length	SSG No.	Area Ha.	Capacity Mn TEU
Freeport	HPH	16	3, 1036	9	57	1.5	16	6, 2150			3.3
Cartagena	SPRC CONTECAR	14 13.1	4, 1088 4,1000	6 6	20 20	1.5 1.5	16.5 16.5	4, 1088 4, 1000	8 13	25 90	2.0 3.2
Caucedo	DP World	13.5	3, 992	5	50	1.7	15	5, 1600	8	50	2.3
Colon MIT CCT Cristobal	 SSA Evergreen HPH	 16.5 14- 16.5	 6, 2040 4, 1258 3, 800*	 19 13 11	 52 74 16	 3.5 2.4 1.0					
Limon-Moin	JAPDEVA APM		2, 450	2	12.5	1.2**	14.5	2, 600	6	40	1.3
Port of Spain	Public	10.5- 11.5	4, 700	4	60	0.6					
Kingston KCT KWL	 CMA-CGM KWL	 14.7 9-13	 6, 2400 1655	 14	 102 33.5	 3.2 0.5	 15.2 14.5	 6, 2400 4, 1655	 17 10*	 80 40	 4.2* 2.0*

*Author's Estimates
** Self-Sustaining Vessels
Caucedo Planned 120 Ha Free Zone
Catagena Hub for Hamburg Sud and Hapag Lloyd

Table A.5 Kingston Port Traffic

	Transshipment			
Year	KCT	KWL	Domestic	Total
2012	8.25	0.26	4.82	13.32
2013	7.11	0.23	4.67	12.01
2014	7.94	0.23	4.86	13.04
2015	7.28	0.25	4.97	12.49
2016	7.49	0.49	5.43	13.41

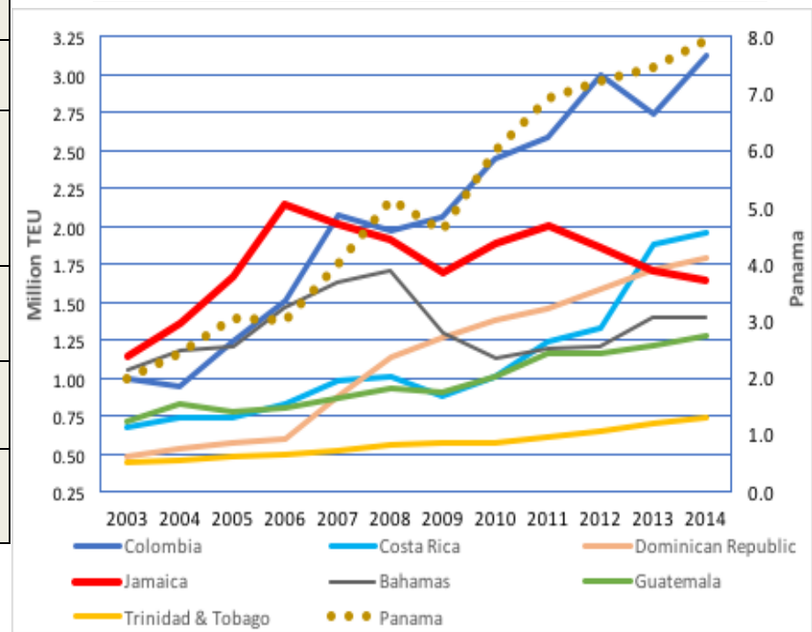


Figure A.8: Container Traffic by Country

V. Air Freight

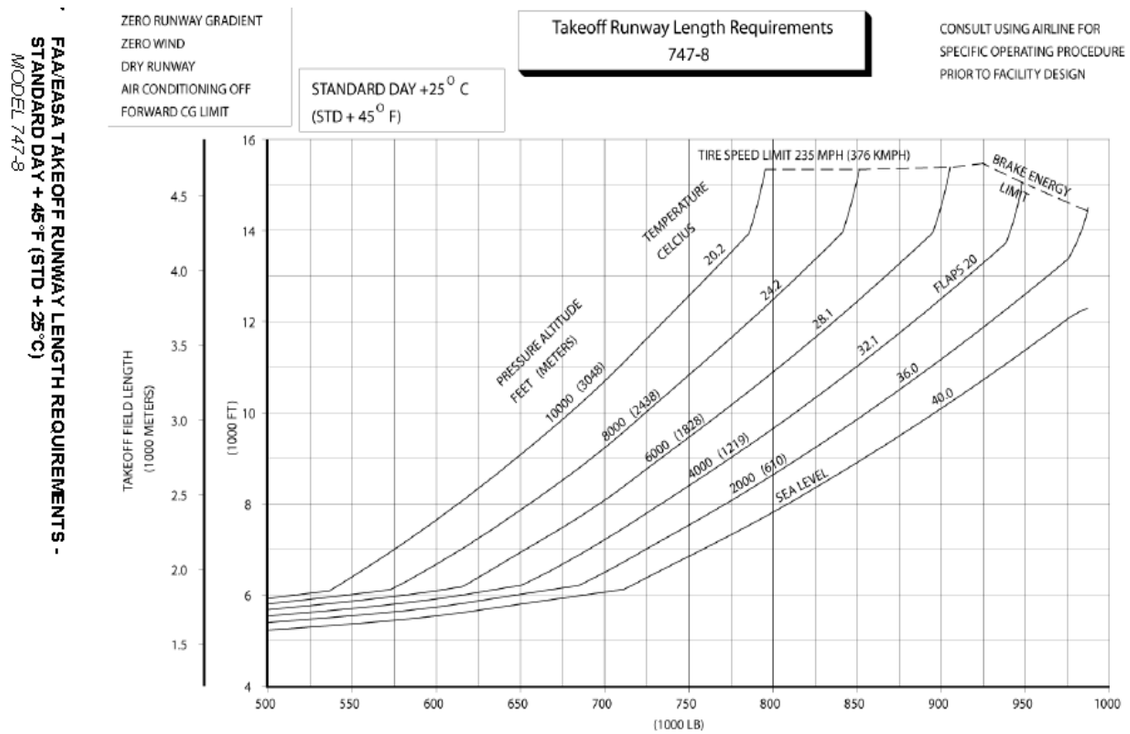


Figure A.9: MTW for 747-8 at 40 C.

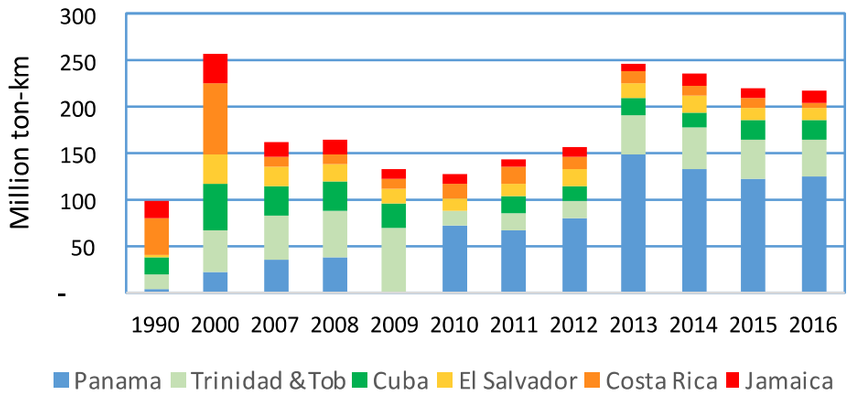
Table A.6. Airlines Serving Jamaica

Regional	Intl Scheduled	Intl Leisure
Arkefly	Air Berlin	Air Canada Rouge
Blue Panorama	Air Canada	Air Transat
Aerogal	American	Allegiant
Aerogaviota	Condor	Neos
Canjet	Delta	Sun Country
Carinbean	Eurowing	Sun Wing
Caymans	Frontier	Jetairfly
Copa	Jet Blue	Thomas Cook
	Southwest	Thompsom
	Spirit	Westjet
	United	Xtrairways
	Virgin Atlantic	

Source. Jamaica Aviation Authority

Table A.7. Air Cargo Revenues (Tonne-Kilometers by Country)								
Country	Total				International			
2010	Rank 2010	2010	2009	% change	Rank 2010	2010	2009	% change
Brazil	15	10,451	7,364	42	25	3377	2,464	37
Mexico	38	2,306	2,404	-4	39	1680	1,715	-2
Colombia	31	3,097	2,499	24	32	2,495	1,977	26
Panama	53	912	916	-	51	912	916	-
El Salvador	73	299	332	(10)	71	299	331	(10)
Trinidad &Tobago	75	256	279	(8)	73	241	255	(5)
Venezuela	76	249	230	8	91	99	91	8
Costa Rica	79	228	215	6	78	225	213	6
Jamaica	81	202	206	(2)	79	201	206	(2)
Cuba	82	199	184	8	81	189	175	8
2015	Rank 2015	2015	2014	% change	Rank 2015	2015	2014	% change
Brazil	18	12,609	12,299	3	26	4,105	3,798	8
Mexico	24	7,209	6,202	16	29	3,493	2,904	20
Colombia	30	4,206	3,822	10	32	3,021	2,807	8
Panama	40	2,699	2,643	2	39	2,608	2,554	2
El Salvador	72	434	498	(13)	71	434	498	(13)
Trinidad & Tobago	73	426	432	(1)	72	420	425	(1)
Venezuela	68	520	559	(7)	81	203	181	13
Cuba	77	290	244	19	77	256	212	21

Source: ICAO



Source. World Bank Indicators

Figure A.10: Regional Air Traffic

Table A.8. Revenues in Millions (Passengers-Kilometers by Country)

	Total				International			
Country	Rank 2010	2010	2009	% change	Rank 2010	2010	2009	% change
2010								
Brazil	14	90,846	74,049	23	25	22,777	20,649	10
Mexico	35	18,546	20,831	-11	41	12,079	13,616	-11
Colombia	42	14,760	13,983	6	44	9,596	9,005	7
Panama	46	10,138	10,175	-	43	10,138	10,175	-
El Salvador	70	3,223	3,516	(8)	68	3,219	3,511	(8)
Trinidad &Tobago	76	2,718	2,879	(6)	74	2,675	2,828	(5)
Venezuela	75	2,765	2,551	8	90	1,069	987	8
Costa Rica	77	2,582	2,877	(10)	75	2,555	2,854	(10)
Jamaica	79	2,187	2,241	(2)	77	2,187	2,241	(2)
Cuba	84	1,538	1,427	8	81	1,462	1,357	8
2015								
Brazil	15	122,868	117,760	4	25	32,032	28,273	13
Mexico	24	64,923	55,820	16	29	28,897	23,890	21
Colombia	34	29,062	25,168	15	41	17,785	15,519	15
Panama	37	26,216	25,526	3	31	25,311	24,633	3
El Salvador	67	4,948	5,656	(13)	65	4,948	5,656	(13)
Trinidad & Tobago	71	4,247	4,307	(1)	70	4,181	4,232	(1)
Venezuela	65	5,411	5,883	(8)	81	2,153	1,915	12
Cuba	76	2,734	2,303	19	78	2,392	1,975	21

Source: ICAO

Appendix B

Organizations/People Interviewed for the CSEZ Market Study

B.1. Organizations and Persons Interviewed		
#	Organization	Name of Stakeholder Interviewed
1	**AmCham**	**Gail Abrahams** – *Chief Executive Officer*
2	**ATL**	**Wayne Cummings** – *Commercial Director*
3	**Cars to Go**	**Gordon Baldie** – *Managing Director*
4	**Campari**	**Jorge Gonzalez** **Tanikie McClarthy Allen**
5	**CMA-CGM**	**Dean Williams** – *Project Manager*
6	**Coldfield**	**Brett Wong** – *Managing Director*
7	**Crown Packaging**	**A Wisdom**
8	**EdgeChem**	**Mellissa McHargh** – *General Manager*
9	**ELARC Welding Products**	**LeRoy Morris** – *Managing Director*
10	**Factories Corporation Jamaica Ltd**	**Dr. Donald Farquharson** – *Managing Director* **Desmond Sicard** – *Chief Strategic Officer* **Sharon Phillips** – *Client Relations*
11	**Gulfray SEZ**	**Martin Scott** – *Managing Director* **Rodger Bailey** – *Purchasing & Logistics Manager*
12	**Jamaican Chamber of Commerce**	**Larry Watson** – *President* **Cathrine Kennedy** – *1st Vice President* **Treavor Fearson** – *Chief Executive Officer*
13	**Jamaica Exporters' Association**	**Marjory Kennedy** – *Immediate Past President* **Stephen Dawkins** – *Deputy President* **Tamra Thomas** – *Acting General Manager*

B.1. Organizations and Persons Interviewed		
#	Organization	Name of Stakeholder Interviewed
		Andre Soares – Member
14	**Jamaica Manufacturers' Association**	**Metry Seaga** – *President* **Imega Breese McNab** – *Executive Director*
15	**Jamaica Special Economic Zones Authority**	**Dr. Eric Deans** – *Chief Executive Officer* **Gary Scott** – *Senior Director* **Sanvia Martin-Bailey** – *Director Infrastructure Development & Special Projects* **Kelli-Dawn Hamilton** – *Director*
16	**JAMPRO**	**Don Gittens** – *Manager, Logistics & Emerging Markets*
17	**Kingston Freeport Terminal Limited**	**Olivier Tretout**
18	**Kingston Wharves**	**Mark Williams** – *COO* **Grantley Stephenson** – *CEO* **Clover Moodie** – *Group CFO*
19	**LASCO**	**Hortense Edwards** – *General Manager*
20	**Mac's Pharmaceuticals**	**Noel McFarlane** – *Manager*
21	**Marinter**	**Natashe Barnett-McFarlane** – *Account Executive*
22	**Musson Jamaica Limited**	**Geoffrey Messado** – *Director*
23	**Orchard Electrics**	**Neville Burnell**
24	**PA Benjamin**	**Christopher Powell** – *Commercial Manager*
25	**Port Authority**	**Prof. Gordon Shirley** – *President & CEO* **Ed Marsh** – *VP Logistics*
26	**Private Sector Organization of Jamaica**	**Dennis Chung** – *Chief Executive Officer*
27	**Shipping Association**	**Trevor Riley** – *Group Chief Executive Officer*

B.1. Organizations and Persons Interviewed		
#	Organization	Name of Stakeholder Interviewed
28	**Strawberry Hill Hotel**	**Adriana Moreno Vogt** – *Hospitality & Service Manager*
29	**Sutherland Global Services**	**Olivia Campbell** – *Manager Strategic Initiatives*
30	**Toyota Jamaica**	**Tom Connor** – *Managing Director*
31	**Trade Facilitation Task Force**	**Patricia Francis** – *Chairperson of the Trade Facilitation Task Force*
32	**Tritel Services Jamaica Ltd**	**Wayne Chai Chong** – *Chairman*
33	**Wisynco**	**Stephen Dawkins** – *Group Export Manager*

B.2. Phone Interviews		
#	International Organization	Name of Stakeholder Interviewed
1	**Asociación de Zonas Francas, Colombia**	**Maria Camila Moreno** – *Executive Director*
2	**Barranquilla Free Trade Zone, Colombia**	**Levis Racedo** – *Commercial Manager*
3	**Carat, UK**	**Sylvain Valeix** – *Global Client President*
4	**CMA-CGM**	**Neil Ferguson**
5	**Designer and Web Influencer, France**	**Marie Haumont**
6	**Etche Securite, France**	Executive Director
7	**Former Minister of Trade, Israel**	**Ronit Kan**
8	**HEMA, NL**	*Firm Representative*
9	**IKEA Purchasing (Americas)**	*PR Representative*
10	**Jamaica Canadian Association, Toronto**	*Association Representative*
11	**Las Americas, DR, Free Zone Park**	**Yamile Medrano**
12	**Merrill Lynch, US**	**E Matthews** – *Large Accounts Advisor*

B.2. Phone Interviews		
#	International Organization	Name of Stakeholder Interviewed
13	**NYIISA, Trinidad**	**L Leonard** – *Founder and Head Designer*
14	**Pak Cosmetics, UK**	*Logistics Manager*
15	**Panama Pacifico, SEZ**	**Jennifer Hotsko**
16	**Zdenakie Ltd, Zambia**	**George Liacopoulos** – *CEO*

Appendix C

User Manual For the Financial and Economic Model

1.0 Purpose of the Financial and Economic Manual

This manual explains the features of the financial and economic model as well as provides an overview of the model's data entries, analysis and reports. The manual has been prepared for the GoJ so they can adjust any of the numbers or model inputs to see the effect on the project's IRR and ERR.

1.1 The Financial and Economic Model

The financial and economic model prepared by IDG is a live model. It is designed to allow the GoJ to easily calculate and see the effects of different variables and assumptions on the project's IRR, ERR and NPV. It allows the GoJ to adjust or change variables and assumptions as they see fit, if the CSEZ project is delayed or if the project costs or inputs change over time. This means that the model is useful beyond the feasibility study and will be a tool for the GoJ to use over the long term of the project.

1.2 Financial and Economic Model Objectives

The financial and economic model takes into account all costs and revenues associated with the development of the CSEZ. It explores and identifies various development scenarios and allows for the manipulation of the different variables, which will affect revenues, cost options, and project financing. In the end, its purpose is to identify the optimal financial/economic arrangements to develop the CSEZ for both the GoJ and a developer.

The main objective of the financial and economic model is to incorporate all available data as of October 2018 into a single model, which will then analyze different development scenarios for the CSEZ and identify key responsibilities of the GoJ and the developer. The model utilizes the following:

- **Demand Analysis:** Revenues to the developer, which are based on the number of tenants in the CSEZ and lease rates for serviced land, pre-built factories/warehouses and commercial rents.

- **Infrastructure Costs:** The model utilizes infrastructure costs—roads, power, water, drainage, sewerage, and telecommunications estimated from the master plan.
- **Operating Expenditures (OPEX):** Operating costs for the developer.

- **Allocation of Services:** Allocation of services between the GoJ and the developer.
- **Phasing Plan:** Phasing of the project, which is based on the demand forecast and the master plan.

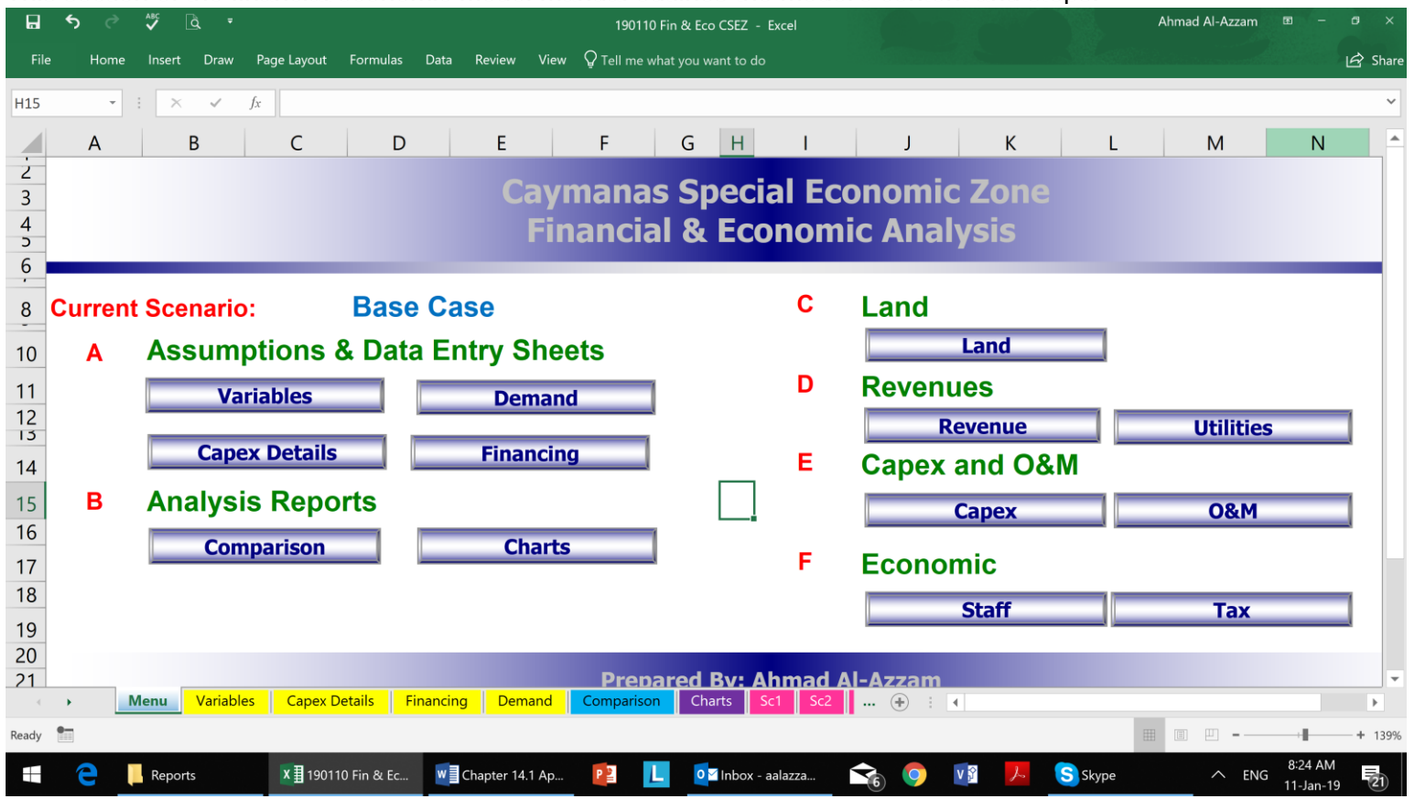
1.3 Financial Model Features

The key attributes of the financial/economic model are:

- The model is flexible and easy to use.
- The model allows the user to test different development scenarios and can save up to 10 scenarios at a time.
- The model allows the users to test both the effects on: i) the developer's profitability, hence the project's IRR, and ii) the GoJ's costs and revenues.
- The model provides users with detailed calculations and summary sheets for cash flows.
- The model allows for changes in the allocation of services between the GoJ and the developer.
- The model allows for the testing of costs and the effects of different GoJ contribution options.
- The model allows for the phasing plan to be changed according to different levels of demand.

2.0 Using the Financial/Economic Model

This section of the financial/economic model manual outlines the model's content and steps.

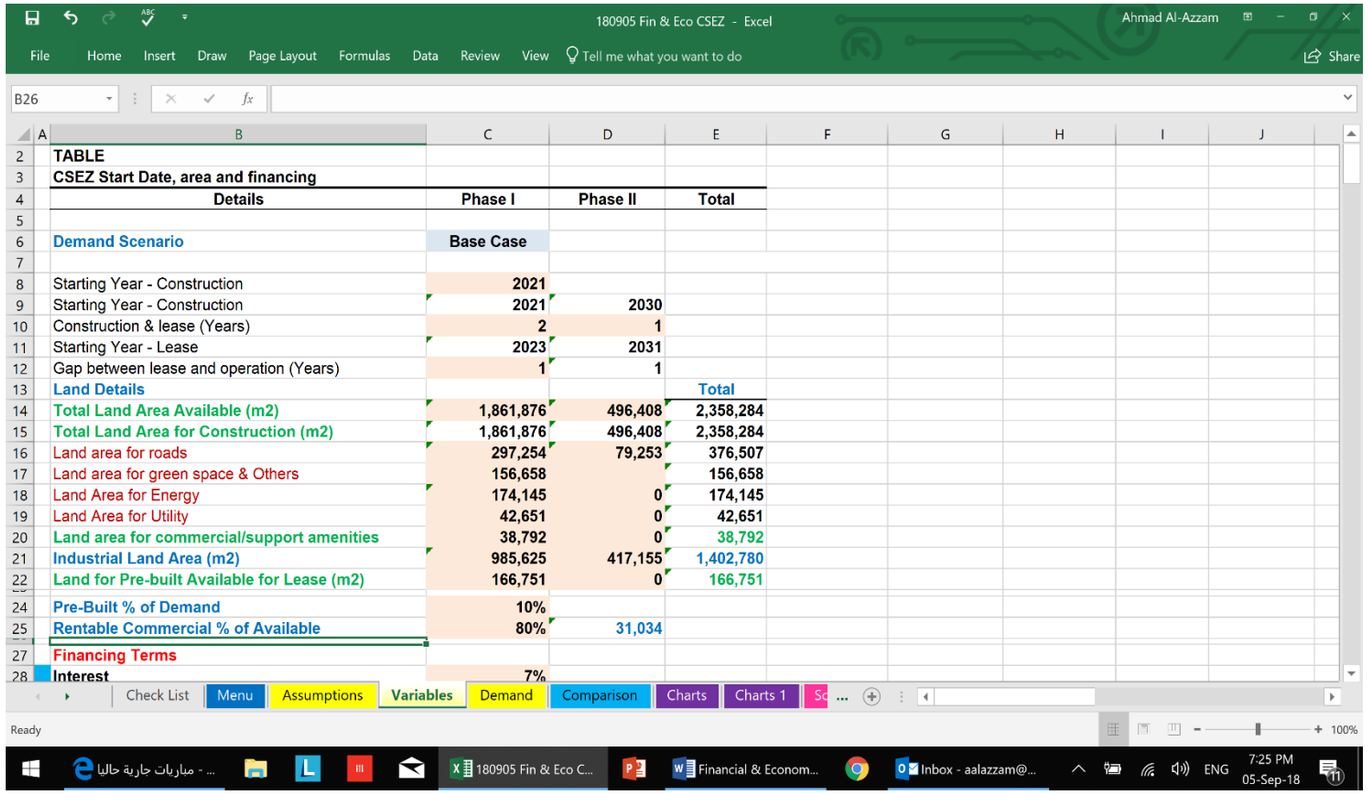


The financial/economic model contains the following sheets:

2.1 Data Entry Sheets

Any data to be inputted into the financial/economic model is done through only two sheets: i) the variable sheet found under the variable tab and ii) the demand sheet found under the demand tab. The model will then automatically recalculate the project's financial and economic viability. Nothing more is required.

- **Variables Sheet**: Data should only be fed into cells shaded in orange. This type of data includes the following:
  - Demand scenarios
  - Land details
  - Financing terms
  - Infrastructure costs
  - Occupation of leased land
  - Utility demand
  - Lease rates
  - Staffing
  - Land leased from the GoJ to the developer
  - Economic factors and GoJ revenues
  - Customs duties and taxes
  - Marketing costs
  - CAPEX, administrative, depreciation and O&M costs
  - Inflation
  - Utilities
  - Power options



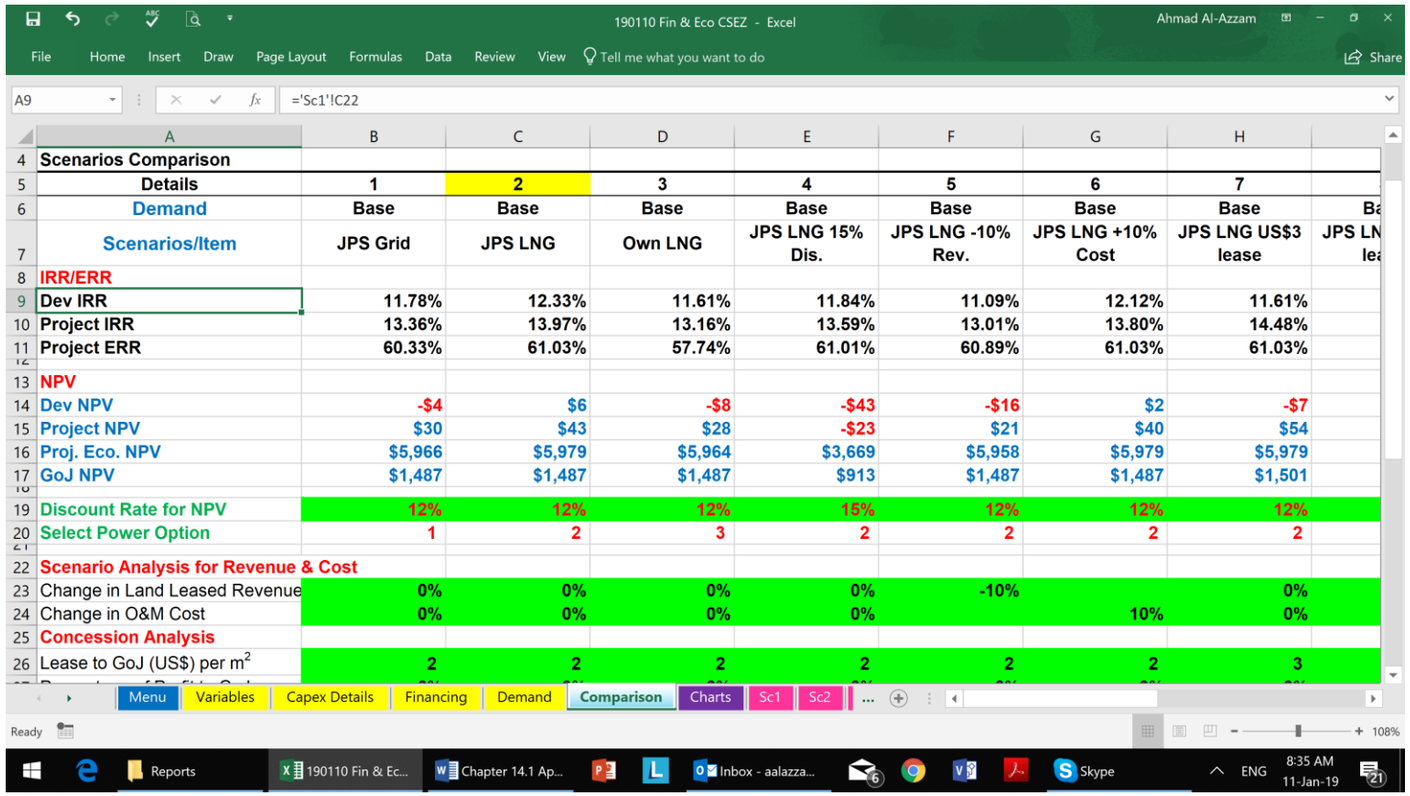
- **Demand Sheet**: The demand sheet allows a user to change/adjust the demand data, as required. IE. The number of expected tenants in each industry sector per phase of the project.
- **Capex Details**: The Capex sheet allows a user to update details of Capex for both onsite and offsite Capex.
- **Financing Sheet**: The Financing sheet allows a user to update financing options (loans/equity percentage, repayment term of each loan, interest percentage of each loan) for onsite, offsite and power Capex.

2.2 Model Analysis and Charts

Once the new data is placed into the variable and demand sheets, the financial/economic model will automatically summarize the result of the financial and economic analysis. This information can be found in two sheets:

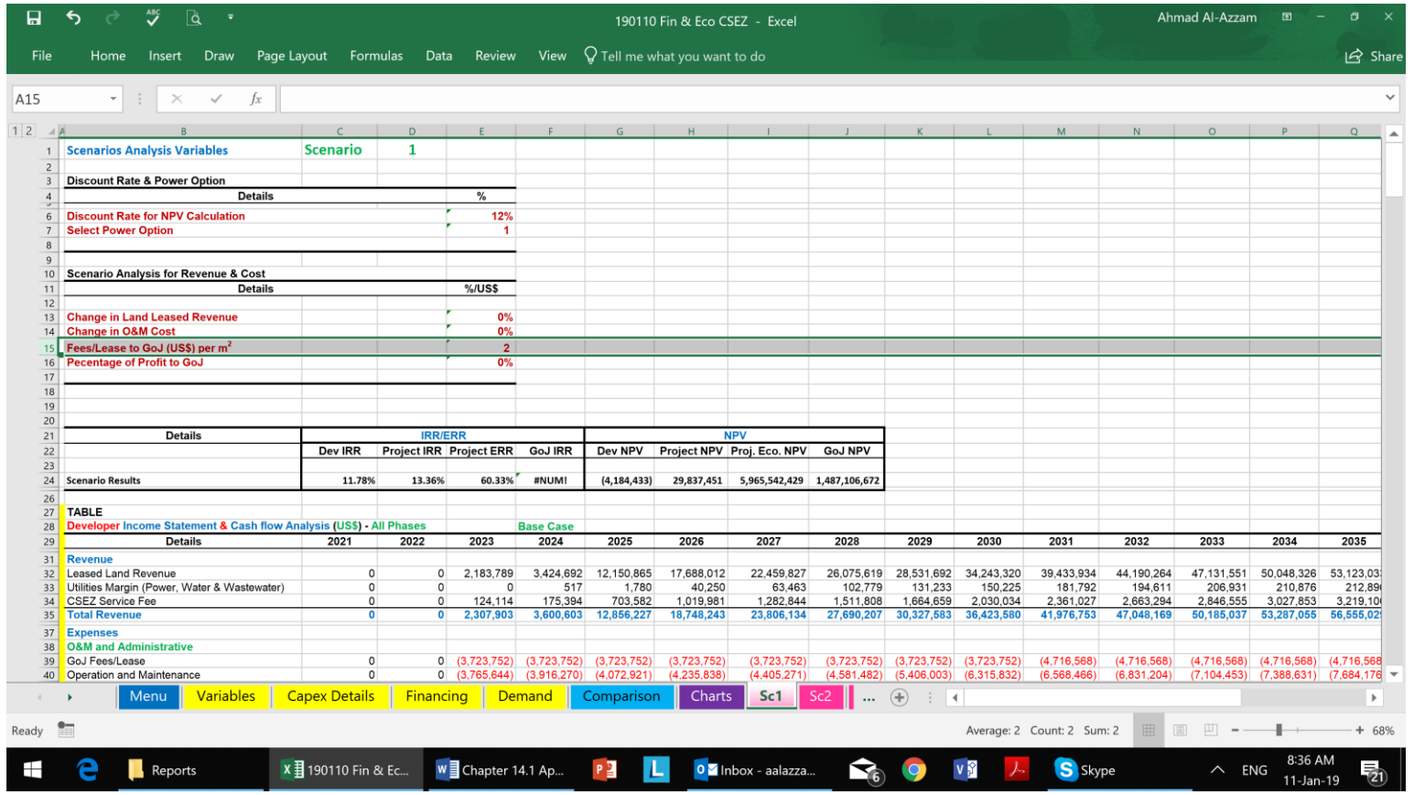
- **The Comparison Sheet**: The comparison sheet will automatically test different development scenarios for the CSEZ and will provide the following information:
  - Discount rate for the NPV
  - Change in land leased revenues
  - Change in O&M costs

  It also allows user test the impact of the change in the following sheets:
  - Demand sheet
  - Variable sheet
  - Financing sheet
  - Capex Details



	A	B	C	D	E	F	G	H
4	Scenarios Comparison							
5	Details	1	2	3	4	5	6	7
6	Demand	Base	Base	Base	Base	Base	Base	Base
7	Scenarios/Item	JPS Grid	JPS LNG	Own LNG	JPS LNG 15% Dis.	JPS LNG -10% Rev.	JPS LNG +10% Cost	JPS LNG US$3 lease
8	IRR/ERR							
9	Dev IRR	11.78%	12.33%	11.61%	11.84%	11.09%	12.12%	11.61%
10	Project IRR	13.36%	13.97%	13.16%	13.59%	13.01%	13.80%	14.48%
11	Project ERR	60.33%	61.03%	57.74%	61.01%	60.89%	61.03%	61.03%
13	NPV							
14	Dev NPV	-$4	$6	-$8	-$43	-$16	$2	-$7
15	Project NPV	$30	$43	$28	-$23	$21	$40	$54
16	Proj. Eco. NPV	$5,966	$5,979	$5,964	$3,669	$5,958	$5,979	$5,979
17	GoJ NPV	$1,487	$1,487	$1,487	$913	$1,487	$1,487	$1,501
19	Discount Rate for NPV	12%	12%	12%	15%	12%	12%	12%
20	Select Power Option	1	2	3	2	2	2	2
22	Scenario Analysis for Revenue & Cost							
23	Change in Land Leased Revenue	0%	0%	0%	0%	-10%		0%
24	Change in O&M Cost	0%	0%	0%	0%		10%	0%
25	Concession Analysis							
26	Lease to GoJ (US$) per m^2	2	2	2	2	2	2	3

- **Scenario Sheets**: The model has been designed to permit up to 10 scenarios resulting from the comparison sheet.



- **Charts Sheet**: Under the chart tabs, the financial/economic model will provide charts, which module outputs and scenario analysis.

2.3 Output Sheets for the Financial/Economic Model

Once all data is entered into the variable sheet, the following output sheets will be automatically prepared by the model:

- **The Land Sheet**: The land sheet includes: i) the amount of land, which is leased, ii) the number of companies in the CSEZ, iii) the land under operation, iv) the developer's profit, v) commercial lease revenues, vi) leased land revenues, and vii) tax on leased land.
- **The Revenue Sheet**: The revenue sheet will identify: i) leased land revenues, and ii) service fees.
- **The Utility Sheet**: The utility sheet will identify details on the: i) power, ii) water, and iii) wastewater.
- **The Capex Sheet**: The Capex sheet will specify the capex details per phase.
- **The O&M Sheet**: The O&M sheet will provide details on the operation and maintenance costs for the CSEZ including maintenance staffing details.
- **The Staffing Sheet**: The staffing sheet provides information on the CSEZ's tenant's and developer's staffing with data on numbers, salaries, taxable salaries and payroll taxes.
- **The Tax Sheet**: The tax sheet deals with all tax implications for the CSEZ.

2.4 Impact of different Variables

Below is the impact of key variables on different sheets in the model:

Table 14-1. Key Variables' Impact on the Model	
Variables	**Impact**
Land Details	Comparison, Scenarios, Capex, land, revenue, utilities, O&M, Staff, Tax
Inflation	Comparison, Scenarios, Capex, revenue, utilities, O&M, Staff, Tax
Financing	Comparison, Scenarios, Capex
Occupation of leased land	Comparison, Scenarios, Capex, land, revenue, utilities, Staff, Tax
Utilities	Comparison, Scenarios, revenue, utilities
Land economic value	Comparison, Scenarios
Lease rate	Comparison, Scenarios, Capex, land, revenue, utilities, Staff, Tax
Staff per company	Comparison, Scenarios, Staff, Tax
GoJ revenue per company	Comparison, Scenarios
Percentage of indirect labor	Comparison, Scenarios, Staff, Tax
Wages variable	Comparison, Scenarios, Staff, Tax
Developer costs	Comparison, Scenarios, O&M
Utilities rates	Comparison, Scenarios
Power options	Comparison, Scenarios, Capex, O&M

Appendix D

An Outline for a Developer Prospectus

1.0 Outline of the Strategy and Steps for Finding a Developer

In accordance with best practices, the following is the strategy and necessary steps required to find/attract a developer for the CSEZ project. The following outlines the activities and order as well as the role of the JSEZA or other associated government procurement agencies.

I. Finalize the Feasibility Study and have it approved by the Cabinet

II. Create informal connections with Jamaican and the international development community to inform them of upcoming opportunities (ongoing activities)

III. Undertake additional due diligence, as needed or required (IE. Environmental impact assessment, soil testing, etc.)

IV. Ensure all Cabinet/government approvals, including agreement of all terms for a Developer for the CSEZ project. This is must come from all stakeholders including—land owner, utilities, etc.

V. Prepare the tender documents (procurement package) and outline/agree upon the timeframe of the tendering process

VI. Advertise the Developer Conference (requires 3 months pre-planning minimum)

VII. Issue the Request for Quotation or Expression of Interest documents

VIII. **Developer Conference** (voluntary)

IX. Receive Statements of Quotation or Expression of Interest proposals

X. Short-List potential developers

XI. Issue Request for Proposal Documents

XII. Receipt of proposals

XIII. Negotiate with winning bidder

XIV. Developer constructs and operates the CSEZ as per contract

XV. JSESA monitors the zone

This document consists of an outline for a Developer Prospectus to be sent to potential developers in Jamaica and around the world in advance of a formal CSEZ developer procurement. Such a prospectus is often packaged together with a Request for Quotation (RFQ), and that is reflected in this outline. The prospectus and RFQ can be provided together or separately to potential developers, depending on JSEZA's needs and circumstances.

2.0 Outline for a Prospectus for a CSEZ Developer Conference

2.1 Cover Page "Caymanas Special Economic Zone Developer Prospectus"

[Content: One page with title, important dates, and photograph(s) relevant to the Caymanas Special Economic Zone (CSEZ).]

A. REF Issuance: [Insert date]
B. Developer Conference and Site Visits: [Insert date(s)]
C. RFQ Submission Date: [Insert date]

2.1 Developer Conference Information

[Content: One page announcing and providing details about the time, location, contents, and schedule of the Developer Conference. The Developer Conference information could alternatively be included at the end of the Investor Prospectus or RFQ documents.]

A. Date, Time, and Location of Conference
[Content: Provide the date, time, and location of the conference]

B. Brief information about Developer Conference

i) Overview
[Content: One paragraph explaining that the Developer Conference will provide potential developers with information on the CSEZ project scope and procurement process and will include a tour of the CSEZ site (and perhaps other tours as well—port, airport, etc.). It will also allow an opportunity to network with other interested developers, perhaps with the aim of encouraging joint ventures. Include a statement that the conference is voluntary, and that a list of registered attendees and other materials from the event will be made public via JSEZA website.]

ii) Developer Conference Schedule

[Content: Provide a brief conference schedule, which might include the following:

- Attendee Sign-In
- Welcome and Introduction of key people in JSEZA and GoJ and developer participants
- Technical presentation on CSEZ—Background, vision, location, market, feasibility
- Developer questions and Requests for Clarification on technical aspects of CSEZ project
- Presentation on procurement aspects of CSEZ project, including overview of RFQ documents
- Developer questions and Requests for Clarification on procurement aspects of CSEZ project
- Closing Remarks
- Tours
- Dinner/Social Hour
- Optional: Roundtable with Jamaican industry leaders and/or presentations by Jamaican investor success stories.

C. Accommodations

[Content: Provide information regarding any special arrangements for hotel accommodations for participants.]

D. To register

[Content: Provide a link for developers to register. State that each member of an organization should RSVP through the invitation website. If an attendee has already joined a consortium, they should include the name of that consortium of the lead firm in the consortium.]

2.3 Developer Prospectus

[Content: Approximately 14 to 21 pages introducing and describing the vision and technical details of the CSEZ project, as well as a general selection process timeline.]

A. Introduction

[Content: Approximately two pages introducing the CSEZ project, including the following.]

i) Introduction to the CSEZ Project

[Content: One-page summary of CSEZ project, history, strengths and weaknesses.]

ii) Introduction to JSEZA

[Content: Basic information about what JSEZA is, and its role in the CSEZ project.]

iii) Key documents

[Content: Links to documents such as:

- SEZ law and regulations, PPP Policy, etc.
- CSEZ Feasibility Study
- Jamaica Logistics Study
- Environmental impact assessment
- RFQ

iv) Selection process timeline

[Content: Key dates, perhaps in a table.]

B. CSEZ Development Opportunity

[Content: Approximately two to four pages describing the opportunity for developers, including the following.]

i) Project Description

[Content: One to two pages describing the type of development JSEZA envisions for the CSEZ. Include picture of conceptual layout of the zone. There can be a statement to the effect of, “To reduce cost and risk, JSEZA commissioned a feasibility study, and spent more than two years collecting comprehensive industry and site data. Developers can utilize and expand upon this in their offers.”]

ii) Project Goals

[Content: Half page describing JSEZA’s goals for the CSEZ project, which might include:

- Integration of site within greater CEDA
- Types of uses for the CSEZ

- Creation of new jobs and revenue
- Maximize market viability
- Activation of CSEZ site, including realistic implementation and phasing strategy from developer
- Maximize market viability
- Minimize site vacancy and attract tenants to CSEZ
- Project environment, and utilize sustainable and green construction and operations practices.

iii) Project Financials

[Content: One to two pages, including the following. Explain that the numbers are based on JSEZA's own due diligence as reflected in the CSEZ feasibility study, and that they are not a guarantee to developers, who are encouraged to do their own financial due diligence.]

a) Investment overview
   1) Projected period
   2) Investor capital required
   3) GOJ intended financial contribution to project, if any
   4) Minimum investment commitment
   5) Projected overall investment return

b) Pro Forma
   1) Capital structure—equity required, bank financing, total project cost
   2) Project summary—gross project sales, total project costs, estimated net profits

C. CSEZ Development Site

[Content: Four to five pages describing the CSEZ site, including the following.]

i) Site Description

[Content: One to two pages describing the site]

1) Size
2) Ownership
3) Surrounding area and context, including CEDA, adjacent properties, Soapberry Waste Treatment Plant, landfill dump
4) Map(s) showing site in context
5) Survey map(s) showing boundary measurements

6) Site challenges (hydrology issues, including mitigation drawings)

ii) Site history
[Content: Half page.]

iii) Existing area plans and zoning
[Content: Discuss CEDA and any other area or zoning plans that will impact development of CSEZ.]

iv) Transportation access
[Content: Half page.]

v) Utilities
[Content: Half page on status of on-site and off-site utilities, and their suitability and need for upgrades for CSEZ.]

vi) Environmental Conditions of CSEZ site
[Content: One-page summarizing EIA undertaken by government for south site, and current environmental conditions of CSEZ site.]

D. CSEZ Project Plan Summary

[Content: Three to five pages describing the master plan and phasing plan based on the feasibility study, including the following.]

i) Planning Process
[Content: One to two page-description of the process/methodology of arriving at the master plan described in the feasibility study.]

ii) Development Phasing and Timing
[Content: One to two pages on projected phases based on market demand, need of developer to market to tenants, and extent to which JSEZA expects developers to adhere (or not) to the master plan in the feasibility study.]

E. Land Conveyance Process

[Content: One to three pages, including the following.]

i) CSEZ land disposal process

[Content: One to two pages discussing applicable laws, regulations, policies, processes, and how the ownership and/or lease structure will transfer to the developer.]

ii) Public benefit uses

[Content: Half page on expectations of land conveyance or set aside for public benefit use, including customs, right of ways, and other access issues.]

F. Developer Responsibilities

[Content: One to two pages detailing what JSEZA expects of developers, including.]

i) Developer responsibilities

[Content: One page on responsibilities developers of the CSEZ site, such as:

- Property acquisition
- Final master plan—conducting own market research, demand, and master plan that exemplifies vision set forth by JSEZA
- Set and follow specific design standards
- Obtain all necessary development approvals
- Financing—devise financing structure and obtain financing
- Construction
- Maintenance and operation
- Sustainable practices
- Accommodate public benefit users of site
- Development schedule
- Community engagement
- Coordinate with government stakeholders
- Transportation access and coordination.

- Project documentation and management.]

2.5 Request for Quotation

[Content: An RFQ document requires everything in the “Investor Prospectus” section of this outline, plus the following additional sections.]

A. JSEZA Policy Goals and Requirements

[Content: One to two pages on JSEZA and GOJ requirements regarding CSEZ project procurement, which might include things like the following:

- Zoning
- Green or sustainable building requirements
- Local hiring and opportunities
- Reservation of rights of JSEZA to cancel, modify, or reject RFQ
- Conflict of interest disclosures
- Ongoing reporting
- Miscellaneous provisions such as confidentiality, non-binding nature of RFQ shortlist selection, restricted communications, non-liability, etc.]

B. Selection Process and Submission Requirements

i) CSEZ Developer Solicitation Process

[Content: Half page on steps in process—RFQ, RFP, Negotiation, etc.]

ii) Submission requirements

[Content: One to two pages, including.]

1) Transmittal letter
2) Description of project team
3) Experience and background—projects and scale over last ten years. Project team names, demonstrated ability to structure public/private development projects

4) Financial capability—ability to arrange financing for large-scale projects, examples of projects similar in scope, brief description of projects and their financing structures, financial references.

iii) Shortlist Evaluation and Selection Criteria

[Content: Half page, including.]

1) Experience and background of project team
2) Understanding of development responsibilities
3) Financial capability and level of financial commitment
4) Completeness of project team

iv) Submission Instructions

[Content: Half page.]

v) Questions

[Content: Quarter page detailing where Questions and Requests for Clarifications should be sent and by when.]

vi) Additional Information and Links