

**Approaches to Disaster
Risk Reduction & Climate Resilience
at the
Norman Manley International
Airport (NMIA)**



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May 2019



PRESENTATION OUTLINE

- Introduction to the Norman Manley International Airport (NMIA)
- Climate Change Trends and Focus in Jamaica
- Initiatives in Climate Resilience
 - ❑ Palisadoes Highway Improvement Project
 - ❑ NMIA Airport Master Planning Upgrade & CDP
 - ❑ NMIA Terminal Building
 - ❑ Palisadoes Shoreline Protection Project
 - ❑ NMIA Climate Studies
 - ❑ NMIA Solar-at-Gate Project



International Airports - Jamaica

Airports Authority of Jamaica (AAJ)



Sangster International Airport



Ian Fleming International Airport

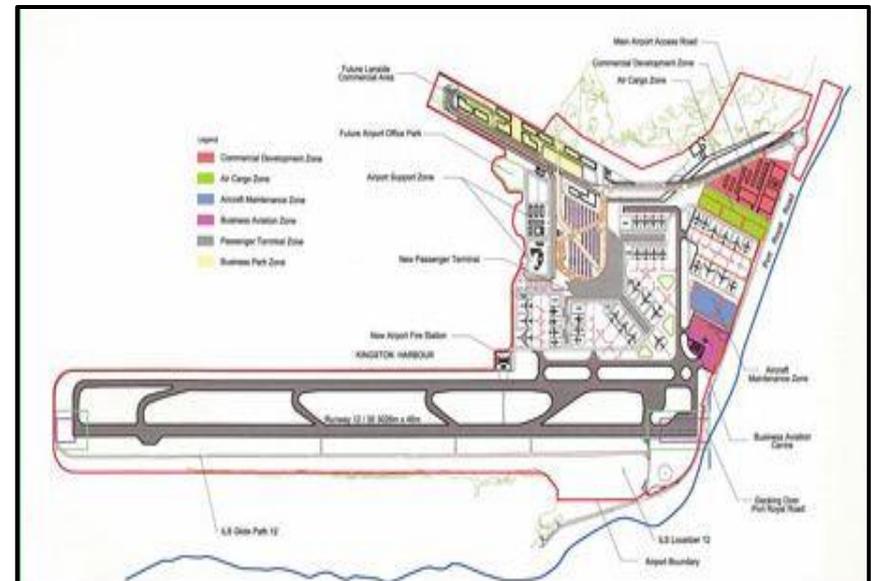


Norman Manley International Airport



Norman Manley International Airport (NMIA)

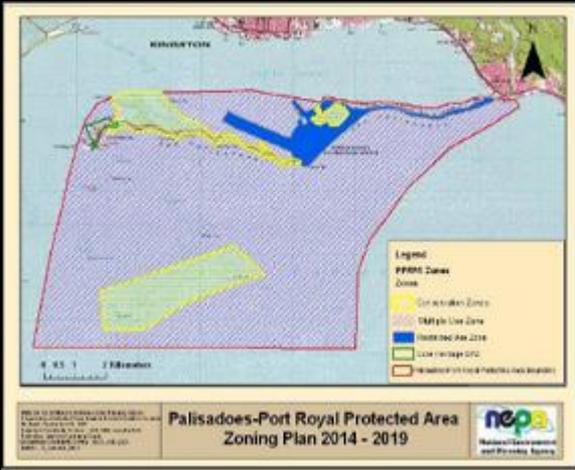
- Established in 1948
- Located 20 mins. from Kingston
- Approx. 1.6 million passengers/year
- Air service mostly for business travel + air cargo service + VFR
- On 230 hectares; surrounded by Kingston Harbour & Caribbean Sea
- One runway classified Code 4 with a precision approach & has a Category 1 Instrument Landing System (ILS)
- Runway is 2,716m long by 46m wide; 4 taxiways
- Level along runway centre line is 2.38m above sea level and 1.95m at edge of runway shoulders
- Terminal covers ~ 40,000 sq. metres.
- 2009 - Terminal facility expansion & upgrade + ancillary upgrades completed
- 2019-2024 - Runway End Safety Area (RESA) Project + other upgrades



Operated by NMIA Airports Ltd.



NMIA - Environmental Setting



PPRPA

NMIA is located in the Palisadoes and Port Royal Protected Area (PPRPA).

PPRPA is approx. 7,523 hectares (75.23 km²) with both terrestrial and marine areas.

NMIA bordered by the Kingston Harbour, 7th largest natural harbour in the world.

Palisadoes - Port Royal is Ramsar site no. 1454 with significant wetlands, endangered & vulnerable species + high historic & cultural values having the legendary city of Port Royal.



Port Royal – June 7 1692



RAMSAR



Port Royal – After 1692



Climate Change Trends for Jamaica



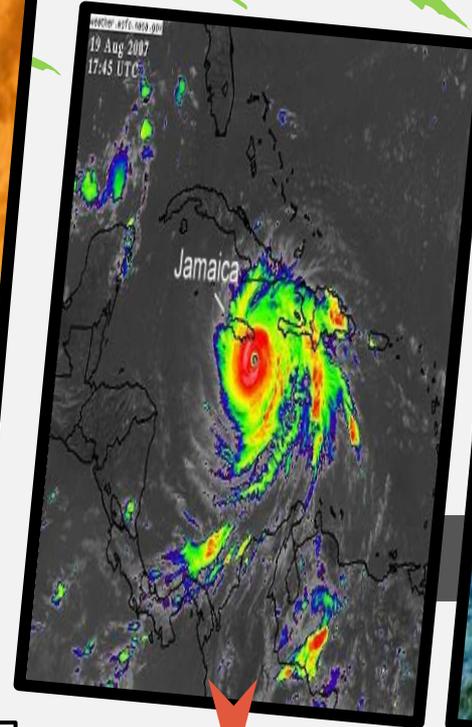
RAINFALL

By 2020s, Jamaica expected to be slightly wetter. By the 2050s, drier conditions may emerge esp. between May – Nov. The country may be 80% drier by 2080s.



TEMPERATURES

Jamaica expected to be between 0.5 – 1.1°C hotter by 2060s & 1' – 3°C hotter by 2080s. Frequency of hot 'Jamaican' days expect to be up to 90% more by 2090s.



HURRICANES

Increases in rainfall intensity & peak wind strength of tropical storms & hurricanes expected. No consensus if there will be more storms or hurricanes.



SEA LEVEL RISE

Mid-century change projected as 0.24 -0.30 m between 2046 - 2065. Future rise is not projected to be much different from projected global rise

DISASTER RISK & The Palisades Environment



- (a) Tropical Storm Gustav (2009)
- (b) Hurricane Gilbert (1988)
- (c) Palisades – Before Road Improvement Works
- (d) Hurricane Ivan (2004)
- (e) Hurricane Charlie (1951)



Coastal Transportation Infrastructure Resilience



- Rising sea levels can increase impact of storm surge.
- Access to NMIA was heavily affected by storm “over wash”.
- Norman Manley highway is only access connecting Port Royal & commercial/institutional activities to the airport & to the main land.
- Solution: Build coastal protection
 - Reinforcement for 100-year return period on Caribbean Sea & Harbour sides
 - Highway raised to ~ 3.2m above sea level
 - ~ 4,600m of roadworks & boardwalk, 3,900m of shoreline revetments & 4,000m of new 16” water supply line.
 - Road alignment improvement



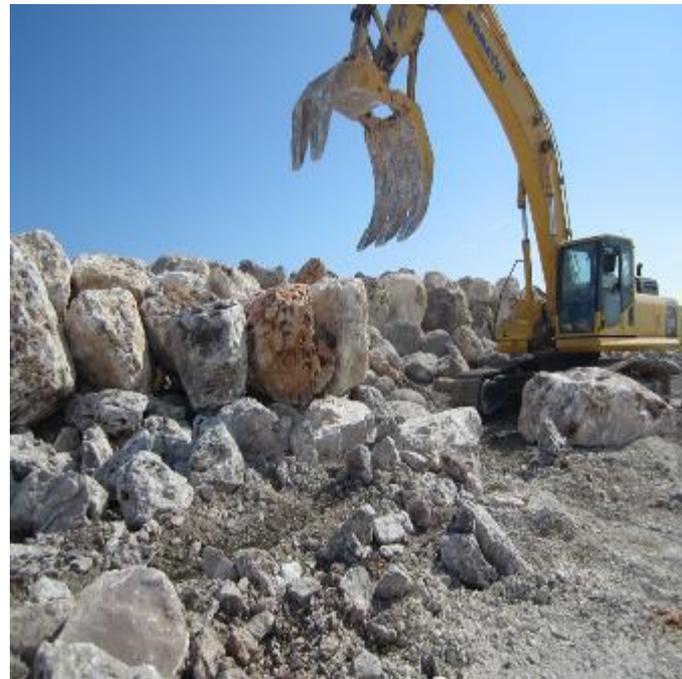
Palisadoes Shoreline and Road Project (2009 – 2012)



Cost -US\$65.4 million



2004



2012



Climate Vulnerability & Airport Master Planning

- NMIA Master Plan update (2013) indicated that the NMIA is potentially vulnerable to:
 - ✓ Hurricanes
 - ✓ Precipitation increase
 - ✓ Temperature increase
 - ✓ Storm surge due to sea level rise.
- Specifically,
 - ✓ Wind damage to assets
 - ✓ Redirection of flights
 - ✓ Reduced airplane performance
 - ✓ Increased energy use and demand
 - ✓ Scour of embankments and earthworks
 - ✓ Potential closures and failures due to storm surge
 - ✓ Flooding of airfields and roads causing delays
- **Strategy: Manage natural & other resources to cope with disaster risk = reduced vulnerability to events + increased adaptive capacity after events.**



NMIA Capital Development Programme

Since 2004, NMIAL has invested over US\$136m in its Capital Development Programme (CDP):

✓ Terminal & apron expansion; Upgraded Cargo and Logistics Centre (CLC); Improvements to landside facilities & site services; Upgrading of mechanical, electrical and IT systems; Phase 1 East Airfield development; & Various equipment acquisitions.

Going forward, airport operator Grupo Aeroportuario del Pacifico, (GAP), the new Concession holder, has committed to invest over US\$100 million to further upgrade NMIA over a 25 year concession.



Reducing Vulnerability – NMIA Terminal Building



THERMAL STRESS

2014: 3M sun control film (Prestige PR50) application to Terminal glass (Departure Lounge, Mezzanine Departure Hallway, Upper and Lower Piers).

Prestige Series - non-metallized, multi-layer optical film rejects up to:

- ✓ 97% of the sun's infrared light
- ✓ 60% of the heat to windows.
- ✓ 99.9% of UV rays (reduce fading of building furnishings).



HURRICANE & STORM RISK

2007: Alumayer& Zimmcor Insulating Laminated Glass on the Terminal building – Hurricane Resistant to Category 5



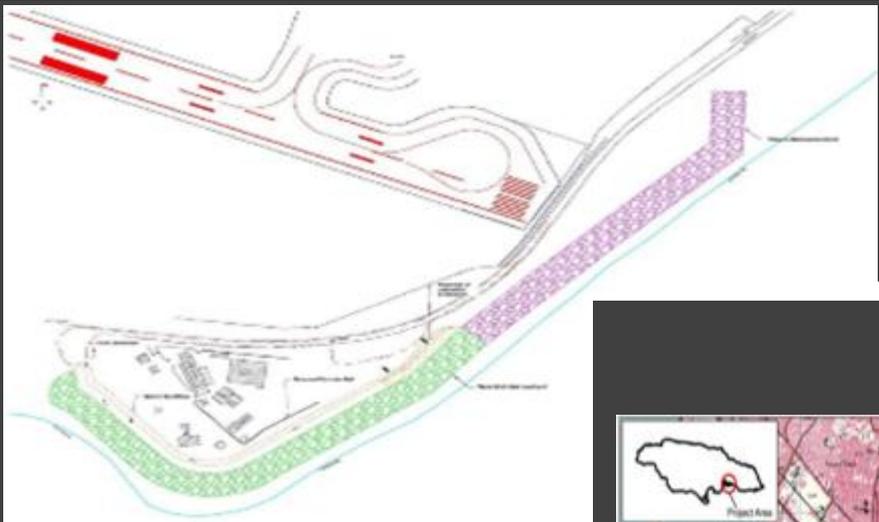


- Caribbean Sea shoreline at Runway 30 vulnerable to extreme hurricane waves, coastal erosion from sea level rise & short term storm events.
- Utility services in the road: water, telecom and electricity.
- Width of buffer between edge of road and shoreline: 30 – 80m.
- Predictions suggest that 30 - 60m of shoreline can be lost in a single event.
- Project is to protect shoreline to secure access to NMIA, general road access for Port Royal residents & the public + protection of critical infrastructure.
- Integrated hard & soft approaches
 - ✓ Biological/ecological - dune nourishment and re-vegetation.
 - ✓ Rock revetment development

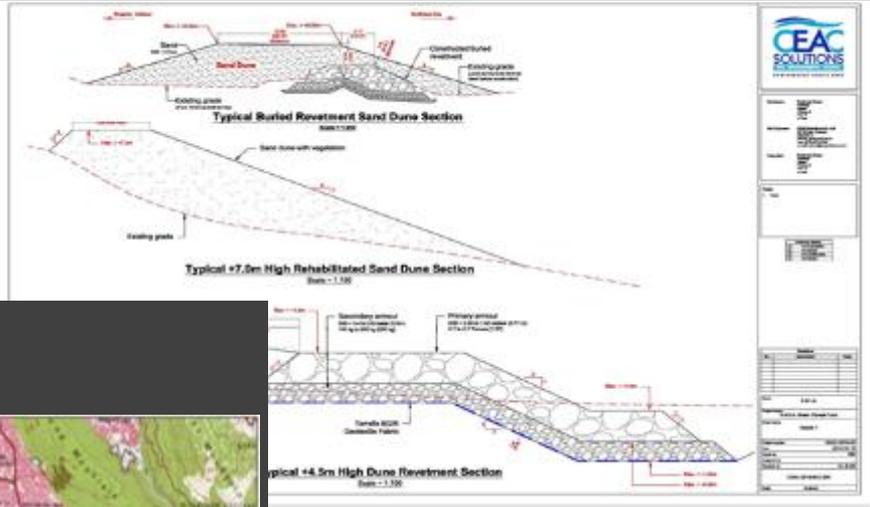
Palisadoes Shoreline Protection Project



LAYOUT OF SOUTHERN END OF RUNWAY SHOWING THE PROPOSED REVETMENT

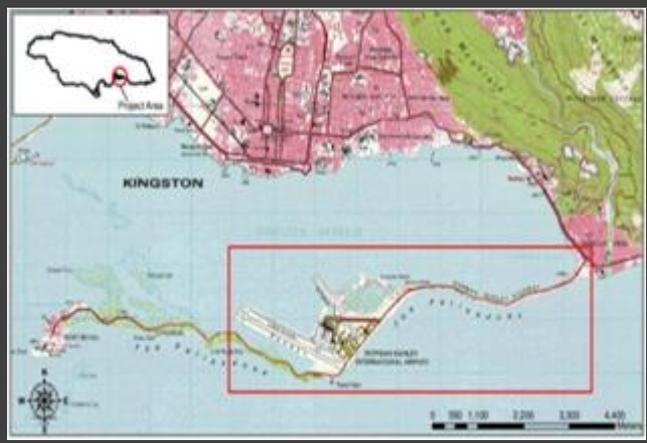


Project Area

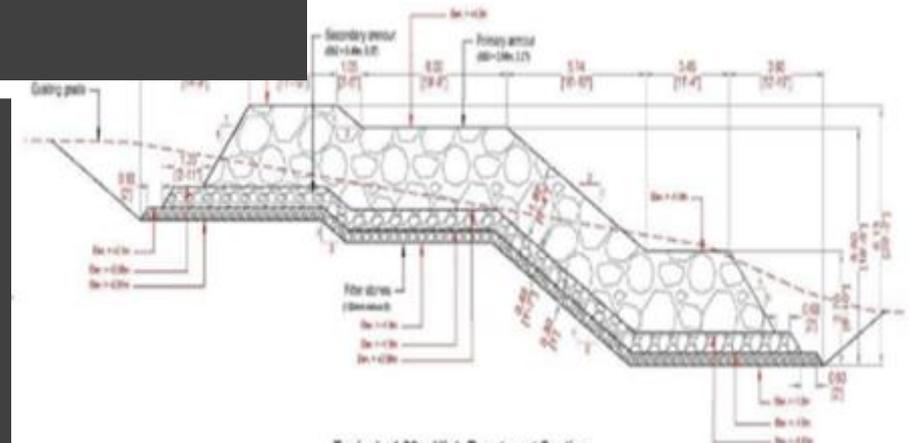
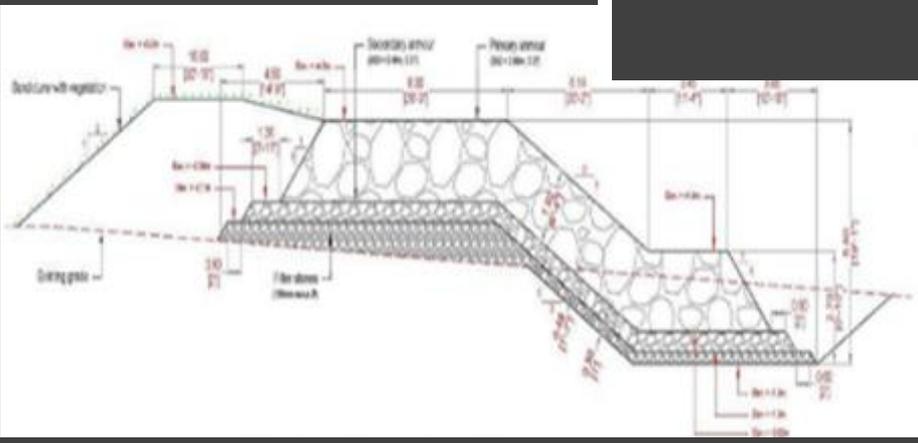


Proposed Dune

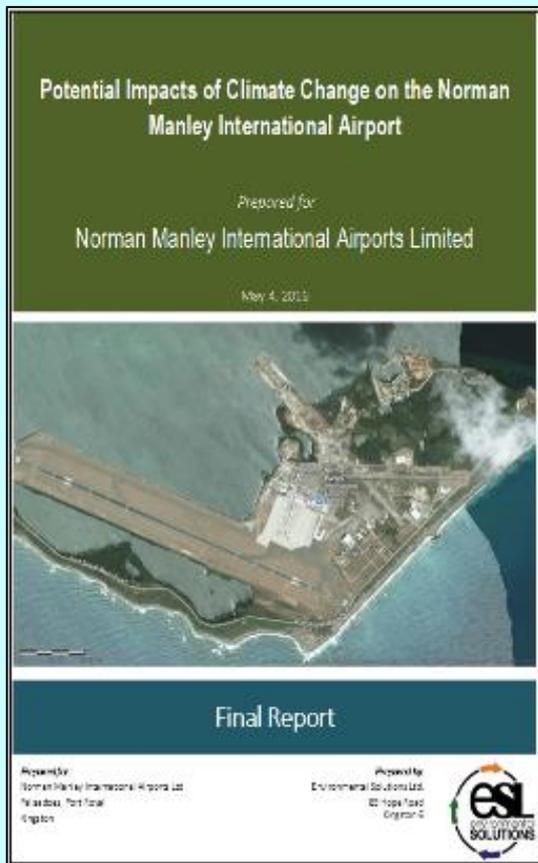
Proposed Rock
Revetment



Proposed Rock
Revetment Revetment



Airport Climate Studies



Tender for major engineering based Climate Assessment & Adaptation Reporting



<https://sidsport-climateadapt.unctad.org/>



airports authority of jamaica

INTERNATIONAL CALL FOR EXPRESSIONS OF INTEREST VARIOUS ENVIRONMENTAL, ZONING AND OTHER BASELINE STUDIES FOR THE NORMAN MANLEY INTERNATIONAL AIRPORT

The Airports Authority of Jamaica (AAJ) received a loan from the European Investment Bank (EIB) towards the cost of the Norman Manley International Airport (NMIA) Project and is the beneficiary of a subsidy which is being utilized to provide technical assistance and studies related to the planned privatization of the airport.

PROJECT#: EIB/IRS-AAJ-B
PROCURING ENTITY: Airports Authority of Jamaica

SCOPE:
A comprehensive review of all components of the study to produce the following results: improve communication between government, operators, stakeholders and customers; boost profitability by eliminating overlap and waste; improve the general operations and operational resiliency across all departments & stakeholder operations at NMIA; Development of an advisory process.

Climate Change Adaptation: Develop an advisory process; Identify partners for monitoring and surveillance of climate impacts; Complete a vulnerability assessment schematic; Development of adaptation goals and policies and make recommendations for shoreline protection projects.

GIS/GPS Asset Mapping: The Creation of an airport GIS Database with spatial and attribute data on electrical & mechanical facilities, civil structures and natural features; Use GPS (and related equipment) to capture and record accurate geospatial references for airport facilities and infrastructure; facilitate accurate real-time data collection for planning, analysis, mitigation and response and determine the airport locality boundaries.

Obstacle Limitation Survey: Provide the basis on which to enter into discussions with other major users of the airspace that may present obstacles as well as provide information to the regulator JCAA who may need to trench this data in law.

Noise exposure and land use compatibility: Define the noise exposure levels in and around an airport and develop updated Noise Exposure Maps; develop an initial Noise Compatibility Strategy for land use planning and noise mitigation; and determine existing incompatible land use within the airport locality

Airport Zoning: Determine the airport locality boundaries; determine existing incompatible land use within the airport locality; specify land use to be permitted within the airport locality; develop zoning ordinances/regulations for the designated areas; determine and measures to be taken to protect the safety and welfare of property owners, residents and businesses in the airport locality; and identify and determine the effectiveness of current local and international legislations, regulations and policies in for airport land use planning and zoning.

The contract is expected to be implemented from 2017 NOVEMBER 1 to 2018 JUNE 30

(Respondents please note that scope and timeline may be extended during the award. EOIs are being accepted through an open International call from which the Procuring Entity will shortlist firms being considered).

CONTACT INFORMATION: Airports of Authority of Jamaica,
Norman Manley International Airport,
Palisades,
Kingston, Jamaica, W.I.

NMIA Solar-at-Gate Pilot Project



The Project is a partnership: Government of Jamaica (GOJ) + Jamaica Civil Aviation Authority (JCAA) + International Civil Aviation Organization (ICAO) with ICAO-UNDP/GEF project funding. 1st of its kind in Jamaica.



The Project design phase:
Planning Phase - began October 2017
Implementation phase – February 2018
Project Completed - April 2018



Project involved aircraft gate electrification + a solar power generation facility. The solar car park system is grid tied to the NMIA ring Main System & produces 460kWhs per day. Peak output is 82kW. System is also fully integrated within NMIA's Building Management System.



Provides renewable power sources for aircraft parked at airport gate at NMIA. Estimated to produce 157,000 kWh per year in solar electricity to offset approx. 83 tonnes of greenhouse gas emissions or offset 530 metric tonnes of CO₂ per year.



SOLAR-AT-GATE MAJOR COMPONENTS



324 solar panels
100 kW Solar Photovoltaic System



28 parking spaces covered
Educational kiosk in Terminal Building



Pre-conditioned Air Unit (PCA)
& 400 Hz Ground Power Unit (GPU) at Gate 1
Allows aircraft to plug-in to Terminal



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