ENVIRONMENTAL IMPACT STATEMENT (EIS)

ROMANZA ON GRACE BAY TOWNHOUSES AND CONDO TOWER DEVELOPMENT PR: 16739 – 60900/258 – GRACE BAY BEACH, PROVIDENCIALES, TURKS AND CAICOS



ROMANZA ON GRACE BAY LIMITED

MARCH 2025

PREPARED BY:

CARIBBEAN ENVIRONMENTAL DESIGN ASSOCIATES (CEDA)

SUSTAINABLE ECOSYSTEMS INTERNATIONAL (SEI)
SMITH WARNER INTERNATIONAL (SML)
JSS CONSULTING (ENVIRONMENTAL CONSULTING SERVICES)
ENVIRONMENTAL-ALL

DRAFT ENVIRONMENTAL IMPACT STATEMENT ROMANZA ON GRACE BAY TOWNHOUSES AND CONDO TOWER DEVELOPMENT – PR. 16739 – 60900/258, GRACE BAY BEACH, PROVIDENCIALES, TURKS AND CAICOS ISLANDS – FOR ROMANZA ON GRACE BAY LIMITED.

CONTENTS

SECTION I

A Non-Technical Summary.....01

1.0 Introduction and Overview.....13

1.1 The Study.....13
1.2 Aims and objectives of assessment.....13
1.3 Organization of EIS Report.....14
1.4 Names and Contact Information of EIA Team 16
1.5 Brief description of the proposed development.....16
1.5.1 The Developers.....17
1.5.2 Project Locations.....17
1.5.3 Project Concept and Description.....19
1.5.4 Development relationship with other developments in the area....24

1.6 Overview of the areas/topics to be addressed.....25
1.7 Impact Assessment Methods/Analysis.....26
1.7.1 Conducting literature search.....26
1.7.2 Field surveys.....27

SECTION II

2.0 Baseline Studies.....35

2.1 Historical overview of the site and existing development.....35

2.1.1 Historical ownership and land use of the site, proposed development And Surrounding areas.....35

2.2 Biological Environmental Baseline Assessment.....35

2.2.1 Baseline terrestrial environment.....36

2.2.1.1 Quantification Assessment.....71

2.2.2 Baseline marine environment 72

2.2.2.1.1 Qualitative Analysis of Marine Ecology 73

2.2.2.1.2Quantilative Analysis of the Marine Ecology.....78

2.2.2.2 List of Fish Species.....80

2.2.2.3 List of all coral species.....81

2.2.2.4 Other Fauna and Epifauna.....82

2.2.2.5 Flora algae, Seagrass and Seaweed Species..... 83

2.2.2.6 Commercially Important, Endangered and Protected Species.....83

2.3 Physical environmental baseline assessment.....88

2.3.1 Topography of the area.....88

2.3.2 Bathymetry for the site shoreline.....88

2.3.3 Geology.....92

2.3.4 Hydrology.....92

2.3.5 Sediment Analysis.....95

2.3.6 Climate and Meteorology.....97

2.4 Baseline aesthetics.....99

2.5 Baseline Coastal Processes and Dynamics.....104

2.5.1 Currents and Tides.....112

DRAFT

2.5.2 Sediment transport....122
2.5.3 Erosion and Accretion....134
2.5.4 Coastal dynamics....140
2.6 Water quality....141
2.7 Social-economic....145
2.7.1 Demographic....145
2.7.2 Employment....147
2.7.2.1 Labor and Skills Demand Construction phase....149
2.7.2.2 Labor and Skills Demand operational phase....149
2.7.3 Safety and security concerns within the Community....149
2.7.4 Economic impact: short-term and long-term....150
2.8 Other relevant parameters identified during the scoping exercise....150

SECTION III

3.0 Legislative and regulative context....151
3.1 TCI Development Plan/Master Plan....151
3.2 TCI National Physical Development Plan 2020....152
3.3 TCI Physical Planning Ordinance and Subsidiary Legislation....153
3.4 TCI Development Manual....154
3.5 TCI Building Code....154
3.6 National Parks Ordinance....155
3.7 Coastal Protection Ordinance and Subsidiary Legislations....157

DRAFT

3.8 Mineral (Exploration and Exploitation) Ordinance and Subsidiary Legislations.....157

3.9 Marine Pollution Ordinance and Subsidiary Legislation.....158

3.10 Fisheries Protection Ordinance and Subsidiary Legislations.....158

3.11 Wild Birds Protection Ordinance.....158

3.12 International Treaties and Conventions.....159

3.13 Turks and Caicos Islands Vision 2040.....159

3.14 Turks and Caicos Islands Environmental Charter.....160

3.15 Turks and Caicos Islands Climate Change Charter.....161

3.16 Others relevant Laws and Regulations.....162

SECTION IV

4.0 Project Description, Construction and Operation and Alternatives.....163

4.1 Description of the proposed project/components.....163

4.2 Project Justification.....164

4.2.1 Project Justification Socio-economic.....165

4.2.2 Project Justification Ecological.....165

4.3 How the proposed project will affect erosion accretion.....166

4.4 Coastal/beach development and management-beach access....167

4.5 Solid waste management.....178

4.5.1 Solid waste management construction phase.....178

4.5.2 Solid waste management operational phase.....178

4.6 Surface-run-off management/Stormwater runoff and treatment.....179

DRAFT

4.7 Traffic flow and safety (marine and Coastal) 180

4.8 Water and Electrical Demand and Sources.....180

4.8.1 Water and Electrical Demand and Sources – Construction.....181

4.8.2 Water and Electrical Demand and Sources – Operational.....181

4.9 Landscaping (Initial phase and maintenance/operations) 186

4.9.1 Landscaping Initial phase.....186

4.9.2 Landscaping maintenance and operation.....186

4.10 Construction phase activities.....187

4.10.1 Construction Phase Activities.....187

4.10.2 Site security and hoarding.....188

4.10.3 Storage of Materials and Equipment.....189

4.10.4 Beach Traffic Impact and Safety.....189

4.10.5 Temporary sanitary facilities.....190

4.10.6 Access and staging.....190

4.10.7 Solid waste management those generated during construction.....190

4.10.8 Liquid waste management-those generated during Construction.....190

4.10.8.1 Waster Management Plan.....190

4.10.9 Control of air, dust, water, and noise pollution (Generated by the project heavy equipment.....193

4.10.10 Control/storage of fuels and other dangerous Substances.....193

4.10.11 Emergency mitigation plan.....193

4.10.11.1 Health and Safety Plan.....194

DRAFT

4.11 Social-economic.....199

4.11.1 Demographic.....199

4.11.2 Employment – Labor and Skills ls demand at construction and operation.....199

4.11.3 Safety and security concerns within the community during Construction and operation.....200

4.11.3.1 Construction.....200

4.11.3.2 Operations.....200

4.11.4 Issues raised in the public consultation.....201

4.11.5 Others.....201

4.12 Impact on terrain, including methods of clearing the site.....201

4.13 Marine Traffic Flow and Safety.....202

4.14 Beach Traffic Impact and Safety.....202

14.15 Potential alternative.....203

SECTION V

5.0 Impact Assessment.....208

5.1 Impact identification.....208

5.2 Description of impacts.....210

5.2.1 Potential Impact on the biotic environment.....211

5.2.2 Potential Impact of Added Lighting.....217

5.2.3 Potential Impact on the coastal environment and Processes.....218

5.2.4 Potential Impact on any species identified as endemic, near-endemic, rare, threatened, or endangered.....219

DRAFT

5.2.5 Potential Impact on the aesthetic and other built environment....220

5.2.6 Water Quality and Noise Pollution....221

5.2.7 Ecosystem and Economic Analysis....221

5.2.7.1 Ecosystem Analysis....222

5.2.7.2 Economic Analysis....222

5.2.8 Socio-economic impact....222

5.2.8.1 Labor....223

5.2.8.2 Tourism....223

5.2.8.3 Public infrastructure....224

5.2.8.4 Crime....225

5.2.8.5 Public Beach Access....225

5.2.8.6 Potential impact on neighbouring development, businesses and residences....225

5.2.8.7 Potential Climate Change Impact....226

5.2.8.8 Solid Waste Impacts....227

5.3 Impact assessment....228

5.4 Derivation of significance....231

5.5 Register of Significant Aspects and Impacts....232

SECTION VI

VI MITIGATION AND MONITORING

6.0 Mitigation and Monitoring....239

6.1 Proposed actions and schedule to mitigate against any Environmental Impacts....239

DRAFT

6.1.1 Impacts on terrestrial and marine life (Displacement).....243

6.1.2 Impacts on water quality.....244

6.1.2.1 Water Quality Mitigations.....246

6.1.3 Impacts of noise and light.....246

6.1.4 Impacts of the incursion of invasive species of flora and fauna.....247

6.1.5 Impacts on resettled wildlife.....247

6.2 Proposes actions to mitigate against noise pollution.....247

6.3 Storm surge analysis and mitigation plan for sea level rise.....249

6.4 Building around, or rescue and removal of rare, threatened, or endangered species of plants where possible.....264

6.5 Landscaping/replanting plan utilizing native species.....265

6.6 Proposed techniques and models to mitigate against light pollution, including impacts on nesting sea turtles and migratory birds.....266

6.7 Proposed Climate Change mitigation both locally with the Turks and Caicos Islands and globally.....266

6.8 Financial resources for mitigation.....267

6.9 Environmental monitoring and financial requirements.....269

6.10 Public Consultation/social listening/monitoring.....274

6.11 Biodiversity Management plan.....277

6.12 An Environmental Management Plan.....277

SECTION VII

7.0 Recommendations and Conclusions.....279

DRAFT

SECTION VIII

STATEMENT OF UNDERSTANDING OF ENVIRONMENT CHARTER (2001) AND CLIMATE CHANGE CHARTER (2022)

8.0 Statement of Understanding of the Environment Charter (2001) and Climate Change Charter (2022) 284

8.1 Statement of Understanding of the Environment Charter 2001 From the proponents, with an explanation of how this development approaches and best practices for the protection of biodiversity and the environment, as noted in the charters.....284

8.2 Statement of Understanding of Terms of Climate Change Charter2022 from the proponent, with an explanation of how this development approaches best practices toward mitigation.....284

8.3 Proponent's Declaration of Intent to guide the development by the recommendation of the EIA consultant, with an updated Declaration following response to public or TCIG requests or requirements. alterations to any part of the EIA.....284

9.0 APPENDICES.....286

DRAFT

List of Acronyms

AGRRA	Atlantic and Gulf Rapid Reef Assessment
AR6	IPCC Sixth Assessment Report
BCI	Business/Commercial/Industry
CEC	Certificate of Environmental Clearance
CEDA	Caribbean Environmental Design Associates
CITES	Convention on International Trade of Endangered Species
CVI	Coastal Vulnerability Index
DDP	Detailed Development Permission
DECR	Department of Environmental and Coastal Resources
DHI	Danish Hydraulic Institute
DoP	Department of Planning
DSAS	Digital Shoreline Analysis System
EBA	Ecosystem-Based Approach
EHD	Environmental Health Department
EIA	Environmental Impact Assessment
EM	Environmental Monitoring
EMP	Environmental Management Plan
ENGOS	Environmental NGOs
EPA	Environmental Protection Agency
ESA	Environmental Sensitive Area
GDP	Gross Domestic Product
GPS	Global Positioning System
GIS	Geographic Information Systems
GSLR	Global Sea Level Rise
ICZM	Integrated Coastal Zone Management
IMA	Institute of Marine Affairs
IUCN	International Union for Conservation of Nature
LiDAR	Light Detection and Ranging
LPG	Liquefied Petroleum Gas

DRAFT

MCA	Multi-criteria Analysis
MSL	Mean Sea Level
NHC	National Hurricane Center
NEC	National Electrical Code
NOAA	National Oceanic and Atmospheric Administration (of the United States)
NPDP	National Physical Development Plan
NRCS	Nature Resources Conservation Services
ODP	Outline Development Permission
ODPM	Office of Disaster Preparedness and Management
PANP	Princess Alexandra National Park
PDP	Progressive Democratic Patriots
PWC	Provo Water Company
ROP	Reverse Osmosis Plant
SDB	Satellite-Derived Bathymetry
SIDA	Small Island Developing States
SLR	Sea Level Rise
SMP	Shoreline Management Plan
SWI	Smith Warner International Ltd.
SWOT	Strengths-Weaknesses-Opportunities-Threats
TCIG	Turks and Caicos Islands Government
UTM	Universal Transverse Mercator
UAV	Unmanned Aerial Vehicle

DRAFT

List of Tables

Table 1.0 EIA Team and their contact information 16

Table 2.0 Townhouses and Condominium Unit Count.....20

Table 3.0 Condominium Bedroom and Unit Count.....20

Table 4.0 Romanza on Grace Bay Townhouse and Condominium GPS Points and Measurements.....31

Table 5.0 Plants Abundance in Plots.....40

Table 6.0 Existing Landside Community Types.....43

Table 7.0 Notable Species of Flora and Fauna Designated by TCI Government that were Observed on the site.....60

Table 8.0 Fish Species Observed during Assessment.....80

Table 9.0 Coral Species Observed during Assessment.....81

Table 10.0 Other Fauna and Epifauna Species Observed during Assessment.....82

Table 11.0 Fauna and Fauna Species Observed during Assessment.....83

Table 12.0 Commercially Important, Endangered, and Protected Species.....84

Table 13.0 Sediment samples key diameters and sediment type percentages.....96

Table 14.0 Summary Table Modelling Results in the nearshore of the project.....141

Table 15.0 Water quality data collected for the project site 143

Table 16.0 Population Distribution by Island 1960 -2012.....146

Table 17.0 Population by Status, Sex and Age 146

DRAFT

Table 18.0 Distribution of Population Labour Force Participation & Unemployment by Islands, 1999.....147

Table 19.0 Labour force characteristics, 2014.....148

Table 20.0 Labour Force by Industry/Sector, 2014.....148

Table 21.0 Boulder sizing for buried revetment.....171

Table 22.0 Cost estimate for dune and filling work on the Romanza on Grace Bay property.....172

Table 23.0 Wave event impacts after the concept implementation 173

Table 24.0 Minimum daily water consumption rates.....182

Table 25.0 Romanza on Grace Bay Townhouses and Condo Tower Block daily water consumption rates.....182

Table 26.0 Cost estimate for surge protection alternatives.....207

Table 27.0 Magnitude classifications system used to identify and Access impacts.....210

Table 28.0 Direct impacts on landside vegetative communities.....211

Table 29.0 Impact Assessment.....229

Table 30.0 Potential Impacts to the coastal environment.....230

Table 31.0 Register of Significant Aspects and Impacts.....233

Table 32.0 Proposed monitoring work after construction, frequency and estimated data needed by resources.....241

Table 33.0 Boundary wave and uniform wind conditions used for all investigated return-period simulation.....253

Table 34.0 IBR and Design deepwater surface level (m) for all return period investigated.....255

DRAFT

Table 35.0 Exposure risk (%) over a project span (blue) for Different return period investigated (green).....255

Table 36.0 Summary of economic cost for recommended mitigation measures.....268

Table 37.0 Summary table describing impacts.....271

Table 38.0 Environmental Impact Predictions Checklist.....273

DRAFT

List of Figures

Figure 1.0 Project Location....18

Figure 2.0 Site Plan of the proposed development....21

Figure 3.0 Site Plan of the proposed development showing parking layout....22

Figure 4.0 Site Plan of the proposed development showing parking layout....23

Figure 5.0 Romanza on Grace Bay Townhouses and Condo Benthic survey area....30

Figure 6.0 Habitat characterization and mapping....32

Figure 7.0 Marine Benthic Survey Area Depicting Nearshore and Offshore Surveyed Areas....73

Figure 8.0 Benthic Habitat Map....86

Figure 9.0 Deepwater and shelf bathymetry points used for modelling of Providenciales....89

Figure 10.0 Topography and bathymetry points recorded during the data collection phase....91

Figure 11.0 Subsurface Lithology....93

Figure 12.0 Subsurface Lithology....94

Figure 13.0 Sediment distribution sampling locations and pictures of samples taken....95

Figure 14.0 Semi-Arid Regions....97

Figure 15.0 Historical Model of Climate Data for TCI 2009-2021 Providenciales....98

DRAFT

Figure 16.0 Boundaries of the Baseline Study Area for the Romanza on Grace Bay EIA.....103

Figure 17.0 Offshore location where ERAs data was collected to describe the wave climate.....105

Figure 18.0 Monthly statistics of the data extracted from the ERA5 node 106

Figure 19.0 Summarised wave height distribution across 0.2 m bins representing the tidal signal.....107

Figure 20.0 Wave height distribution across binned tidal data.....107

Figure 21.0 Nearshore wave rose (1 to 5) extracted from statistical binning simulations.....109

Figure 22.0 Daily wave climate figure results for the average conditions (top) and 99th. Percentile (bottom.....111

Figure 23.0 Dominant Ocean currents in the Northern Atlantic Ocean.....112

Figure 24.0 Predicted tide levels near to Grace Bay in June 2023.....113

Figure 25.0 Currents speed and patterns during the spring tide signal (rising above, falling below).....117

Figure 26.0 Wave-generated currents for the mean conditions and 99th percentile conditions 118

Figure 27.0 Curves used to determine whether the coast is wave or tide dominant adopted from Davis, Hayes,1984.....119

Figure 28.0 Wave-generated currents for the mean conditions and the 99th. Percentile conditions.....121

Figure 29.0 Lift Drift results along the profile showing sediment drift to the west and to the east.....124

DRAFT

Figure 30.0 Wave conditions to show what wave properties generate sediment movement.....125

Figure 31.0 Offshore wave conditions during swell events of March 2018.....126

Figure 32.0 Swell currents (top) and wave height (bottom) at the peak of the swell event.....128

Figure 33.0 Sediment transport result showing the change in bed level at the end of the swell simulation with semifixed vector showing the direction of transport.....130

Figure 34.0 The water level components that contribute to coastal flooding adapted from (Vitousek, et al., 2017).....*131*

Figure 35.0 XBeach profile used to assess wave run-up on the Romanza on Grace Bay property.....132

Figure 36.0 Wave run-up and scour results for the swell event of March 2018 run in XBeach.....133

Figure 37.0 Shoreline change analysis for Romanza on Grace Bay property from 2012 to 2021 (overlain on 2022 ESRI imagery) 136

Figure 38.0 Profile analysis done to show possible erosion and accretion around the project site.....137

Figure 39.0 Beach width movement in front of the Romanza on Grace Bay property.....139

Figure 40.0 Water quality sampling locations for the study.....142

Figure 41.0 Island Framework Plan, Grace Bay, Providenciales (NPDP 2020).....152

Figure 42.0 Princesses Alexandra National Park, Grace Bay, Providenciales.....156

DRAFT

Figure 43.0 Lift Drift result with proposed option in place.....167

Figure 44.0 Design option plan view showing overall fill zones.....169

Figure 45.0 Design option typical cross-section.....170

Figure 46.0 Daily waves modelling of existing (baseline) and proposed conditions within a 5km radius.....174

Figure 47.0 99th percentile wave under existing (baseline) and proposed conditions within a 5km radius.....175

Figure 48.0 Proposed conditions within a 5km radius.....176

Figure 49.0 99th percentile wave-generated currents under baseline And proposed conditions within a 5km radius.....177

Figure 50.0 Stockpile and signage location..... 189

Figure 51.0 Alternative 1 Plan and typical cross-section for the Romanza on Grace Bay property.....205

Figure 52.0 Alternative 2 Plan and typical cross-section for the Romanza on Grace Bay property.....206

Figure 53.0 Predicted Global Mean Sea Level Rise Over time.....227

Figure 54.0 Major hurricanes passing within a 300km radius of Providenciales from 1851 to 2020 (Source: NOAA-NHC).....250

Figure 55.0 Storm distribution, according to Saffir Simpson classification, since 1850 showing storms that have passed within a 300km radius of the project site 251

Figure 56.0 Storm distribution since 1851 showing storms that have passed within a 300km radius of the project site 252

DRAFT

Figure 57.0 Passage of Major hurricanes over the period (divided into 200-year intervals) 252

Figure 58.0 Storm surge results for the 50-year (top) and 100-year (bottom) storm with a sea level rise design horizon to 2070.....257

Figure 59.0 **Storm waves result for the 50-year (top) and 100-year (bottom) storm with a sea level rise design horizon to 2070** 258

Figure 60.0 XBeach non-hydrostatic model results along P1 (profile 1) for 50-year storm event.....260

Figure 61.0 XBeach non-hydrostatic model results along P1 (profile 1) for 100-year storm event.....261

Figure 62.0 XBeach non-hydrostatic model results along P1 (profile 1) for 50-year storm event under proposed conditions 262

Figure 63.0 XBeach non-hydrostatic model results along P1 (profile 1) for 100-year storm event under proposed conditions.....263

Figure 64.0 Advertisement Notice erected on the site of the proposed development.....275

Figure 65.0 Rendering Plans of the proposed development erected on the site.....276

DRAFT

List of Photos

Photo 1.0 Grace Bay Beach and surrounding developments 24

Photo 2.0 High rise developments on Grace Bay..... 25

Photo 3.0 unvegetated Sandy Beach view looking southwest from approximately the middle of the property 45

Photo 4.0 Sandy Strand view looking southwest including vegetation analysis plot 1b.....47

Photo 5.0 Invasive dominated sand strand.....49

Figure 6.0 Mature Leucana leuocephala in invasive dominated area near the western property boundary view north towards Grace Bay.....51

Photo 7.0 Dry Broadleaf Evergreen shrubland Plot 5c view looking outhwest.....53

Photo 8.0 Clusters of epiphytic Encyclia orchids were common.....54

Photo 9.0 Mouring Dove.....55

Photo 10.0 Dry Broadleaf Evergreen Forest in Plot 10 a view looking west.....57

Photo 11.0 Corridor of scarified land near western property boundary looking north towards Grace Bay.....59

Photo 12.0 Coccothrinax Inaguenis.....65

Photo 13.0 Coccothrinax Inaguenis 66

Photo 14.0 Old man Cactus.....,67

Photo 15.0 Seed pod of Pork and Doughboy-Vachilla acuifera.....68

DRAFT

Photo 16.0 Seed pod of Cinnecord Coriophylla.....69

Photo 17.0 Thick Mat of fallen casuariva needless.....70

Photo 18. 0 Dense Scaevala Faccada in Plot 9a.....71

Photo 19.0 Tire observed in the marine ecosystem.....74

Photo 20.0 Algal-dominated sandy bottom habitat.....75

Photo 21.0 Sandy Bottom with turtle Grass.....76

Photo 22.0 Bare Sand.....77

Photo 23.0 Sandy bottom with rubble.....78

Photo 24.0 Sandy bottom with rubble.....78

Photo 25.0 Bare Sand in the nearshore environment.....79

Photo 26.0 Long – Spined Squirrelfish.....80

Figure 27.0 Blue tang.....80

Photo 28.0 Mountainous Star Coral.....82

Photo 29.0 The adjacent Tuscany on Grace Bay.....100

Photo 30.0 The neighboring Venetian on Grace Bay.....101

DRAFT

9.0 APPENDICES

9.1	Appendix A	Grant of Outline Development Permission 286
9.2	Appendix B	The Terms of Reference (ToR).....290
9.3	Appendix C	Approval Letter EIA Team.....300
9.4	Appendix D	Consultant's Contact Information.....301
9.5	Appendix E	Scientific Research/Conservation Permit 302
9.6	Appendix F	Sections of Terms of Reference assigned to the various consultants.....303
9.7	Appendix G	Certification/Legal Document from the EIA Consulting Team.....326
9.8	Appendix H	Turks and Caicos Endemic Flora List.....327
9.9	Appendix I	Hydrogeological Data – Subsurface Sand Sample.....337
9.10	Appendix J	GPS points and description of spot checks along the transect.....339
9.11	Appendix K	Numerical Modelling.....344
9.12	Appendix L	List of Plant Photos.....356
9.13	Appendix M	Plans and Drawings.....369
9.14	Appendix N	Resumes.....373
9.15	Appendix O	Reference and Literature Cited.....401

DRAFT

DRAFT ENVIRONMENTAL IMPACT STATEMENT, ROMANZA ON GRACE BAY TOWNHOUSES AND CONDO TOWER DEVELOPMENT – PR. 16739 – 60900/258, GRACE BAY BEACH, PROVIDENCIALES, TURKS AND CAICOS ISLANDS – FOR ROMANZA ON GRACE BAY LIMITED.

SECTION I

Non-Technical Summary

1. A new townhouse and condo development is being proposed for a beachfront property located along Grace Bay Beach on Providenciales, Turks and Caicos Islands.

2. The development will have multiple homes with different floor plans and a 7-story condo tower block. Other amenities will include a community room for activities such as yoga, play areas, tennis court, gym and parking lots. resort project that is proposed to include eight waterfront villas, a community room, and sports areas that include a tennis court, basketball court, pickleball court, a court for bocce ball and a playground. No piers, docks or other in-water structures are proposed.

3. The property boundary has an unusual shape which provides a means to separate the housing and condo units from the amenities. The property will have multiple pools and have beach access via stairs.

4. The property is bounded on the west by an existing residential development, Tuscany, on the northwest by a narrow stretch of barren sandy beach and the waters of Grace Bay (which at this location of part of the Princess Aleandra National Marine Park. The property is bounded on the northeast by vacant land, and on the southeast by the northwest right-of-way of Grace Bay Road.

5. Caribbean Environmental Design Associates was contracted to carry out the Environmental Impact study and has incorporated a team of environmental specialists to assist with this task, including Sustainable Ecosystems International, terrestrial assessment, Environmental All, Geologist and hydrologist; JSS Consulting, Environmental Consultants, and Smith Warner International, coastal engineers.

Ecological – Terrestrial

6. The ecological assessments of landside areas were conducted on a vacant tract of land where the Romanza Grace Bay project is proposed to be constructed. The site, which is approximately 5 acres (2 ha) in size is located northwest of Grace Bay Road in the northeast portion of the island of Providenciales in the Turks and Caicos Islands.

7. The assessments included qualitative and quantitative evaluations of the floral and faunal communities present in landside areas within the project area and observations of flora and fauna in adjacent areas that could be seen from publicly accessible areas.

8. The results of the terrestrial field investigations were then used to determine the potential environmental impacts of the project. The spatial scope of the assessment area included all landside areas of the subject property that could be affected by the proposed project if the project were to proceed.

9. The landside assessments involved visual inspections of terrestrial areas within the footprint of the proposed activities and in adjacent areas that could be affected by the proposed activities.

10. Suitable terrestrial vegetation will be replanted on the dune after the placement of sand to design grade.

11. Additional vegetation is recommended to strengthen the dune and buffer zone areas. This vegetation must be salt and drought resistant to thrive.

12. The beach and dune area will be monitored over time to assess the restoration progress after the dune has been restored, and after impacts from tropical storms and hurricanes.

13. Two methods can be used to track the beach width, through a profile survey done by a commissioned land surveyor or by tracking a series of rectified photos.

DRAFT

14. The photos can be taken using a drone with a GPS attached or a permanent benchmark could be set up on the site for amateur photographs to be taken.

Hydrogeological

15. The Hydrogeological Assessment of the proposed development site provides baseline evaluations of the physical environmental conditions relative to the components of the proposed project, namely the construction of townhouses and condominium units.

16. Surface water bodies did not occur within and surrounding the development site. The development parcel is situated within a coastal zone and immediately adjacent to the Princess Alexandra National Park.

17. The Pleistocene Sandy formation is highly conducive to the formation of a fresh groundwater lens.

18. The topography of the project site has a general elevation of less than ten- (10) feet above mean sea level and dips seaward from the landside. Localized high points occur randomly across the project site and appear to have been created during past earth moving exercises, namely land clearing and access road building.

19. Carbonate formation dominates the geology of the proposed development site. Lithological descriptions of the subsurface geology to an average depth of 12 feet below ground level revealed a thin 16 inches layer of loosely compacted Holocene sand that transitioned to a well compacted and well cemented Limestone formation.

20. A thin freshwater lens approximately 8.5 feet thick was measured in the test pits. The average depth to the water table was measured at 44 inches and 39 inches at test pits 1 and 2, respectively.

21. The depths to the water table suggested that the direction of groundwater flow, at the time of measurements, was from inland outward towards the coastline.

DRAFT

22. Physical observation of a sand sample suggested that the sand could be classified as fine grained

23. The perceived potential impacts include, depletion of existing fresh groundwater, degradation of groundwater quality and Odor – wastewater treatment system operations

24. Holocene Sand and Pleistocene Limestone dominant the geology of the project site.

25. A fragile and thin fresh groundwater lens occurs beneath the project site.

26. The exploitable freshwater lens is unsustainable over the long term. Over exploitation of the fresh groundwater lens will result in saltwater intrusion and groundwater contamination.

27. Groundwater abstraction should be limited to an abstraction rate of less than 10 US gallons per minute

28. Building footings should be constructed above the water table level.

29. Groundwater should be used for irrigation and filling swimming pools

Coastal Processes

30. The investigations began by collecting physical data on site to describe the elevations, sand characteristics and water quality in the area. This data provided key information that was used to simulate the baseline conditions in the bay. These conditions included daily waves, tidal currents, swell events and hurricane events with an allocation for sea level rise.

31. Baseline sediment investigations and modelling shows that the beach is dynamically stable with a small trend of accretion.

32. Daily waves and swells did not impact the property as it is well setback from the waterline.

DRAFT

33. Hurricane modelling results showed that there was room to improve the resilience of the property against hurricane inundation.

34. Hurricane inundation is a major concern as hurricanes are projected to grow in intensity and pass more frequently under the impacts of climate change.

35. Key results of the coastal engineering analysis show that the existing dune is at an average elevation of 3.2m above mean sea level, and it provides protection under swell waves.

36. The land will be raised to protect it against hurricane surges. The filling and grading of the land will be done in the initial stages of the project during the site preparation phase of the development. Further, the building of superstructures will likely commence when filling work is almost complete.

37. Proper signage will be used during the construction to warn patrons from both the road entrance and along the beach area. Hoarding will be installed around the perimeter of the property to prevent unauthorised access.

38. The property boundary is set back far enough to not be heavily impacted by erosion after a swell event. However, hurricane simulations showed vulnerability during hurricane events. Two storms were tested that represented a 50-year and 100-year storm. In both cases, there was inundation on the property over 220m inland from the property line.

39. Vulnerability to hurricanes was an issue when considering that the projections of climate change show stronger, more frequent hurricanes. It was therefore proposed that the dune crest elevation be increased to an elevation of +3.7m and finished floor level be set to 4.5m above MSL to provide protection against storm surges.

40. The dune would also be vegetated with suitable plants to maintain the overall aesthetic of the existing landscape and reduce the potential for erosion of the dune.

41. Results of the impact assessment showed that almost all negative impacts would occur during the construction phase and will be confined to within the property boundary.

DRAFT

42. Following construction, the positive impacts in the operational phase were reduced inundation from hurricanes and restored berm vegetation from the mitigation measure of replanting.

43. Overall, the assessment shows that the implementation of raising the land would increase the resilience of the property's coastal zone. As climate change brings more natural hazards to the shores of the property, this concept will provide a buffer for the assets and reduce stoppage after a storm.

Marine Processes

44. The marine benthic habitat was assessed using a modified transect method. Direct observation of the benthic conditions was conducted by snorkeling gear in shallow water (inshore) and diver tows in deeper waters (offshore).

45. The purpose of the investigation was to record the existing conditions within the survey area including habitat characterization, habitat mapping, species diversity and habitat utilization.

46. A qualitative analysis was completed for the offshore environments as the area is expected to be indirectly impacted and a quantitative analysis was completed for nearshore environments as the area may to be directly impacted.

47. Overall, the benthic habitats appeared healthy and consisted of typical flora and fauna populations. Although human activity, in terms of boating traffic and beach goers, was observed during the assessments there was minimal human-related debris observed. There was no evidence of degraded water quality.

48. The entire offshore benthic habitat was dominated by a variation of sandy bottom habitat, that included algal-dominated sandy bottom, bare sand, seagrass, and sand with rubble. The least amount of activity was observed in the bare sand and algal-dominated sandy bottom habitats.

DRAFT

49. Fish abundance was low in this area, with the only fish being observed were silversides[1] moving from one area to the next. No coral or other epifauna was observed in this habitat.

50. Seagrass beds were observed in patches throughout the offshore area. The seagrass areas mainly consisted of Turtle Grass, with sparse Manatee Grass and moderate algae.

51. Seagrass diversity was low, but the abundance varied from patches of only Turtle Grass to Turtle dominated patches with little Manatee Grass. The seagrass beds appear to be healthy and consist of floral and faunal populations that depict a healthy seagrass ecosystem.

52. No corals were observed in the seagrass and the only epifauna observed in the seagrass were Black Ball Sponges. Common macroalgae observed in the seagrass beds include Green Algae.

53. The entire nearshore benthic habitat consisted of bare sand. No flora was observed in this benthic habitat.

54. There were six (6) species of fish observed during the assessment. Significant fish activity was observed mainly around the sandy bottom with rubble with little to no activity being observed in the bare sand habitat.

55. Flora species were observed in abundance throughout the surveyed area. There were fourteen (14) flora species observed.

56. There were eleven (11) marine species observed during this assessment that are listed on the Convention on International Trade of Endangered Species (CITES) list and/or the International Union for Conservation of Nature (IUCN) Red List.

57. There were no turtle nests or turtle tracks observed during the assessment. It is unlikely that the beach in front of The Project site is being used as a nesting site for either species; however, monitoring should be done during

.

construction and post-construction to check for nesting activity on the beach.

58. There were no seabirds observed during the assessment. There was no nesting activity observed along the beach in front of The Project site. The Project should not interfere with any seabird populations that may inhabit or utilize the area for foraging as no work is scheduled for the beach or marine area.

59. Grace Bay Beach is a prime tourist attraction with many beach goers and water sports charters. Boating traffic is extremely high in the area due to many charters utilizing the area for tours, dive trips, sports fishing etc. Due to development happening adjacent to Grace Bay Beach, the safety of boaters is important.

60. Therefore, creation of a swim zone should have minimal impact on boaters. Due to the numerous hotels, villas and businesses in the area, numerous swim zones have already been established along Grace Bay's Beach with the closest swim zone being that of the property adjacent to the proposed development.

61. Long-term negative impacts on the marine resources in the area are not expected to occur because of the proposed construction work. Construction will be closely monitored to prevent contamination of the adjacent marine habitats.

62. Generally, the potential environmental marine impacts associated with The Project include water quality Impacts, Light Impacts, and Solid Waste Impacts.

63. Mitigating any potential harmful effects to the marine water quality is extremely important. There is a potential impact of turbidity during the creation of the swim zone due to the anchorage of the buoys.

64. Controlling measures and monitoring to reduce turbidity in the marine environment is extremely important as suspended sediments that cause

turbidity can block light to aquatic plants such as seagrass and smother aquatic organisms. Proper monitoring efforts should be implemented to ensure sedimentation impacts do not exceed the threshold (fifteen (15) NTU).

65. Impacts caused by the increase in light can possibly occur during pre-construction, active construction, and post construction activities.

66. The increase in light due to urban development has the potential to negatively impact on the marine environment including species such as marine sea turtles.

67. Increased artificial light on or near turtle nesting sites can cause disorientation in turtle hatchlings, affecting their ability to reach the safety of the ocean.

68. Impacts caused by the increase of artificial light is expected to be low during pre-construction, active construction and post construction as there were not avian or turtle nesting activity observed on the beach.

69. During pre-construction and active construction, works are scheduled to occur during daylight hours therefore the need for artificial light during construction may only extend toward erection of tower lights to aid in securing the site.

70. During post-construction there will be an increase in artificial light sources from houses and other buildings. A proper light management plan should be established during the operational phase to reduce impacts.

71. The Project should seek to reduce the production of waste and recycle material as much as possible. This will help to reduce and/or eliminate any solid waste from entering the marine environment.

72. Solid waste, in particular material that takes a long time to degrade, can have numerous negative impacts to wildlife and ecosystem and are usually caused by improper waste management.

DRAFT

73. Negative impacts to the marine ecosystem because of improper solid waste management can include animals becoming entangles in debris, marine wildlife such as seabirds, whales, fish, and turtles mistaking solid waste for prey and ingesting it which can cause them to starve, and some debris can also carry bacteria and virus into the marine environment causing diseases in marine species.

74. Solid waste not only impacts marine wildlife but also tourism. Large amounts of solid waste on the beaches and in shallow marine waters can reduce the aesthetic value of the beach.

75. Monitoring of activities during construction and post construction will be carried out to eliminate or reduce any adverse environmental impacts.

Socio-economic and Aesthetics

76. The proposed development comes at a time when the TCI's economy is experiencing unpresidential economic and physical growth. This new development brings additional prosperity to the government and people of the TCI. It also brings with it potential environmental, social and cultural heritage impact.

77. The proposed Romanza on Grace Bay Townhouses and Condominium is expected to make significant contribution to the socio-economic development of the islands by providing employment opportunities, new revenues for government and adding additional social facilities for the enjoyment of the local and tourist population.

78. The construction phase of the development will generate approximately 100 construction related jobs. Additionally, the operational phase of the facility will create approximately 110 permanent jobs in the top and middle level managers, services providers, operators, bar maids and cleaners.

79. Safety and security are a major concern for the developers, during the construction and operational phases of the development.

DRAFT

80. Proper site security during the construction phase of the development will reduce the potential for theft and restrict entry to only authorized personnel.

81. Some security measures to be taken during the construction phase of the development will include securing the perimeter boundaries of site to restrict access, install security lights, have limited access to the site and install surveillance security systems.

82. Security measures will be developed to ensure that any physical, financial or information threats to property and guests are reduced. By providing surveillance monitoring systems throughout the property, equipping employees with safety devices, ensure that all employers are trained in safety and security measures and develop a security plan for the facility operation prior to the opening.

83. Infrastructural development in the TCI during the past two decades or so has not kept pace with the rapid development, resulting existing infrastructures that cannot adequately meet the needs of a growing population and increased tourist arrivals.

84. The increased annual tourists' arrivals because of the proposed development and other planned development will encourage government to utilize increased revenues from tourism to upgrade the infrastructure of Providenciales, like public roads, airports, and seaports.

85. Increases income from tourism will make additional funds available to spent on protecting the natural environment and financing the preservation of historic and cultural sites. Historical site like the "Cheshire Hall Ruins" can benefits from tourists visiting the site and entrance fees collected.

86. Owners should seek out collaboration opportunities with other developers and planners for material sourcing. This would reduce the unit cost of the sand required for the proposed works.

87. Ensure that all available land space is vegetated as best as in practical in the landscaping plans. This will reduce scour and erosion on land.

DRAFT

88. It is recommended that safety and security measures be in place before the commencement of construction activities to ensure the greatest environmental protection. Some of the environmental measures to be implemented include designation of an area for storage of waste containers, ensuring adequate waste containers are present on site, and that appropriate signage and fencing are placed around the site for workers and beach goer safety.

89. It is recommended that during construction, the Contractor or the Environmental Manager (EM) conduct weekly monitoring meetings, and a site visit every week and record all observations, including digital photo documentation. The EM should have the authority to halt any activity that is noncompliant with or damaging to the environment.

90. Post-construction monitoring should be conducted by the EM to assess the surrounding marine life and water quality. Monitoring during the post-construction phase of The Project will include the following_benthic assessment to note any changes in benthic habitat and marine fauna populations.

91. The contingency plan should be developed prior to the commencement construction activities and should aim to be proactive in reducing the risk of environmental damage due to human error, machine failure, intentional destruction and/or natural disasters.

Recommendations and conclusions

92. The project design and construction teams should work with landscape professionals to determine the appropriate plant species of native plants to be used in site restoration and landscaping.

93. A biological monitoring program should be developed and implemented ensure that quarterly monitoring for invasive species be carried out, and that protocols are implemented to ensure that invasive pest plants do not become re-established on the site and that the uses of chemicals (e.g., herbicides, pesticides, rodenticides, fertilizers etc.) be prohibited or minimized.

DRAFT ENVIRONMENTAL IMPACT STATEMENT, ROMANZA ON GRACE BAY TOWNHOUSES AND CONDO TOWER DEVELOPMENT – PR. 16739 – 60900/258, GRACE BAY BEACH, PROVIDENCIALES, TURKS AND CAICOS ISLANDS – FOR ROMANZA ON GRACE BAY LIMITED.

1.0 Introduction and Overview

This Document constitutes the Environmental Impact Statement (EIS) for the Romanza on Grace Bay Townhouses and Condo Project on Providenciales, Turks and Caicos.

1.1 The Study

The Romanza on Grace Bay Townhouse and Condominium Development, hereafter referred to as "The Project," is located on the famous Grace Bay, Providenciales, Turks and Caicos Islands. The Project site is approximately seven (7) acres of land that will be developed into fifty-four (54) townhouse units and a 7-story condominium block, inclusive of swimming pools, poolside bars, restaurant building, reception/gym building, staff building, tennis and sports court, garage enclosure, boardwalk, and gatehouse.

The townhouses component of the development comprise 20 luxury units and the condominium thirty-four (34) suites.

1.2 Aims and objectives of the assessment.

Literature research and field investigations were completed to accurately determine and document existing on-site conditions, including physical and geological features and floral and faunal communities, marine ecology, and coastal and beach processes. The results of these investigations were to subsequently be applied to determine the extent of ecological impacts that could result from the construction and long-term operation of the proposed residential and resort project.

This document supports the compilation of the Environmental Impact Assessment for the Romanza Grace Bay Townhouses development (reference code PR16739). The central objective is to ensure that any proposed intervention

does not negatively impact the existing environment. This will be done by considering the following sub-objectives:

Investigate and quantify baseline conditions:

- To describe key physical features.
- To define the coastal hazards related to storm surge (winds, waves and water levels) and simulate how the property withstands the hazards.
- To establish the exposure risk of the property; and
- To provide an understanding of dominant wave and sediment patterns seaward of the property and within a five (5) kilometre radius of the project site.

Estimate Impacts:

- To refine concept components.
- To inform mitigation measures; and
- To provide an Emergency Mitigation Plan that summarises the impacts and detail the mitigation measures.

1.3 Organization of the EIS Report

This Environmental Impact Statement (EIS) report is structured in accordance with the guidelines provided in the detailed Terms of Reference (TOR) issued by the Department of Environment and Coastal Resources (DECR) and the Department of Planning (DoP) in the Ministry of Tourism, Environment, Heritage, Maritime, Disaster Management and Gaming, Turks and Caicos Islands Government on December 7, 2022.

Section one provides an introduction and overview of the study, including the aims and objectives of the assessment, an overview of areas/topics to be addressed, an analysis of the methods used to assess the receiving environment and a brief description of the project.

Section two offers a detailed historical overview of the site and existing development in the surrounding area and gives a detailed baseline assessment of the site, including the terrestrial, marine, and physical environments. This

section also detailed various modelling scenarios that detailed current wave conditions and how the project would respond.

Section three reviews the existing and appropriate legislative and regulatory framework under which the proposed project will be constructed and operated. It goes on to discuss how project design, construction and operation are impacted by such ordinances and regulations.

Section four gives a detailed description of the various components of the proposed development, including design, construction, and operational infrastructural components. Here construction activities and programs, including a detailed description and timeframes for all construction and related activities are outlined. Socio-economic parameters like demographic, employment and safety and security concerns are also discussed in this section. Safety and security measures during the construction and operational phases of the development are evaluated.

Impact assessment is the focus of Section five. Here potential environmental impacts associated with the proposed development are identified using computer modelling and other methodologies.

Mitigation and Monitoring measures are detailed in Section Six, which includes proposed actions and schedules to mitigate against identified environmental impacts.

Recommendations and conclusions can be found in section seven.

A Statement of the understanding of the Environmental Charter (2010 and the Climate Change Charter (2022) and the proponent's declaration of intent to be guided by the recommendations of the EIA consultants are listed in section eight.

Appendices are included in section nine. These include the Terms of Reference (ToR), Resumes detailing the qualifications and experiences of the EIA Team, and Government permits.

DRAFT

1.4 Names and contact information of the developers and EIA Team

Table 1.0: EIA Team and their contact information

Team Member	Study Area	Nationality	Contact Information	
			Phone	Email
Sustainable Ecosystems International	Terrestrial	USA (Florida)		
Philip Warner Smith Warner International Ltd	Coastal Processes	Jamaican	1876-9788-8950	philip@smithwarner.com
Janeen Bullard JSS Consulting (Environmental)	Marine	Bahamian	242-357-9262	Janeen2JSSConsultants.com
Ezekiel Hall EnvironmentalALL	Geology	TCI	649-246-8263	Hallenvironment1@gmail.com
Oswald R. Williams Caribbean Environmental Design Associates	Socio-economic/ Terrestrial	TCI	649-231-0371	oswaldwilliams51@gmail.com
Oswald R. Williams	Projector Coordinator	TCI	649-231-0371	oswaldwilliams51@gmail.com

1.5 Brief description of the proposed development

The Romanza on Grace Bay development comprises a mixture of upscale luxury residential development in the form of townhouses and a condominium tower block along the famous Grace Bay Strip, Providenciales, Turks and Caicos Islands. The townhouse type development will be complemented by a 7-story condo tower building, which is necessary to make the project economically feasible.

The proposed development consists of two design types – the Townhouse and a 7-story condo tower block. The townhouses take the form of a 6-building blocks, accommodating a total of 20 luxury townhouses. The 7-story condo tower building comprises 34 condominium suites. Overall, the development comprises 54 residences. Ancillary development includes a community building, staff building, reception building, garbage enclosure, swimming pools, pool side bar, access control building and car parking.

1.5.1 The Developers

Romanza on Grace Bay Townhouses and Condo Tower on the famous Grace Bay, Providenciales, Turks and Caicos Islands will be developed by Romanza on Grace Bay Limited.

1.5.2 Project Location

The project site is strategically located on the world-renowned Grace Bay beach, Providenciales, Turks and Caicos Islands. Vehicular access to the property is from the Grace Bay Road, the major roadway that provides access the Leeward Development and the Leeward mega marina. The site of the proposed development is situated adjacent to the Tuscany on Grace Bay resort. Other hotel developments in the area include Ocean Club East and the popular Providenciales' Golf Club is also located in the area.

The location of the property relative to the world-famous Grace Bay beach and other hotel developments in the area is shown in Figure 1.0 below.

DRAFT



Figure 1.0: Project Location

The Romanza townhouses and condo project is slated to be built on the 4.6-acre property shown in Figure 2.0 (Block: 60900 Parcel: 258). The site is along the Grace Bay beach with about 80m of beach frontage. The Venetian on Grace Bay is located to the southwest of the property and there are undeveloped lands to the northeast. The site may be accessed from the beach or by Grace Bay Road to the southeast. The property has a funnel shape with most of the area closer to the beach and a narrower entrance that is 25m wide and 200m long.

The coordinates below are GPS position of the property configuration:

192* 45' 59" - East corner Grace Bay corner of property

291* 43' 12" – Interior southeast corner

324* 42' 18" – At the interior bend East side of property

358* 51' 23" – East point at Grace Bay Road

294* 16' 17" – West Point at Grace Bay Road

113* 53' 37" – West point at the interior bend West side of property

114* 23' 29" – West upper point at interior bend west side of property

181* 17' 00 – West point at interior bend at upper level on the west side

144* 42' 18" – Interior southwest corner

117* 27' 22" – West Grace Bay corner of property

1.5.3 Project Concept and Description

The proposed development consists of two design types – the Townhouse and a 7-story condo tower block. The townhouses take the form of a 6-building block accommodating a total of 20 luxury townhouses and the 7-story condo tower building comprising 34 condominium suites. In total the development comprises 54 residences. Ancillary development includes a community building, staff building, reception building, garbage enclosure, swimming pools, pool side bar, access control building and car parking.

The design team for the Romanza on Grace Bay Townhouses and Condo project includes Richard Zeoler Architect Inc. out of Toronto, Ontario and Landscape Design firm Natural Ficial Inc of Coral Gables, Florida. The Townhouse units are grouped in two design areas – the beach-front units and garden-side units. Both the townhouse and the condominium units are supported with several swimming pools and hot tubs. Incorporated in the design are private swimming pools and public bar-side swimming pools.

The development has 100 feet building line set back from the coastal zone, where lush vegetation will be planted to mitigate against dune erosion. Access to the property, including the townhouse and condominium units, is provided by a wrapped-a-round 18-foot driveway. Pedestrian access is by a 4-feet sidewalk.

DRAFT

The site takes the form of a dipper, the design team used the Furnell portion of the site for ancillary and infrastructural development, including recreational facilities, namely, tennis court, Pickel Ball. Basketball court and bocce ball court. The entrance gate, wastewater treatment facilities and car parking facilities are also located in this area.

Overall, the development has building footprints of approximately 40,333.4 square feet and a site ration of 18.93 percent. More details on the building composition and description are shown on the table below.

Table 2.0: Townhouses and Condominium Unit Count

UNIT COUNT	TOTAL
BEACH TOWNHOUSES	8
GARDEN TOWNHOUSES	12
CONDOMINIUM	34

Table 3.0: Condominium Bedroom and Unit Count

CONDOMINIUM BEDROOM AND UNIT COUNT							
	2ND FLOOR	3RD FLOOR	4TH FLOOR	5TH FLOOR	6TH FLOOR	7TH FLOOR	TOTAL
STUDIO	5	0	0	0	0	2	7
1 BED	5	0	0	0	0	0	5
2 BED	0	3	3	3	3	0	12
3 BED	0	2	2	2	2	0	8
4 BED	0	0	0	0	0	2	2
					TOTAL UNIT COUNT		34
					TOTAL BED COUNT		68

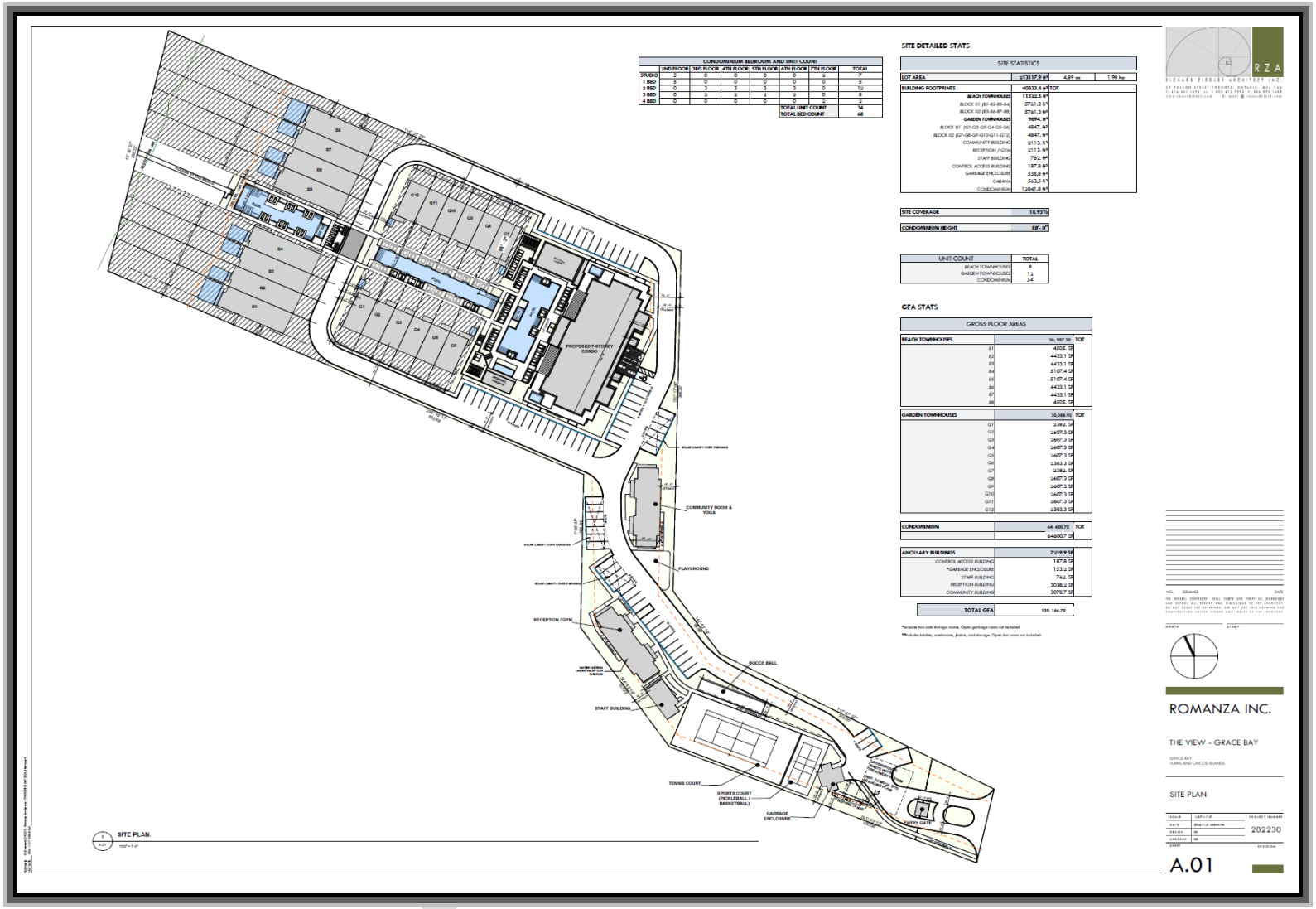


Figure 2.0: Site plan of the proposed development.

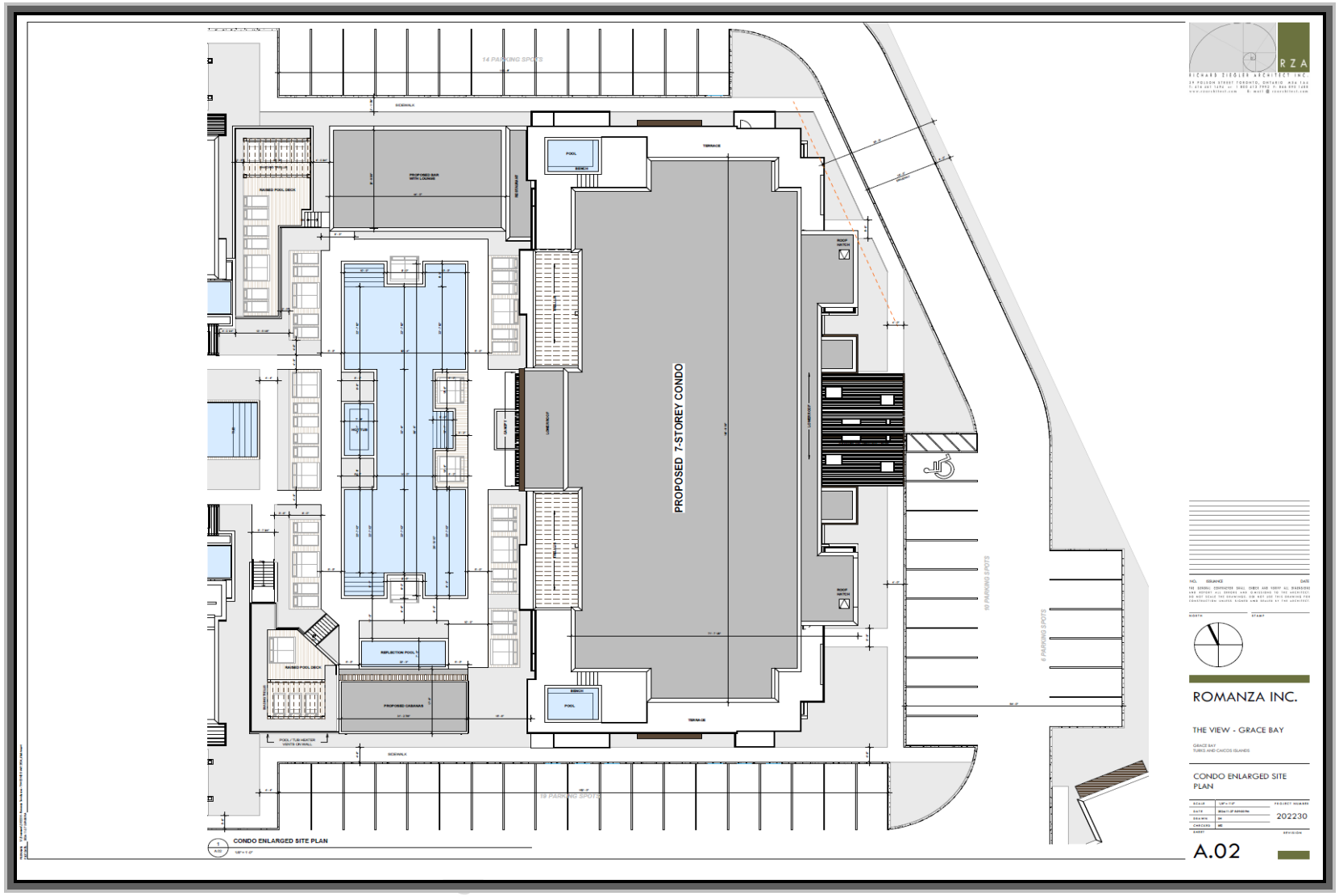


Figure 3.0: Site plan of the proposed development showing parking layout

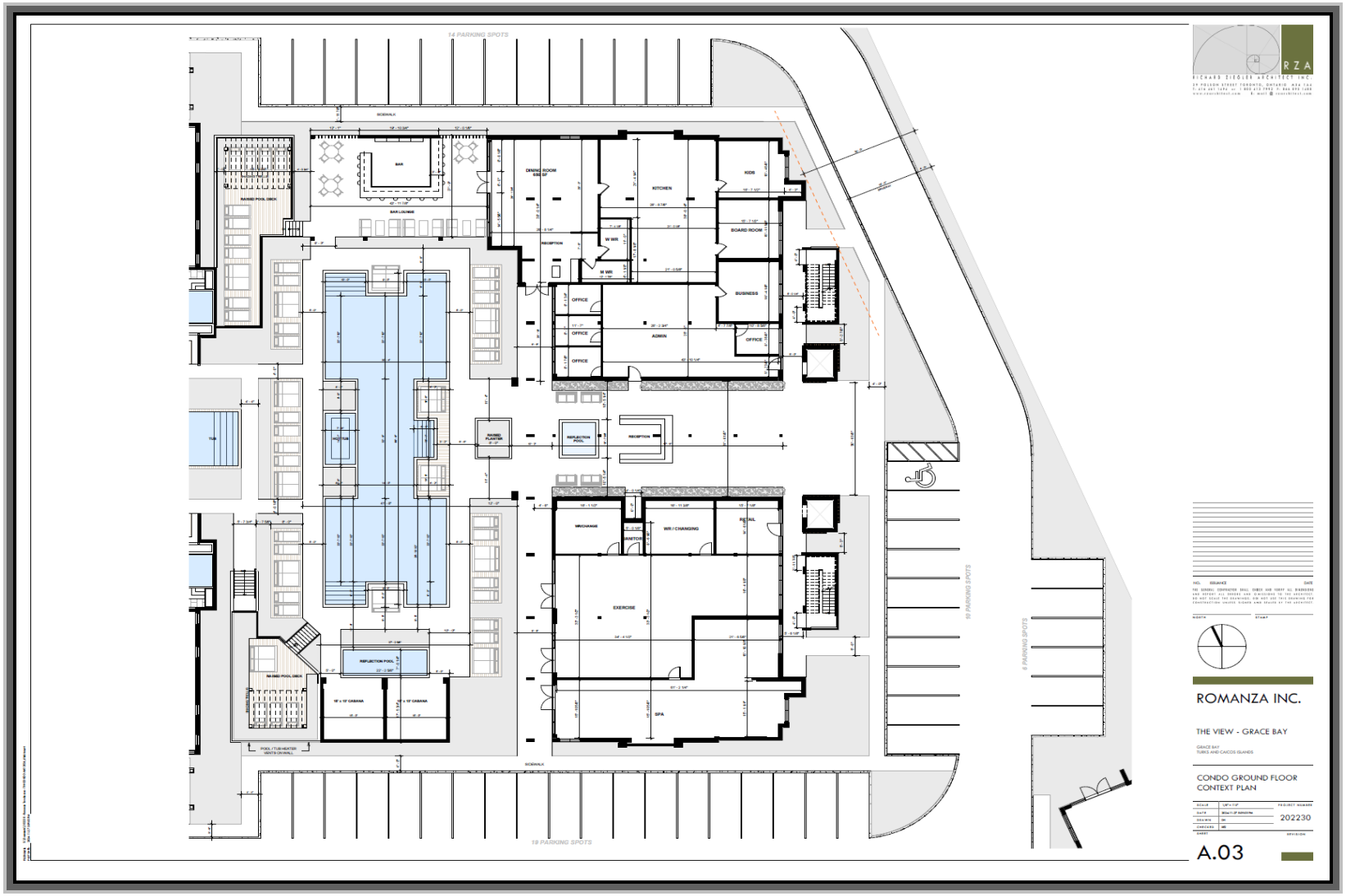


Figure 4.0: Site plan of the proposed development showing parking layout

1.5.4 Development relationship with other developments in the area

The proposed Romanza on Grace Bay Townhouses and 7-story Condo Tower Block and associated supporting development moves the developmental focus away from the clustered development area around the 7 Stars and Ports of Call area eastward along Grace Bay Road to a less developed area to the east towards Leeward gate and Leeward Development compound.

The Romanza on Grace Bay development will complement the existing development in the area and moved any development pressure away from the crowed central Grace Bay area.



Photos 1.0: Grace Bay Beach and surrounding developments



Photos 2.0: High-rise developments on Grace Bay Beach

1.6 Overview of the area/topics to be addressed.

The general areas to be addressed in this study include the terrestrial, coastal and marine environments, the socio-economic and cultural heritage settings and the legal context in which the proposed development will occur.

A quantitative and qualitative baseline assessment of the terrestrial environment and how the proposed development will be sited to ensure the least impact on the site. Whilst no physical development is proposed for the marine environment the topics to be considered in this context include a quantitative and qualitative assessment of all aspect of the marine environment within a 100 meters radius, including marine flora and fauna.

The site physical characteristics will also be studied including the topography, geology and hydrological characteristics and ground water resources.

This report describes the coastal zone and its features to develop baseline conditions. The results indicate that the property is vulnerable to storm surges. Increasing the crest height of the dune has been proposed to provide protection in hurricane events. The effectiveness of the concept was tested with numerical models, which showed negligible impacts within a wider study area of 5km.

Coastal processes and dynamics will also be looked at including, currents and tides; sediment transport, and erosion and accretion. Other topics to be addressed are impact description and identification. Mitigation and monitoring techniques will also be addressed.

1.7 Impact assessment methods/analysis

To determine the terrestrial, coastal, and marine species that could be affected by the project, both a literature search and field surveys were completed, as described hereafter.

Existing features and conditions on the site were evaluated first to provide a baseline. Impacts were then assessed by comparing baseline conditions and proposed conditions. Baseline and proposed conditions were simulated in a verified numerical model that simulates wave heights and water levels under certain events. The events included hurricanes, swell waves and average wave conditions. These events are generally described statistically, based on return period or exceedance probability. For each event listed the wave climate is compared by a side-by-side comparison of wave parameters during and after the implementation of coastal structures, which contrasts both magnitude and patterns.

Construction impacts are categorised based on their area of impact and duration. The likelihood of the impact is also incorporated to determine the significance of the impacts on the project.

1.7.1 Conducting literature search.

The literature search involved querying the databases the Government of the Turks and Caicos Islands used for information pertinent to the site, including lists of terrestrial and aquatic flora and fauna designated as Endangered,

Threatened, and/or Endemic. It also included querying protected species lists maintained by international conservation organizations to which the Turks and Caicos Islands are signatories, including the International Union for the Conservation of Nature (IUCN) and the Convention on International Trade of Endangered Species (CITES).

1.7.2 Field surveys

The landside field assessments involved visual inspections of terrestrial areas within the proposed project's footprint and adjacent areas that could be affected by it. The landside assessment involved direct visual observation of conditions between Grace Bay Road and Grace Bay beach.

Although no construction activities are proposed to seaward of the Mean High-Water line, the project team included marine experts who were to observe conditions extending into Grace Bay's waters from the water's edge.

An Olympus TG-870 and a Nikon D3500 digital camera with a 70-300 mm Nikon zoom lens were used to photograph representative and/or noteworthy landside flora and fauna. A hand-held Garmin GPS map 62sc Global Positioning System (GPS) was used to record latitude and longitude waypoints at landside investigation plots and at locations where notable flora and/or fauna or community boundaries were observed.

Nikon Monarch 10 x 42 binoculars were used during bird surveys, which included observations during early morning and late afternoon hours. Records were also kept of observations of birds and other wildlife that were seen. At the same time, qualitative and quantitative analyses of 3m x 3m vegetation analysis plots in 10 landside transects were being conducted.

A recent Google Earth image of the site taken on September 21, 2023, onto which the property lines were superimposed, was used as the base map for field investigations. In landside communities, a total of thirty-five 3m x 3m temporary vegetation plots along ten approximately shore-parallel transects were established and analyzed. A flexible, fiberglass tape measure was

extended around the perimeter of each plot, and the flora and fauna within the plot were documented.

The abundance of all floral species (actual counts of individual species of trees and shrubs), estimates of percent cover of groundcover and vine species), estimates of epiphyte, including orchids and air plants), indications of faunal use and a qualitative assessment of conditions that were present within each plot were recorded.

Inventorying of flora and fauna also included documentation of observations along pedestrian transects that traversed other areas outside the transects but within various vegetative communities within the assessment area.

All plants were identified to species level within each plot, whenever possible. Cumulative percent cover of all vegetation within each plot was estimated. Trees (woody species greater than 2 m (~7 feet) in height, and shrubs (woody species at heights between 0.3 m (~1 foot) and 2 m were counted numerically. Plants less than one foot in height were considered "groundcover," even if they were young plants that could eventually grow to shrub or tree heights. The percentage cover of individual groundcover species and vines was estimated. The presence of fauna observed within the plot or in the vicinity was recorded. Evidence of human-related (e.g., vehicular or pedestrian traffic, etc.) and natural (e.g., hurricanes) impacts were recorded to determine the quality of the vegetative community in each plot.

Plant names follow the *Flora of the Bahamas Archipelago* by D.S. H.B. Correll, *Flowers of the Bahamas, and Turks and Caicos Islands* by K. McNary Wood, with updates of plant names where warranted. Additional reference materials for landside flora and fauna included *The Birds of the Turks and Caicos Islands* (Ground, 2001), *Birds of the Bahamas and Turks and Caicos Islands* (Hallett, 2006), *Wildlife of the Caribbean* (Raffaele & Wiley, 2014), The *Natural History of the Bahamas* (Currie, Wunderle et al., 2019), Insects and other Arthropods of Tropical America (Hanson and Nishida, Comstock Publishing, 2016) and various on-line resources.

Qualitative ratings were based on the best professional judgment considering factors such as biodiversity, location-appropriate floral, and faunal assemblages, the presence, absence, and/or abundance of notable floral and/or faunal species (e.g., endangered, endemic, etc.), and the extent to which the area appeared to have been subjected to damage because of human and/or natural processes. Note that Hurricanes Irma and Maria caused widespread damage in some areas of the TCI during October 2017. The qualitative rankings vary from Poor (i.e., low biodiversity, absence of notable floral and faunal species, and impacted by human and/or natural processes) to Excellent (e.g., high biodiversity, abundant notable floral and faunal species, pristine condition).

The boundaries of the landside assessment area were readily visible in the field on the northwest (Grace Bay), southwest (Tuscany), and southeast (Grace Bay Road) sides. Calculated GPS coordinates were programmed into the portable GPS unit used in the field based on dimensions contained in site plans for the proposed project that had been overlaid on a rectified Google Earth image of the site and adjoining properties.

The marine area assessed encompasses shallow water between three-tenths meters and four and two-tenths meters (0.3m-4.2m). Seven (7) transects were conducted parallel to the shore within the survey area (See Figure 6.0 and Table 4.0 for transect coordinates). The benthic ecosystem was assessed in areas of the proposed construction footprint may impact directly and indirectly. The transects were approximately three hundred and eighteen meters (318 m) long and approximately sixty-five (65) meters apart.

DRAFT



Figure 5.0: Romanza on Grace Bay Townhouses and Condo Benthic Survey Area

DRAFT

Table 4.0: Romanza on Grace Bay Townhouses and Condos GPS Points and Measurements

Romanza Grace Bay Townhouse Transect GPS Points and Measurements

	Start			End			Measurement (M)
	Latitude	Longitude	Time	Latitude	Longitude	Time	
Transect 1	21°48.732'N	72°10.214'W	15:17	21°48.573'N	72°10.283'W	15:40	317
Transect 2	21°48.559'N	72°10.253'W	15:43	21°48.714'N	72°10.176'W	15:52	315
Transect 3	21°48.697'N	72°10.140'W	15:52	21°48.541'N	72°10.221'W	16:11	319
Transect 4	21°48.519'N	72°10.170'W	16:12	21°48.673'N	72° 10.085'W	16:19	320
Transect 5	21°48.649'N	72°10.037'W	16:33	21°48.497'N	72°10.123'W	16:39	317
Transect 6	21°48.480'N	72°10.087'W	16:40	21°48.634'N	72°10.002'W	16:46	320
Transect 7	21°48.621'N	72°09.973'W	16:47	21° 8.464'N	72° 0.053'W	16:55	318

DRAFT

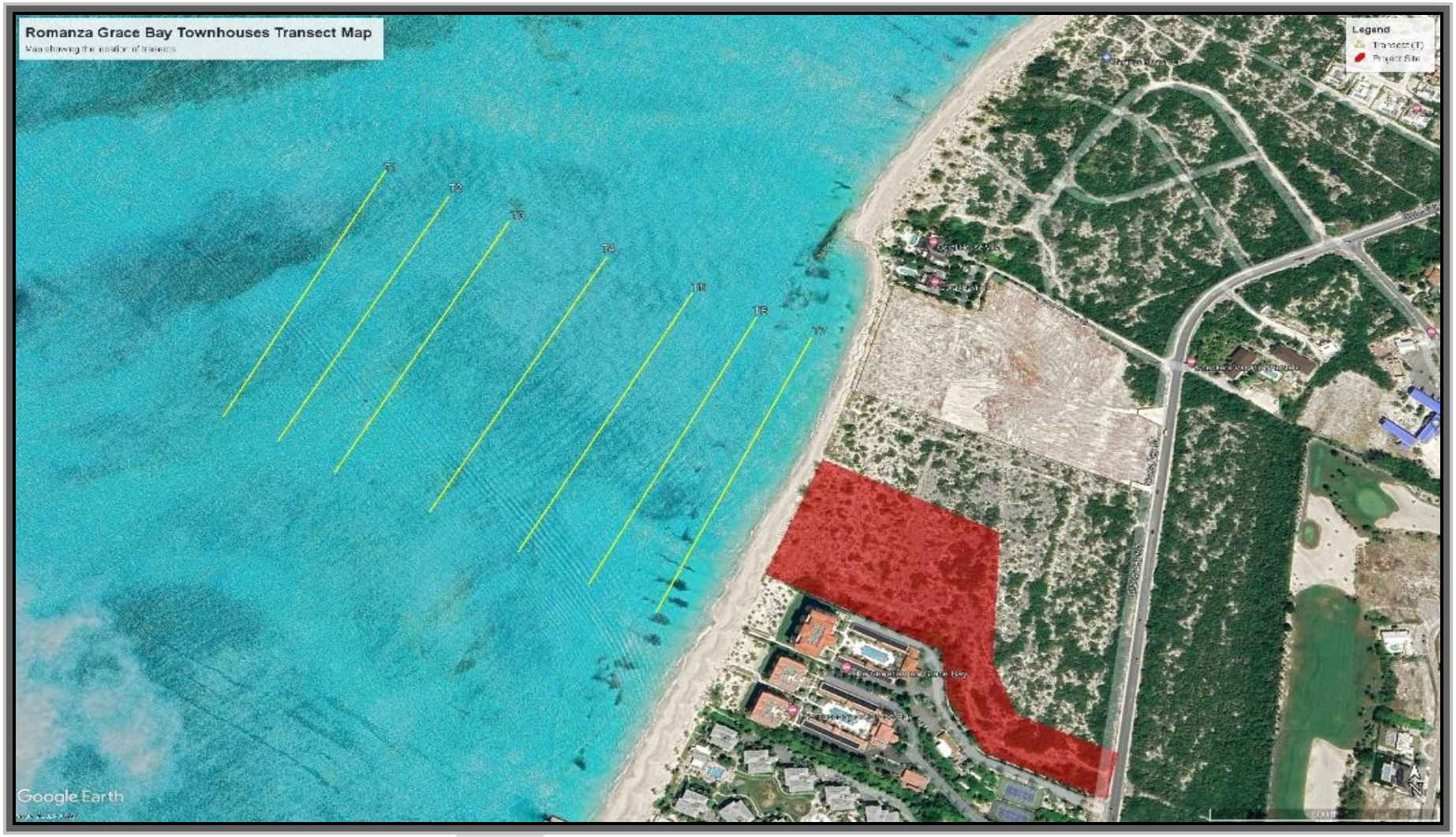


Figure 6.0: Habitat Characterization and Mapping

Marine benthic habitat was assessed using a modified transect method. Direct observation of the benthic conditions was conducted by snorkeling gear in shallow water (inshore) and diver tows in deeper waters (offshore).

Divers swam (or towed) along each transect, covering approximately one and five-tenth meters (1.5 m) on either side of the transect line. Changes in habitat boundaries and habitat types along transects were recorded, and a GPS Coordinate was taken at the surface. Benthic habitats were identified by the substrate type (e.g., sand/silt, rubble, hard bottom, seagrass, dead coral, etc.). Important and/or sensitive areas and any ecologically and commercially important species utilizing the areas were noted and representative photos were taken.

Habitat types identified and recorded were reviewed and used to create a GIS habitat map of the area and calculate the benthic habitat percent cover.

Species Diversity

Roving diver and visual fish surveys were conducted to assess species abundance and diversity. The amount of each species observed along transects was recorded.

Areas with coral colonies and seagrass beds were noted. Coral health was visually observed during the assessment of diseases such as Stony Coral Tissue Loss Disease (SCTLD) and coral bleaching. Representation photos were taken. Random spot checks were conducted at the seagrass areas for epifauna present.

The presence of marine flora, fauna (mobile), and epifauna (sessile) was recorded by divers swimming along transects and at Spot Checks. A record was taken of all flora and fauna species, and a species list was created. Biota was classified into genus and species using Humann et al 2013, Reef Coral Identification, Humann et al. 2013, Reef Fish Identification and Humann et al. 2013, Reef Creature Identification. Algae were identified to genus and species or to the functional group (e.g., turf algae, fleshy macroalgae, etc.). Data will be presented in a table with species' scientific and common names, abundance, and locations. Species abundance was recorded by the exact number of species observed during the assessment.

DRAFT

Turtle Nesting Assessment

The assessment comprised a twenty (20) minute turtle nesting assessment. The assessment of the beach was conducted to determine if the beach in front of The Project site is used as a nesting place for sea turtles. The assessment was conducted on April 15th, 2024, between 4:55 pm and 5:55 pm, and April 16th, 2024, between 8:00 am and 9:00 am. Team members walked along the beach looking for the presence of a sea turtle track or nest. Any findings were noted, and presentative photos were taken.

Avian (seabird) Assessment

The assessment comprised three (3) hours of active avian and ecological observations. Field studies comprised a summer avian survey (April–August), conducted on Monday, April 15th, 2024, between 2:00 pm and 5:00 pm. The area's avifauna was assessed and recorded by walking along the beach shoreline of The Project site and observing any species flying overhead from the boat. Species numbers were recorded in the abundance categories: Single (1), Few (2–10), and Many (11–100). Species recorded were compiled for final abundance estimates. Status is based on the International Union for Conservation of Nature (IUCN).

It is unlikely that this assessment identifies all the marine and avian species present on the site, but it provides a representation of those present.

DRAFT

SECTIOON II

2.0 Baseline Studies

Analyses of baseline features and environments were done to quantify conditions on the site before the construction of the proposed townhouses and condominium development. These findings were then used to indicate the sensitivity of the area to impacts after construction. Under the scope of the project, mainly coastal conditions were investigated. These included erosion and accretion on the site, general wave climate, sediment classification and water quality information.

2.1 Historical overview of the site and existing development

The site of the proposed Romanza on Grace Bay Townhouses and 7-story Condo Tower Block Development (60900/258) has its origin as part of the original Provident Limited Master Plan for the Grace Bay area of Providenciales, Turks and Caicos Islands. The land in question was part of the mega development agreement between the Crown, Government of the Turks and Caicos Islands and Provident Limited in 1966 that form the basis for present day Providenciales development. The site (60900/258 remained vacant over the preceding years.

2.1.1 Historical ownership and land use of the site, proposed development, and surrounding areas

Research showed that the historical ownership of block and parcel number 60900/258 after been transferred to Provident Limit remained under that company's ownership unit it was recently acquired by Romanza on Grace Limited. The land remained vacant over the years.

2.2 Biological Environmental Baseline Assessment

Biological Environmental Baseline assessment including geological, terrestrial, coastal process and marine are detailed below.

DRAFT

2.2.1 Baseline terrestrial environment

The Terms of Reference require that the Baseline Terrestrial Assessment be conducted "(including areas that are cleared, bulldozed and disturbed/damaged) – to include a quantitative description of any terrestrial ecological assets (flora and fauna; habitats, rare, threatened and endangered species) to be directly impacted by the project and a qualitative assessment of assets that may be indirectly impacted". The ToR also specifically identify a variety of items that are to be addressed. The remainder of this section provides the information required.

The baseline field surveys in the landside communities were conducted during the week of March 11, 2024, when no project construction had been initiated. The results of the literature search and field assessments follow.

Results of Literature Search

A ten-page undated list of flora and fauna that are designated "as protected because they are endemic, rare and endangered" entitled "The Schedules" (Appendix H) received from the DECR was used as the primary reference list for notable flora and fauna that could potentially be present on the site. The list is not specific to the project area or Providenciales but applies to all areas in the TCI.

A query of the database maintained by the International Union for the Conservation of Nature (IUCN) on April 7, 2024, revealed the potential presence of 1167 terrestrial and marine floral and faunal species that occur in the Turks and Caicos Islands, which are designated, in descending order of vulnerability, as Critically Endangered, Endangered, Near Threatened, Vulnerable, Least Concern, and Data Deficient.

Although the IUCN list includes many species that exist in habitats that are not present on the subject property (e.g., mangrove forests, coral reefs) or within the potential sphere of influence of the proposed project, it does include several species of terrestrial flora and fauna that inhabit the vegetative communities

that are likely to be present within the Assessment Area and/or may be impacted by the proposed activities.

The Turks and Caicos Islands are not registered as a party to the Convention on 1International Trade in Endangered Species of Wild Fauna and Flora (CITES). Still, a search of their database of listed species was conducted for this project because the TCI is a dependent territory of a signatory party. CITES has determined the DECR to be an "authority competent to issue comparable documentation" and "A scientific institution capable of advising that an export is not detrimental to the species' survival".

The Turks and Caicos chapter of Important Bird Areas in the Caribbean (Birdlife International, 2008) was analyzed to determine if the project site was within one of the nine designated Important Bird Areas (IBAs) in the TCI. None of the IBAs are on Providenciales.

The literature search also involved the review of Environmental Impact Assessments for properties in the vicinity of the project site. Although no data were found for the subject property, an Environmental Impact Assessment for a nearby property, tract PR15580, is an approximately 10.15-acre (4.1 ha) property located approximately 380 ft (110 m) to the northeast. Analysis of aerial photography indicated that that property, owned by Blue Conch Holdings LLC, which also extended from Grace Bay Rd. to the shore of Grace Bay, was likely composed of similar vegetative and biological communities. Lists of floral and faunal species observed during field investigations, which were conducted during April 2022 and included in the EIA for that project, were analyzed for information that could be insightful for the Romanza Grace Bay Project.

Results of Landside Assessment

The landside assessment involved direct visual observation of conditions in thirty-five 3-meter x 3-meter plots along ten transects that were generally in a shore-parallel orientation. It also included recording observations of additional

species that were observed on the site but did not occur in the plots or along the transects.

Overall, the proposed project's site was found to be in Good to Fair condition. A brief description of each community on the site follows, followed by a more comprehensive description.

The northwestern boundary of the project was a sandy, unvegetated beach that was mostly approximately 5-15 meters (~15-57 feet) in width.

The beach was steep in profile and appeared to have been subject to intermittent minimal to moderate levels of erosion. The broad exposure to winds from the west and north appeared to have exposed the nearshore areas to intermittent high levels of sand suspension and wave run-up, preventing a healthy dune community.

Landward of the un-vegetated sandy beach, a narrow, shore perpendicular stretch of Sand Strand community was present. This back dune vegetative community was not intact, with most naturally occurring native vegetation replaced with invasive pest plants, primarily Australian pine (Casuarina equesetifolia) and inkberry (Scaevola saccade). No vertical seawalls or rip-rap shore protection structures were visible. Moderate amounts of debris (e.g., litter, flotsam, jetsam, etc.), most likely deposited during storms, were present near the top and back dune communities.

Landward of the invasive-dominated Sand Strand, a mosaic of open areas interspersed amid a Dry Broadleaf Evergreen Shrubland community extended to the southeastern boundary of the site (the northwest boundary of the Grace Bay Road right-of-way. Although no structures or paved roads were present on the property, an unpaved at-grade path suitable for use by four-wheel-drive vehicles had been intermittently used for access toward the beach near the property's western boundary.

DRAFT

The southwesterly boundary of the subject property abuts "The Tuscany", a 7-story residential development that was constructed sometime after an environmental assessment was performed in 2008 and the project's subsequent approval by the TCIG. Although the time-period during which The Tuscany project was constructed is not known, a Google Earth image taken March 21, 2013, shows that it has been constructed and a high-scarified swath of the subject property, approximately 61 ft (19 m) that had been cleared to allow construction of The Tuscany". This land clearing explained the observed presence of various disturbed land species (e.g., *Leucaena leucocephala, Scaevola taccada, Tridax procumbens*, etc.) along the property's southwestern boundary.

A narrow (i.e., ~62 ft (19m)) strip of Dry Broadleaf Evergreen Forest was present along the property's frontage on Grace Bay Road. However, even this area showed varying levels of encroachment by invasive pest plants.

No bluffs, blue holes, caves, dissolution holes, or other particularly notable geologic formations were observed within the landslide or marine assessment areas.

To meet the ToR's requirement that quantitative data be collected, thirty-five 3 m x 3 m vegetative community plots were established along ten transects that were generally shore-parallel in orientation.

Approximately 90 species of plants and a variety of animals (e.g., birds, reptiles, land snails, insects, etc.) were observed and recorded (flora) and (fauna). Table 5.0 provides scientific names and common names of the plant species encountered, the number of occurrences in the 35 vegetation analysis plots, and a comparative abundance of the plant species identified on the property.

DRAFT

Table 5.0 – Plant Abundance in Plots.

Table 1
Plant Abundance in Plots

Scientific Name	Common Name	# Occurr-ences	Abundance
Alvaradoa amorphoides	Alvaradoa	0	Rare
Ambrosia hispida	Sweet Bay, Bay tansy, Soap-bush	2	Uncommon
Andropogon glomeratus	Bushy Beard Grass	1	Uncommon
Anemotrochus eggersii		4	Uncommon
Angadenia berteroi	Lice-root	4	Uncommon
Bourreria succulenta	Strong-back	0	Rare
Bursera simaruba	Gum-elemi, Gumbo Limbo	1	Uncommon
Byrsonima lucida	Locust-berry	0	Rare
Cajanus cajan	Pigeon Pea	0	Rare
Cassytha filiformis	Woe-vine, Love Vine	7	Common
Casuarina equisetifolia	Beefwood, Australian Pine	8	Common
Catesbaea parviflora	Catesbaea	2	Uncommon
Cenchrus incertus	Sand Bur	2	Uncommon
Chamaecrista lineata	Narrowpod Sensitive Pea	14	Abundant
Coccoloba uvifera	Seagrape	11	Abundant
Coccothrinax inaguensis	Inagua Silver-top Palm	13	Abundant
Concarpus erectus	Buttonwood	2	Uncommon
Corchorus hirsutus	Wooly Corchorus, Jack Switch	11	Abundant
Cordia sebestena	Geiger Tree, Anaconda	0	Rare
Crossopetalum rhacoma	Maiden Berry, Mating Berry	2	Uncommon
Dactyloctenium aegyptium	Crowfoot Grass	0	Rare
Desmodium glabrum	Horse-grass, Velvety Tick-Trefoil	0	Rare
Dodonaea viscosa	Dogwood, Swamp Bush	14	Abundant
Echites umbellata	Devil's Potato	0	Rare
Encyclia sp. 1	Tall Orchid	6	Uncommon
Encyclia sp. 2	Spring Orchid	0	Rare
Erithalis fruticosa	Black Torch, Candlewood	10	Common
Ernodea littoralis	Golden Creeper, Cough Bush	9	Common
Eugenia axillaris	White Stopper	2	Uncommon
Eulophia graminea	Orchid	0	Rare
Euphorbia abbreviata	Wild Thyme (aka E. inauguensis)	9	Common
Euphorbia mesembrianthemif	Coast spurge, Seaside spurge	0	Rare
Euphorbia vaginulata		3	Uncommon
Eustachys petraea	Finger Grass	7	Common

Table 1, Sheet 1

Table 1
Plant Abundance in Plots

Scientific Name	Common Name	# Occurr-ences	Abundance
Fimbristylis cymosa	Limestone Turf Sedge	13	Abundant
Galactia sp.	Milk Pea	1	Uncommon
Genipa (fka Casasia) clusiifolia	Seven-year Apple	3	Uncommon
Guapira discolor	Blolly	10	Common
Gundlachia corymbosa	Horse Bush	0	Rare
Gyminda latifolia	False Boxwood	1	Uncommon
Heliotropium angiospermum	Horse-bush, Scorpion-tail	2	Uncommon
Jacquemontia havanensis	Jacquemontia	0	Rare
Jacquinia keyensis	Joe-wood, Ironwood	4	Uncommon
Lantana involucrata	Sage Cop, Wild Sage	7	Common
Lasiacis divaricata	Wild Cane	1	Uncommon
Launaea (Lactuca) intybacea	Wild Lettuce	1	Uncommon
Leucaena leucocephala	Jumbay	8	Common
Manilkara bahamensis	Wild Dilly	0	Rare
Metopium toxiferum	Poisonwood	7	Common
Mosiera longipes	Sweet Margaret	12	Abundant
Myrica neopallens	Spicewood	1	Uncommon
Myriopus volubilis	Soldier-bush	6	Uncommon
Parietaria floridana		0	Rare
Passiflora cupraea	Devil's Pumpkin	3	Uncommon
Passiflora pectinata	Wild Apricot	3	Uncommon
Pennisetum alopecuroides	Fountain Grass	2	Uncommon
Pilocereus polygonus	Old Man's Cactus	0	Rare
Pithecellobium keyense	Blackbead	3	Uncommon
Randia aculeata minor	Box Briar	0	Rare
Reynosia septentrionalis	Darling Plum	6	Uncommon
Rhynchosia minima	Least Snoutbean	1	Uncommon
Rhynchospora floridensis	Starrush Whitetop	9	Common
Sarcomphalus (fka Ziziphus) t	Taylor's Jujube	2	Uncommon
Scaevola plumieri	Inkberry, Black-soap	3	Uncommon
Scaevola taccada	Ornamental Candlewood	8	Common
Sesuvium portulacastrum	Pondweed, Sea purslane	0	Rare
Sida sp.	Fanpetals	0	Rare
Sideroxylon (Bumelia) americ	Wild Saffron, Milk-berry	0	Rare

Table 1, Sheet 2

Table 1
Plant Abundance in Plots

Scientific Name	Common Name	# Occurr-ences	Abundance
Smilax havanensis	Prickly Saw-brier	16	Abundant
Spermacoce sp.	Buttonweed	3	Uncommon
Stachytarpheta jamaicensis	Worry Vine, Bue rat-tail	0	Rare
Stenostomum myrtifolia	False Myrtle	14	Abundant
Strumpfia maritima	Mosquito Bush, Candle Torch	7	Common
Stylosanthes hamata	Sweet Weed, Pencil Flower	2	Uncommon
Tabebuia bahamensis	White Cedar, Five Fingers	0	Rare
Terminalia buceras	Black Olive, Inagua Oak	0	Rare
Tillandsia flexuosa	Flexuous Wild Pine	9	Common
Tillandsia streptophylla	Silvery Wild Pine Air Plant	9	Common
Tillandsia utriculata	Swollen Wild Pine	2	Uncommon
Tridax procumbens	Rabbit Thistle	0	Rare
Turnera ulmifolia	Buttercups, Yellow Alder	2	Uncommon
Unidentified grass #1	Unidentified grass	3	Uncommon
Unidentified grass #2		3	Uncommon
Uniola paniculata	Sea Oats	4	Uncommon
Vachellia (fka Acacia) acuifera	Pork and Dough Boy, Rosewood	11	Abundant
Vachellia (fka Acacia) choriop	Cinnecord	4	Uncommon
Varronia bahamensis	Cocobey	1	Uncommon
Waltheria indica	Sleepy Morning	0	Rare
Zanthoxylum flavum	Yellow-wood, Satin-wood	1	Uncommon

Green Highlighting = Species included in "The Schedules"

Pink highlighting = Species designated as Invasive by DECR

Species shown as having 0 occurrences were observed on the site during the assesssment, but did not occur in any of the vegetation monitoring plots

Abundance Descriptions:

Rare = did not occur in any of the 35 plots

Uncommon = Present in 1-6 of the 35 plots

Common = Present in 6-10 of the 35 plots

Abundant = Present in more than 11 of the 35 plots

Table 1, Sheet 3

Six vegetative community types and one mostly unvegetated community (i.e., scarified lands) were found to be present within the assessment area. The community type and the corresponding size of each area, its percentage of the overall Assessment Area, relative quality, and comments are identified in Table 6.0 and described thereafter.

Table 6.0 – Existing Landside Community Types

Community Type	Size w/in Assessment Area Ac. / Ha	Percentage of area w/in Assessment Area	Qualitative Rating[1]	Comments
Unvegetated Sandy Beach	0.37 / 0.14	6.1%	Fair	Naturally less biodiverse than other habitats; beneficial as a natural shield for sea level rise/coastal resiliency. No groynes or other man-made structures, but appears subject to moderate erosion
Sand Strand	0.18 / 0.07	3.0%	Good	Subject to erosion, some invasive species present
Invasive-dominated Sand Strand	0.10 / 0.04	1.7%	Poor	Back-dune community substantially infested by invasive, non-native pest plants.
Invasive-Dominated Shrubland & Forest	1.11 / 0.45	18.5%	Poor	Native vegetative communities along the southwestern portions of the property were mostly non-existent, having been replaced by invasive pest plants on what appeared to have been the

DRAFT

				previously cleared soils
Dry Broadleaf Evergreen Shrubland	3.90 / 1.60	65.0%	Good	Native geologic & vegetative communities are somewhat impacted by previous human activities & non-native vegetation.
Dry Broadleaf Evergreen Forest	0.16 / 0.06	2.7%	Good	The native geologic and vegetative community is mostly intact, but habitat fragmentation and the edge effect adjacent to impacted areas have resulted in moderately degraded habitat.
Scarified Lands	0.18 / 0.07	3.0%	Poor	Cleared Lands, un-vegetated or nearly so
Total:	6.00 / 2.43	100		

DRAFT

Un-vegetated Sandy Beach

Approximately 6.1% (i.e., 0.37 ac (~0.14 ha) of the Assessment Area was found to consist of an un-vegetated sandy beach located in the intertidal zone (Photo 3.0).



Photo 3.0: Un-vegetated Sandy Beach
View looking Southwest from approximately the middle of the property
Date of Photo: March 13, 2024

Although no openings of ghost crab (*Ocypode quadrata*) burrows were observed, they are likely present, as claws and other body parts eaten by yellow-crowned night herons were encountered several times.

Various migratory and/or resident breeding shorebirds, including sanderlings (*Calidris alba*), ruddy turnstones (*Arenaria interpres*) and Wilson's plover (*Charadrius wilsonii*) are frequently present in this habitat, but were not observed during this field investigation. Other bird species (e.g., sandpipers (Scolopacidae), plovers (Charadriidae), and oystercatchers (*Haematopus*

palliatus)) are well-documented to be occasionally present and/or to forage in this habitat.

Wilson's plovers have been known to nest on open sandy beaches in other areas of Grace Bay, but the stretch of beach on the subject property appeared to be too heavily used by people to be suitable for nesting by this species. Royal terns (*Sterna maximus*) were observed and heard aerially over the sandy beach and nearshore areas,and laughing gulls (*Larus atricilla*) and least terns (*Sterna antillarum*) would likely be present during other times of the year.

March is not nesting season for these species, so evidence of active nesting by any of them was not expected. Nesting season surveys at other properties on Providenciales with the same types and sizes of habitats suggest that mourning doves, common ground-doves, thick-billed vireos, mockingbirds, bananaquits, and Antillean nighthawks could potentially nest on the property.

Marine turtles are also known to nest on sandy beaches. No data indicates that this area is known for sea turtle nesting. No evidence of turtle nesting (or hatching of young) was observed, but March is not prime nesting season, so it is also not surprising that there weren't any observations of turtle nests or hatchlings.

No portions of this community were heavily eroded. Still, a scarp of 6"-1 ft, where roots of adjacent vegetation were exposed, suggested that shifting sands and storms may result in intermittent periods of erosion.

This community was ranked as being in Fair condition. The beach width was narrow, mostly between 5 and 10 meters (~15 to 30 feet). The upper limit of this community transitioned into the Sand Strand community described hereafter.

Sand Strand

Approximately 3.0% (i.e., 0.18 ac (~0.07 ha) of the Assessment Area was found to consist of a sparsely vegetated Sand Strand community located immediately landward of the un-vegetated sandy beach (Photo 4.0).

DRAFT

There was only a single, low dune. Sea purslane (*Sesuvium portulacastrum*, and *Chamaesyce mesembranthefolium* were the pioneer species that were generally closest to the un-vegetated sandy beach. Shrubs included the native *Scaevola plumieri*, woolly Corchorus (*Corchorus hirsutus*) and *Euphorbia inaguensis*. Bay tansy (*Ambrosia hispida*), sea oats (*Uniola paniculata*), love vine (*Cassytha filiformis*) and burr-grass (*Cenchrus insertus*) were common. No trees were present in this community.



Photo 4.0: Sand Strand View looking Southwest including Vegetation analysis Plot 1b Date of Photo: March 12, 2024

Invasive *Scaevola taccada* was present in varying abundances, from absent in some areas to moderate cover in others. Areas where it and/or Casuarina equesetifolia where dominant were mapped as Invasive-dominated Sand Strands.

There was little evidence of wildlife in this vegetated community, although peanut snails (*Cerion* sp.) were occasionally seen. As with the un-vegetated sandy beach, although no openings of ghost crab (*Ocypode quadrata*) burrows were observed, they are likely present, as claws and other body parts that yellow-crowned night herons had eaten were encountered on several occasions.

`No birds were seen in this area, although gulls and terns might logically be seen `in the nearshore waters adjacent to this community. March is not nesting season for these species, so it is not surprising that no evidence of nesting of any of these species was observed.

`Storm-deposited litter (e.g., flotsam, jetsam) was abundant in this area.

This community was ranked as being in Fair condition, as it included varying amounts of debris, was not densely vegetated, and appeared very vulnerable to erosion.

Invasive-dominated Sand Strand

Approximately 1.7% (i.e., 0.01 acres (0.04 ha)) of the Assessment Area consisted of floral species not native to the Bahamian Archipelago and have replaced most native plants in the Sand Strand community. This habitat was present in a linear, shore-parallel corridor of variable width bounded on the northwest by the un-vegetated sandy beach and on the southeast by a rapid transition to a Dry, Broadleaf Evergreen Shrubland community (Photo 5.0).

DRAFT



Photo 5.0 Invasive-Dominated Sand Strand

Dominant vegetation included mature Australian pine (*Casuarina equesetifolia*) trees in the canopy and Beach Cabbage (*Scaevola taccada*) in the sub-canopy. These two pest plants constituted more than 60% of the biomass in much of this area. Native salt-tolerant and drought-tolerant shrubs and groundcovers in this community included species that can tolerate the build-up of acid-rich Casuarina duff, including sea grape (*Coccoloba uvifera*), love vine (*Cassytha filiformis*), seapurslane (*Sesuvium portulacastrum*), burr-grass (*Cenchrus* sp.), bay hops (*Ambrosia hispida*) and others.

Qualitative Condition of the Invasive-dominated Sand Strand

This community was ranked as being in Poor condition. This qualitative assessment was based on the minimal presence of native plant species, the lack of species designated as endangered, threatened, or endemic, and the resulting vulnerability of this area to wave-induced erosion.

However, the presence of a few native shrub and groundcover species suggests that, if the invasives and the Casuarina needles were to be removed, native species could recover. Supplemental planting with native dune plants (e.g., sea oats (*Uniola paniculata*) to add to those already present, bay cedar (*Suriana maritima*), beach iva (*Iva imbricata*), etc.) could enhance restoration, and the use of dune walk-over structures as part of the proposed development could help reduce the likelihood of continued impacts by trampling

Invasive Dominated Shrubland and Forest

Approximately 18.5% (i.e., 1.11 acres (0.45 ha)) of the Assessment Area was found to consist of floral species that were not native to the Bahamian Archipelago, and which have replaced most native plants in what was formerly likely Sand Strand Dry Broadleaf Evergreen Shrubland and Forest communities was. This vegetative community was present in a corridor approximately 60 ft (18 m) wide that generally was adjacent to and parallel with the boundary with Tuscany. A review of historical Google Earth images suggests that this area had been cleared and was nearly devoid of vegetation in 2013. Opportunistic invasive vegetation likely became established after construction in Tuscany, when the previously cleared areas were allowed to fallow.

Dominant vegetation included mature cow bush (*Leucaena leucocephala*) (Photo 6.0), Australian pine in the canopy, and Beach Cabbage (*Scaevola taccada*) in the sub-canopy. These three pest plants constituted more than 90% of the biomass in much of this area.

DRAFT



Photo 6.0 Mature Leucaena leucocephala in Invasive-dominated area near the western property boundary View looking north toward Grace Bay Date of Photo: March 12, 2024

Native salt-tolerant and drought-tolerant shrubs and groundcovers in this community were minimally present.

One individual of an unusual, non-native terrestrial orchid, *Eulophia graminea*, was observed in this community (see photos in Appendix G).

Qualitative Condition of the Invasive Dominated Shrubland and Forest

This community was ranked as being in Poor condition. This qualitative assessment was based on the paucity of native plant species and the absence of endemic, threatened, and endangered species.

Dry Broadleaf Evergreen Shrubland

Approximately 65.0% (i.e., 3.90 acres (1.60 ha)) of the Assessment Area was found to consist of Dry Broadleaf Evergreen Shrubland (DBES). Vegetation in this community and the small area of Dry Broadleaf Evergreen Forest described

later were the most diverse of the communities present within the assessment area.

Due to the combination of salt spray, poor soil, and previous human-related impacts, trees were infrequently present in this community. Those that exceeded seven feet (~ 2.1 m) in height were primarily Inagua silver top palms (*Coccothrinax inaguensis*) and poisonwood (*Metopium toxiferum*).

Shrubs were the dominant land cover in this community, and included black torch (*Erithalis fruticosa*), Cinnecord (aka Leatherleaf Casha) (*Vachellia choriophylla*), pork and dough boy (*Vachellia acuifera*), *Euphorbia inaguense*, darling plum (*Reynosia septentrionalis)*, sea grape (*Coccoloba uvifera*), seven-year apple (*Genipa clusiifolia*) and others. In areas where rock substrate was at the ground surface, mosquitobush (*Strumpfia maritima*) was common.

Herbaceous/groundcover species and vines included *Rhynchospora floridensis,* Cassytha filiformis, Smilax havanensis, wild apricot (Passiflora pectinata), and others.

Vegetation was mostly less than 10 feet (~3 m) in height. No wetlands were present within the assessment area. Photo 7.0 represents conditions in this vegetative community.

DRAFT



Photo 7.0 Dry Broadleaf Evergreen Shrubland – Plot 5c
View looking Southwest – Date of Photo: March 13, 2024

Although no native epiphytic orchids were in bloom (so identification to species is not certain), clusters of what are believed to be tall orchids (*Encyclia altissima*) (Photo 8) were abundant.

DRAFT



Photo 8.0 Clusters of epiphytic Encyclia orchids were common
Date of Photo: March 13, 2024

As described further in the Notable Landside Resources section and Table 3, several plant species that the TCIG designates as Turks and Caicos Endemic Plants, Lucayan Archipelago Endemic Plants and/or Native Plants of Special Conservation Concern were present in this community.

Comparatively few faunal species were observed in this habitat, but included mollusks (e.g., seagrape and peanut snails (*Hemitrochus* sp. and *Cerion* sp.), respectively, reptiles, including curly-tailed lizards (*Leiocephalus psammodromus*) and Turks and Caicos Anoles (*Anolis scriptus scriptus*) and arachnids, including

silver argiope (*Argiope argentata*) and crablike spiny orb weaver (*Gasteracantha elipsoides*) spiders, fritillary, lyside and skipper butterflies.

Bird species observed during bird surveys and/or while the vegetative analyses were being conducted in this area were primarily resident passerines, including common ground doves, mourning doves (Photo 9.0), and smooth-billed anis. Kestrels, one male and one female, were observed repeatedly and may nest in the vicinity. No active or previously used bird nests were encountered, although March is before the nesting season for most bird species in the TCI.



Photo 9.0 Mourning Dove – Date of Photo: March 13, 2024

Because nearly all species of birds that are present in the TCI are designated as "Protected," a full listing of all bird species observed, and their designation is included in the "Protected Species" section of this EIA.

Qualitative Condition of the Dry Broadleaf Evergreen Shrubland

Most of this habitat was ranked as Good, as, despite a lack of diverse forests, it appeared to be mostly natural. However, scars from previous land-clearing activities were present, primarily in the northern portion of the property (Photo 9.0). This community did not appear to have been significantly impacted hydrologically or because of previous development on the site and/or on adjacent properties. It also did not exhibit any evidence of previous storm-related impacts.

Dry Broadleaf Evergreen Forest

A very small (~2.5%) remnant of Dry Broadleaf Evergreen Forest (i.e., approximately 0.16 ac. (0.06 ha) near the road frontage on Grace Bay Drive was found to consist of Dry Broadleaf Evergreen Forest (DBEF). Plant diversity was comparatively high, in some places exceeding 20 plant species in a single 3 m x 3 m vegetation analysis plot. Plant density varied considerably, from a single individual of one species to multiple trees and shrub-size individuals of other species. The property is very narrow at this location, and impacts to this vegetative community included disturbance along the property line with The Tuscany and the unpaved, at-grade dirt road used to access the property. Photo 10.0 (Plot 10a) is representative of the Dry Broadleaf Evergreen Forest

DRAFT



Photo 10.0 Dry Broadleaf Evergreen Forest in Plot 10a View looking West
Date of Photo: March 14, 2024

Tree species of note in the Dry Broadleaf Evergreen Forest included Inagua silver top palms, poisonwood (*Metopium toxiferum*), long-leaf blolly (*Guapira discolor*), blackbead (*Pithecellobium keyense*), darling plum (*Reynosia septrionalis*) and others. Still, even the tallest were typically less than 20 feet in height.

Shrubs included the same species previously identified in the Dry Broadleaf Evergreen Shrubland, including black torch, cinnecord, pork and doughboy, darling plum, sea sage (*Lantana involucrata*), and others.

Epiphytes included Encyclia orchids and *Tillandsia* air plants, including *T. utriculata*. Vines included *Passiflora cupraea* and *Smilax havanensis.* Ground covers were mostly non-existent or minimally present because of shading.

No birds were heard or seen directly in this habitat, but that was likely the result of a combination of the patch of this vegetative community being so small and

being abutted by highly trafficked Grace Bay Drive. Northern mockingbirds and kestrels were seen flying over this community from south to north. Brown anoles, *Cerion,* and *Hemitrochus* snails were present.

Qualitative Condition of the Dry Broadleaf Forest.

This vegetative community was mostly rated "Fair" in quality and condition. Floral and faunal diversity was comparatively high, and several plant species designated as endemic or protected by international treaties were present. No residences, dwellings, other structures, or areas used for agriculture or other human-related purposes were encountered. Still, it was in a disturbed condition because it was so close to property boundaries on the south and west.

Scarified Lands

As described previously, a review of historical aerial photographs of the site indicates that a swath approximately 60 ft (~18m) near the western boundary of the property had been cleared of vegetation before the March 21, 2013, aerial was taken. Although invasive vegetation has become established in part of this area, approximately 3.0% (i.e., 0.18 Ac, 0.07 ha) of the Assessment Area remains barren and/or nearly devoid of vegetation (Photo 11.0).

Based on vehicle tracks, this area receives intermittent and occasional vehicular use, possibly by individuals seeking access to the beach and Grace Bay.

DRAFT



Photo 11.0 – Corridor of scarified lands near western property boundary View looking north toward Grace Bay – Date of Photo: March 12, 2024

Notable Landside Resources

As identified in Table 7.0, several faunal and floral species listed in "The Schedules" were observed on the site. Brief descriptions of each species' presence on the subject property follow.

The only non-bird animal species observed within the assessment area that is listed for conservation is the curly-tailed lizard (Leiocephalus psammodromus) (see the photo in Appendix L). This species is common on Providenciales and is not one of the less common subspecies that is found on the smaller out islands of the TCI. Several adults and juveniles of this species were often observed in Dry Broadleaf Evergreen Shrubland community areas.

Table 7.0
Notable Species of Flora and Fauna Designated by the Turks and Caicos Government that were observed on the Site[1]

Common Name	Scientific Name	Designating Entity	Designation	Abundance within the assessment area
Fauna				
Nyctanassa violacea	Yellow-crowned Night Heron	DECR	Common year-round resident	Uncommon, not likely to nest on the property
Sterna maxima	Royal Tern	DECR	Locally uncommon, both as a summer resident and winter resident; nests in colonies in offshore cays	Occasionally observed in flight over Grace Bay
Zenaida macroura	Mourning Dove	DECR	Common year-round resident	No evidence of nesting observed, but suitable nesting habitat exists on subject property
Columbina passerina	Common Ground Dove	DECR	Native resident bird	Nest w/ young observed on site
Crotophaga ani	*Smooth-billed Ani*	DECR	Native resident bird	Observed on nearby property in habitat that is present on the subject site
Falco sparverius	*American Kestrel*	DECR	Native resident bird	Saw & heard repeatedly; behaviour suggested potential nesting on nearby tract of vacant land
Dumetella carolinensis	*Gray Catbird*	DECR	Migratory species; nests in northerly latitudes.	Heard one individual in Dry Broadleaf Evergreen Shrubland

			Typically, in TCI fall-spring	
Mimus polyglottos	*Northern Mockingbird*	DECR	Common year-round resident	No evidence of nesting observed, but suitable nesting habitat exists on subject property
Flora	Scientific Name	Designating Entity	Designation	Abundance [1]
Encyclia rufa[2]	Rufous Encyclia	DECR	Lucayan Archipelago Endemic	Rare – Only noticed one cluster
Lantana involucrata	Sea Sage, Wild Sage	DECR	Lucayan Archipelago Endemic	Common
Coccothrinax inaguensis	Inagua Silver-top Palm	DECR IUCN	Lucayan Archipelago Endemic Near Threatened	Abundant
Euphorbia inaguensis	Wild Thyme	DECR	Lucayan Archipelago Endemic	Common
Varronia bahamensis	Bahama cocobey	DECR	Lucayan Archipelago Endemic	Uncommon
Encyclia altissima[3]	Tall Orchid	DECR	Native Plant of Special Conservation Concern	Uncommon
Pilocereus royenii	Dildo Cactus	DECR	Native Plant of Special Conservation Concern	Rare – Only saw one, in southern portion of Dry Broadleaf Evergreen Shrubland
Vachellia (fka *Acacia*[4]) *acuifera*	Pork-and-doughboy	DECR	Native Plant of Special Conservation Concern	Common

DRAFT

Vachellia (fka *Acacia*[4]) *coriophylla*	Leatherleaf Casha, Cinnecord	DECR IUCN	Native Plant of Special Conservation Concern Data Deficient	Uncommon
Sarcomphalus (fka *Ziziphus*[5]) *taylorii*	Taylor's jujube	DECR	Native Plant of Special Conservation Concern	Uncommon

[1] Abundance categories based on presence in 35 vegetation analysis plots (see Table 1 and Appendix F)

[2] Suspected ID based on leaf and pseudobulb size, needs verification during blooming season.

Lists of species of flora and fauna that are designated by the International Union for the Conservation of Nature and the Convention on International Trade in Endangered Species of Wild Fauna and Flora are included as Appendices B and C, respectively.

[4] Genus name *Acacia* in "The Schedules".

[5] Genus name *Ziziphus* in "The Schedules"

DRAFT

Species that are included on the IUCN and CITES lists for the Turks and Caicos Islands are included in Table 7.0. Species that were observed and/or are likely to occur on the subject site and/or within the sphere of influence of the project have been highlighted in the Appendices.

Additionally, columns have been added to the IUCN database to allow potential impacts to be identified as either "Direct" or "Indirect". Direct impacts are primarily landside plants where fill is proposed and faunal species whose habitats are proposed to be impacted. Impacts to individuals of these floral species could be ameliorated if plant salvage/relocation is undertaken.

None of the terrestrial species designated by the IUCN and observed on the subject property have designations of "Endangered". Of the 55 terrestrial species that are included in the IUCN list, and which were observed on the property and/or which have a reasonable likelihood of being present on the property at some time during the year have IUCN's designation as "Least Concern". One species (i.e., *Leiocephalus psammodromus*) is designated by IUCN as "Vulnerable", two species (i.e., *Coccothrinax inaguensis* and *Mosiera longipes*) are designated by IUCN as "Near Threatened", and one species (i.e., *Vachellia coriophylla*) is designated as "Data Deficient".

Species listed in one of the CITES Appendices and which were observed and/or are likely to occur on the subject site and/or within the sphere of influence of the project have also been highlighted in Table 7.0. Most of the species that are included on the CITES list for the TCI are also on the IUCN list.

Individuals of eight species of protected birds (see Table 3) were observed during the assessment. No bird nests (current or formerly used) were observed during the assessment. Still, potentially suitable foraging and nesting habitat appears to be present on the property for Antillean nighthawks, mourning doves, common ground doves, smooth-billed anis, kestrels and thick-billed vireos and bananaquits. Additional species of migratory birds (e.g., plovers, sandpipers, warblers) may also use portions of the property seasonally but were not observed during the March 2024 investigation.

The ten species of plants that are designated by the TCI Government in "The Schedules" as TCI Endemics, Lucayan Archipelago Endemics, or as a Native Plant of Special Conservation Concern were observed within the assessment area. Brief descriptions of the presence and abundance of these species within the Assessment Area follow.

Clusters of epiphytic *Encyclia* orchids were common on the property even though they only occurred in six of the 35 vegetation-monitoring plots. As noted previously, none were in bloom at the time of the assessment, so identification to species was not conclusive, but leaf, seed pods and pseudobulbs suggest populations of both *E. rufa* (Rufous *Encyclia*) and *E. altissima* (Tall Encyclia), are present. E. rufa, which is designated by DECR as a Lucayan Archipelago Endemic Plant was uncommon on the subject property, not being present in any of the 35 vegetation analysis plots. Specimens of what is likely *E. altissima* (Tall Encyclia) (see Photo 6, inserted previously), which is designated by DECR as a Native Plant of Special Conservation Concern, were very common, and were present in six of the 35 vegetation analysis plots. Both species were present in the Dry Broadleaf Evergreen Shrubland community.

Lantana involucrata (Sea Sage), designated by DECR as a Lucayan Archipelago Endemic Plant was common on the subject property, so common that it was not practical to record GPS Coordinates for each location. It was present in 7 of the 35 (25%) vegetation analysis plots, all in the Dry Broadleaf Evergreen Shrubland community.

Coccothrinax inaguensis (Inagua silver-top palm) (Photo 11), designated by DECR as a Lucayan Archipelago Endemic Plant was also so common on the subject property that it was not practical to record GPS coordinates for each plant. It was present in 13 of the 35 (~37%) vegetation analysis plots, in both the Dry Broadleaf Evergreen Forest community and the Dry Broadleaf Evergreen Shrubland community. None were in bloom during the March 2024 (dry season) investigation, but several had fruits.

DRAFT



Photo 12.0 Coccothrinax inaguensis – Date of Photo March 13, 2024

Euphorbia inaguensis (no common name) (Photo 12), designated by DECR as a Lucayan Archipelago Endemic Plant, was so common on the subject property that it was not practical to record GPS coordinates for each plant. It was present in 9 of the 35 (~33%) vegetation analysis plots, mainly in the Sand Strand and Dry Broadleaf Evergreen Shrubland communities.



Photo 13.0: *Coccothrinax inaguensis* – Date of Photo March 13, 2024

Bahama cocobey (*Varronia bahamensis*) designated by DECR as a Lucayan Endemic Plant was very uncommon – only a single plant was encountered, which was found in the Dry Broadleaf Evergreen Shrubland community.

Old Man Cactus, Dildo Cactus (*Pilocereus polygonus*), (Photo 14) identified as *P. royenii* in: The Schedules", was uncommon on the subject property. It was not present in any of the 35 vegetation analysis plots but was near Plot 8c.



Photo 14.0: Old Man Cactus (Pilocereus polygonus) – Date of Photo: March 14, 2024

Pork-and-Doughboy (*Vachellia* (fka *Acacia*) *acuifera* (Photo 15) is designated as a Native Plant of Special Conservation Concern by the TCI's Department of Environment and Coastal Resources. It was common on the subject property, present in 11 of 35 (31.4%) vegetation analysis plots. It was mostly present in the Dry Broadleaf Evergreen Shrubland but was also along the periphery of disturbed areas. Several were in bloom and/or with seed pods.



Photo 15.0: Seed pod of Pork-and-Doughboy – Vachellia (fka Acacia) aculifera
Date of Photo: March 14, 2024

Vachellia (*formerly Acacia*) *coriophylla* (Leatherleaf Casha, Cinnecord), shrubs were plants mostly less than 3 meters (~10 feet) in height. They were encountered in Dry Broadleaf Evergreen Shrubland community and were present in 4 of the 35 (~13%) of the vegetation analysis plots. None were observed in bloom, but several had ripening seed pods.



Photo 16.0: Seed pod of Cinnecord (Vachellia (fka Acacia) coriophylla
Date of Photo: March 12, 2024

Sarcomphalus (fka Ziziphus) taylorii shrubs were only encountered in the southern portions of the property, in both the Dry Broadleaf Evergreen Shrubland community and as sub-canopy shrubs in the Dry Broadleaf Evergreen Forest. They were uncommon, only present in 2 of the 35 (~5.7%) vegetation analysis plots.

Invasive Plants

Individuals of three of the six species of non-native plants that the TCI Government designates as invasive were observed on the property: Beefwood (*Casuarina equisetifolia*), (aka Australian pine, Casuarina), cow bush (*Leucaena leucocephala*) and beach cabbage (*Scaevola taccada*). The general locations and abundance of each of these are described hereafter.

Mature *Casuarina* trees (See Photo 6.0, previously) were common just landward of the un-vegetated sandy beach, extending in a shore-parallel corridor from the north property line to the south property line. They have been present (and dropping needles) for so long that the accumulated duff layer was several

inches thick and had acidified the surface soils to such an extent that few native plants were present under their canopy (Photo 16). They were mostly mature, seed-producing plants.



Photo 17.0: Thick mat of fallen Casuarina needles – Date of Photo: March 12, 2024

Mature cow bush trees (See Photo 5.0, previously) were present in 8 of the 35 (~22.9%) vegetation analysis plots. They were most abundant along the western part of the property, where they appear to have become established after that area had been cleared for the construction of Tuscany, the residential development immediately west of the subject site. Most were mature, seed-producing plants.

Beach cabbage plants (Photo 17.0) were also present in 8 of the 35 (~22.9%) vegetation analysis plots. They were present mostly in two areas: near the top of a dune along the Grace Bay frontage and along the western boundary of the property, where land clearing had occurred associated with the construction of The Tuscany. Although the re-rooting tendency of this species made counting

the number of individual plants a difficult task, at several locations, including Plot 9a below, they reached up to 85% cover.

In comparison, the native *Scaevola* (*S. plumieri*) was minimally present on the property (i.e., 3 of 35) (~8.8%) of the vegetation monitoring plots and was considerably less abundant than the invasive species.



***Photo 18.0: Dense Scaevola taccada* in Plot 9a – Date of Photo: March 14, 2024**

2.2.1.1 Quantitative assessment

The analyses of the plants present in the plots and the additional species encountered during the field assessment showed that the abundance of individual species varied considerably.

The 35 plots had the most abundant plant species: prickly saw-brier, Smilax havanensis (n=16), false myrtle, Stenostomum myrtifolia (n=14), dogwood,

Dodonaea viscosa (n=14), and narrowpod sensitive pea, *Chamaecrista lineata* (n=14).

Several species, particularly those that were encountered in the Dry Broadleaf Evergreen Forest were rare or uncommon within the Assessment Area, including strong-back, *Bourreria succulenta* (n=0), wild dilly, *Manilkara bahamensis* (n=0), and white cedar, *Tabebuia bahamensis* (n=0).

Despite the arid and harsh conditions, populations of epiphytic air plants varied considerably: *Tillandsia flexuosa* and *T.streptophylla* (n=9), and *T. utriculata* (n=2).

Although clusters of epiphytic orchids were categorized as "Uncommon" (n=6), `it should be noted that these species grow in clusters that varied in number from as few as five to more than 30 individual plants per cluster. The total population of *Encyclia* orchids on the property is estimated to be more than 1,000 plants. Because these species are TCI Endemics, Native Plants of Special Conservation Concern, and/or are susceptible to being collected from the wild, it is recommended that a salvage operation be undertaken before initiating land clearing.

One individual of a terrestrial orchid, *Eulophia graminea* (see photos in Appendix L) was encountered in the disturbed area near the western boundary. Despite its rarity on property, it is a non-native species and does not guarantee salvage.

Due to the comparatively sparse cover of native plants and the simultaneous common occurrence of invasive in the shoreward dune protection area, relocation of habitat-appropriate native plants into this zone is recommended.

2.2.2 Baseline Marine Environment

Data collected from diver surveys, satellite imagery, and review of underwater images are described below. The purpose of the investigation was to record the

existing conditions within the survey area, including habitat characterization, habitat mapping, species diversity, and habitat utilization.

2.2.2.1 Qualitative Analysis of the marine ecology

The benthic surveyed area was divided into two areas, nearshore and offshore. The Nearshore environment consisted of the beach shoreline up to one hundred meters (100m) seawards, and the offshore environment consisted of one hundred meters to five hundred meters (100m to 500m) seaward. Development activities would directly impact the near-shore environment, whereas construction activities will indirectly impact the offshore environment.

A qualitative analysis was completed for the offshore environments as the area is expected to be indirectly impacted and a quantitative analysis was completed for nearshore environments as the area may to be directly impacted.



Figure 7.0: Marine Benthic Surveyed Area Depicting Nearshore and Offshore Survey Areas

A qualitative analysis of the benthic habitat offshore was completed. Changes in benthic habitats were noted during the survey and the benthic description is listed below in the following sections.

Offshore Benthic Description

The following sections provide descriptions of the benthic habitats offshore of the surveyed area.

Due to the similarity in benthic habitat along transects, the habitats encountered were separated into one (1) generalized category and four (4) variations:

- Sandy bottom
  - Sand with rubble
  - Seagrass
  - Bare Sand
  - Algal-dominated sandy bottom

Overall, the benthic habitats appeared healthy and consisted of typical flora and fauna populations. Although human activity, in terms of boating traffic and beachgoers, was observed during the assessments, minimal human-related debris was observed. There was no evidence of degraded water quality.

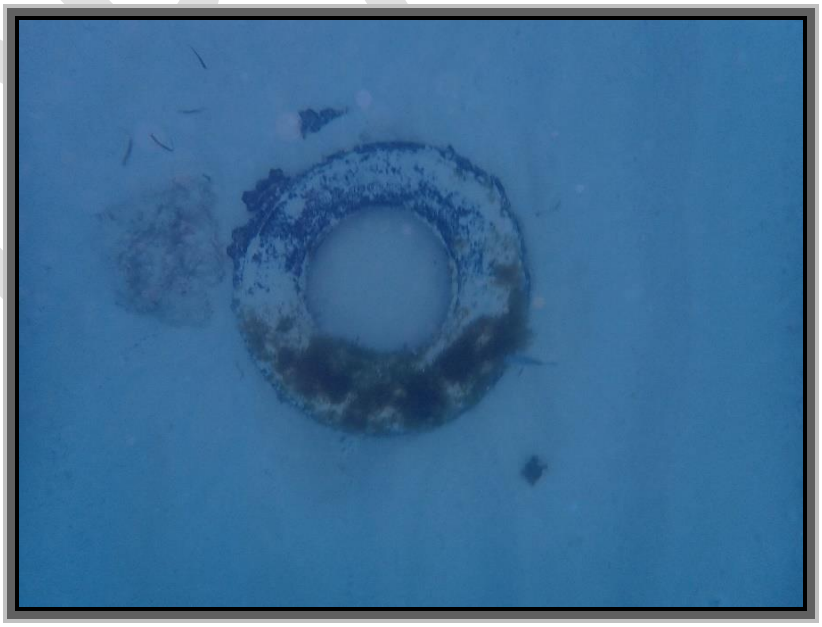


Photo 19.0: Tire observed in the marine ecosystem

Sandy bottom

The entire offshore benthic habitat was dominated by a variation of sandy bottom habitats, including algal-dominated sandy bottom, bare sand, seagrass, and sand with rubble. The least activity was observed in the bare sand and algal-dominated sandy bottom habitats.

Algal dominated Sandy bottom

The center of the surveyed area of the offshore area consisted of a sandy bottom dominated by macroalgae. Commonly observed macroalgae in this benthic habitat included the Slender Cartilage Weed (*Chondria capillaris*), and Sargassum (*Sargassum fluitan*).

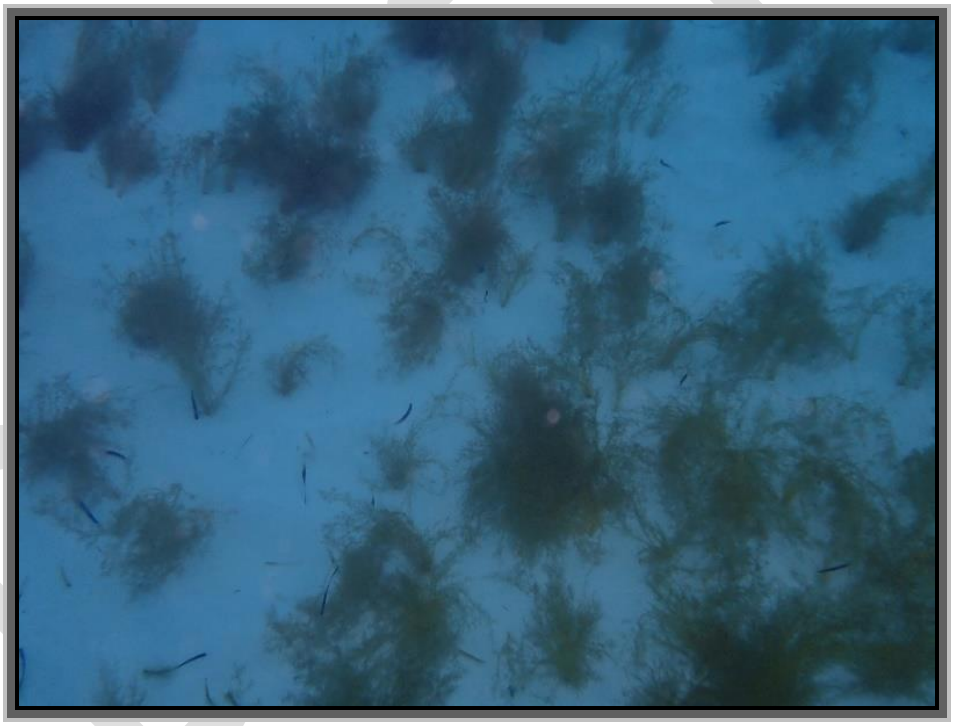


Photo 20.0: Algal-dominated sandy bottom habitat

Fish abundance was low in this area, with the only fish being observed were silversides[2] moving from one area to the next. No coral or other epifauna was observed in this habitat.

.

Seagrass

Seagrass beds were observed in patches throughout the offshore area. The seagrass areas mainly consisted of Turtle Grass (*Thalassia testudinum*), with sparse Manatee Grass (*Syringodium filiforme*) and moderate algae. Seagrass diversity was low, but the abundance varied from patches of only Turtle Grass (*Thalassia testudinum*) to Turtle Grass (*Thalassia testudinum*) dominated patches with little Manatee Grass (*Syringodium filiforme)*. The seagrass beds appear to be healthy and consist of floral and faunal populations that depict a healthy seagrass ecosystem. The seagrass ranged from sparse to moderate across the site and made-up eight percent (8%) of the offshore marine benthic habitat.

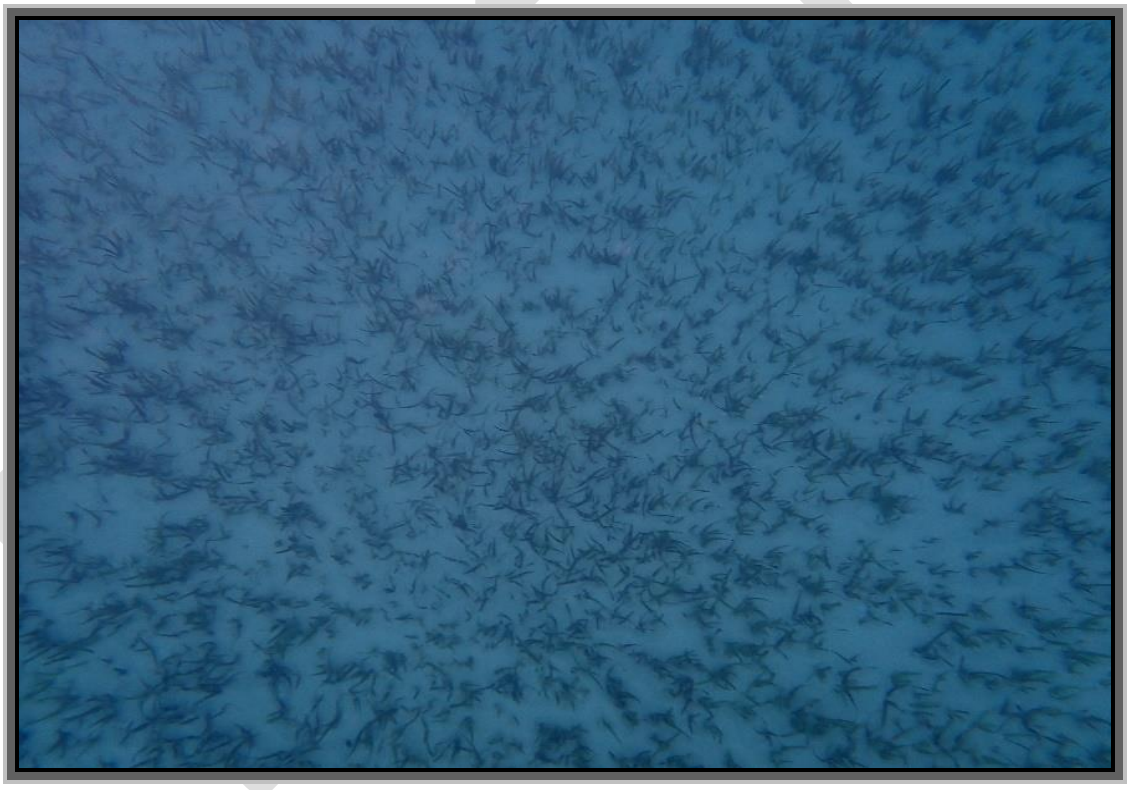


Photo 21.0: Sandy bottom with Turtle Grass (Thalassia testudinum)

No corals were observed in the seagrass and the only epifauna observed in the seagrass were Black Ball Sponges (*Ircinia strobilina*). Common macroalgae observed in the seagrass beds include Green Algae (*Halimeda spp.*), Mermaid's Shaving Brush (*Penicillus sp*.), *Laurencia sp*. and Spiny Seaweed (*Acanthophora spicifera*).

Bare sand

Bare sand patches were observed amongst the seagrass beds and algal-dominated sandy bottom. This benthic habitat made up sixty-one percent (61%) of the offshore marine benthic environment. There was no flora and little fauna observed in these patches. Fish species observed in this habitat moved from one area to the next.



Photo 22.0: Bare sand

Sand with rubble

Three locations on the northwestern and western sides of the site were observed to have sandy bottoms with rubble. The rubble consisted of small to medium-sized pebbles and stones. This benthic habitat was observed to have the most activity, as the crevices and cavities provided shelter for fauna species. This habitat made up twenty-seven percent (27%) of the offshore marine benthic environment.

Fish diversity was the highest in this habitat. Fish species observed included the Long Spined Squirrelfish (*Holocentrus rufus*), Blue Tangs (*Acanthurus coeruleu*), Ocean Surgeonfish (*Acanthurus bahianus*), Grey Snappers, (*Lutjanus griseus*) and Stoplight Parrotfish (*Sparisoma viride*).

Macroalgae was observed on some of the pebble and stones include *Laurencia sp.* and Spiny Seaweed (*Acanthophora spicifera*), and cyanobacteria. The only epifauna observed in this benthic habitat included Black Ball Sponge (*Ircinia strobilina*) and CZOO (*Cliona zooxanthellae*).

Coral was observed on the rubble. Species of corals observed included Elliptical Star Coral (*Dichocoenia stokesii*), Finger coral (*Porites porites*), Symmetrical Brain Coral (*Pseudodiploria strigosa*) and Mountainous Star Coral (*Orbicella faveolata*). All corals were observed to be dead.



Photo 23.0: Sandy bottom with rubble



Photo 24.0: Sandy bottom with rubble

2.2.2.1.2 Quantitative Analysis of the marine ecology

A quantitative analysis was completed for nearshore environments as construction activities may directly impact the area. Benthic habitats were noted, and GPS points (See Appendix J) were recorded. Percent Cover was used to analysis the nearshore benthic environment.

Nearshore benthic analysis

The entire nearshore benthic habitat (one hundred percent (100%)) consisted of bare sand. No flora was observed in this benthic habitat. It should be noted that visibility was poor during the assessment of the nearshore environment. This could be attributed to the windy conditions, choppy water, and high boating traffic. Due to poor visibility, no fauna was observed in the nearshore environment. It is our professional opinion that it's unlikely that epifauna will be in the area, and motile fish species would be limited to mainly fish species moving from one area to the next.



Photo 25.0: Bare Sand in the nearshore environment

Species List

Roving Diver visual fish surveys were conducted to identify fauna. Fish observed were identified and given a frequency rating (based on occurrence) of Single (1 individual), Few (2-10 individuals), Many (11-100 individuals), or Abundant (<100 individuals). Exact abundance counts along transects for each species observed can be found in Appendix J.

2.2.2.2 List of Fish Species

Six (6) species of fish were observed during the assessment. Significant fish activity was observed mainly around the sandy bottom with rubble, with little to no activity in the bare sand habitat. The fish observed were typical of a coastal marine ecosystem and varied in size classes from five centimeters (5cm) up to twenty centimeters (20cm).

Table 8.0: Fish Species observed during the assessment.

Scientific Name	Common Name	Abundance	
		Nearshore	Offshore
Holocentrus rufus	Long Spined Squirrelfish	None	Few
Sparisoma viride	Stoplight parrotfish	None	Single
Acanthurus bahianus	Ocean Surgeonfish	None	Few
Acanthurus coeruleus	Blue Tang	None	Few
Lutjanus synagris	Grey Snapper	None	Few
Family: Atherinidae, Clupeidae**	Silversides	None	Many

Note: The common name Silverside refers to a group of fish from several families usually found together. It isn't easy to distinguish any particular species in a large group.



Photo 26.0: Long-Spined Squirrelfish (Holocentrus rufus)

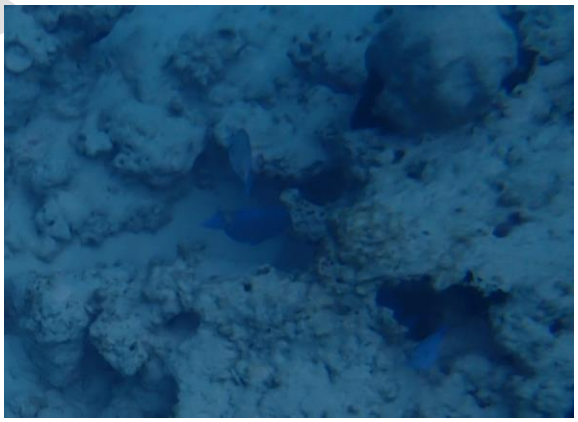


Photo 27.0: Blue tang (Acanthurus coeruleus) and Ocean Surgeonfish (Acanthurus Bahianus)

2.2.2.3 List of Coral Species

Divers observed species diversity, general abundance, and overall health by snorkeling along transects and photographing to confirm conditions. Most coral species were observed in rubble. Four (4) species of coral were observed. All stony corals were dead, and no soft coral was observed during the assessment. The most dominant were the *Porities porites* (Finger Coral).

Table 9.0: Coral species observed during the assessment.

Scientific Name	Common Name	Abundance	
		Nearshore	Offshore
Porites porites	Finger Coral	None	Many
Orbicella faveolata	Mountainous Star Coral	None	Many
Dichocoenia stokesii	Elliptical Star Coral	None	Single
Pseudodiploria strigosa	Symmetrical Brain Corla	None	Single

DRAFT



Photo 28.0: Mountainous Star Coral (Oribicella faveolata) Skeleton

2.2.2.4 Other Fauna and Epifauna

Most of the epifauna species were found either on the sea floor or on rocks on the seafloor. Most other fauna and epifauna were observed in the offshore benthic habitat. Two (2) other fauna and epifauna were observed during the assessment.

Table 10.0: Other Fauna and Epifauna observed during the assessment.

Scientific Name	Common Name	Abundance	
		Nearshore	Offshore
Cliona zooxanthellae	CZOO	None	Few
Ircinia strobilina	Black Ball Sponge	None	Few

2.2.2.5 Flora algae, seagrass, and seaweed species

Flora species were observed in abundance throughout the surveyed area. There were fourteen (14) flora species observed.

Table 11.0: Flora Species observed during the assessment.

Scientific Name	Common Name
Thalassia testudinum	Turtle Grass
Syringodium filiforme	Manatee Grass
Halimeda spp.	Green Algae
Halimeda monile	Jointed Stalk Algae
Halimeda incrassate	Three-finger Leaf Alga
Penicillus capitatus	Mermaid Shaving Brush Algae
Penicillus dumetosus	Bristle Ball Brush
Sargassum fluitans	Sargassum
Udotea sp.	Mermaid's Fan
Neomeris annulate	Fuzzy Finger algae
Chondria capillaris	Slender Cartilage Weed
Acanthophora spicifera	Spiny Seaweed
Laurencia sp.	Laurencia
N/A	Cynobacteria

2.2.2.6 Commercially Important, Endangered, and Protected Species

There were eleven (11) marine species observed during this assessment that are listed on the Convention on International Trade of Endangered Species (CITES) list and/or the International Union for Conservation of Nature (IUCN) Red List (see Table 12).

Generally, animals on the CITES list include threatened/endangered species and those that are commercially or economically valuable. The CITES listing group species are in Appendices I, II, and III. Appendix I lists species that are the most endangered among CITES-listed animals and plants, and Appendix II lists species that are not necessarily threatened with extinction. Still, trade must be controlled to avoid utilization incompatible with their survival. Appendix III lists species protected in at least one country that has asked other CITES Parties for assistance in controlling the trade. There were four (4) species observed during the assessment that are listed within CITES Appendix II.

Table 12.0: Commercially Important, Endangered, and Protected Species

Table 7 Key

LC = Least Concern (Conservation - IUCN)

NT = Near-Threatened (Conservation– IUCN)

CE = Critically Endangered (Conservation-IUCN)

DD = Data Deficient (Conservation-IUCN)

V = Vulnerable (Conservation- IUCN)

Scientific Name	Common Name	CITES Listing	IUCN Listing
Fish Species			
Sparisoma viride	Stoplight parrotfish	N/A	LC
Acanthurus bahianus	Ocean Surgeonfish	N/A	LC
Acanthurus coeruleus	Blue Tang	N/A	LC
Holocentrus rufus	Long Spined Squirrelfish	N/A	LC
Lutjanus griseus	Grey Snapper	N/A	LC
Corals			
Porites porites	Finger Coral	Appendix II	LC
Orbicella faveolate	Mountainous Star Coral	Appendix II	EN
Pseudodiploria strigose	Symmetrical Brain Coral	Appendix II	LC

Dichocoenia stokesii	Elliptical Star Coral	Appendix II	V
Marine Algae			
Thalassia testudinum	Turtle Grass	N/A	LC
Syringodium filiforme	Manatee Grass	N/A	LC

DRAFT

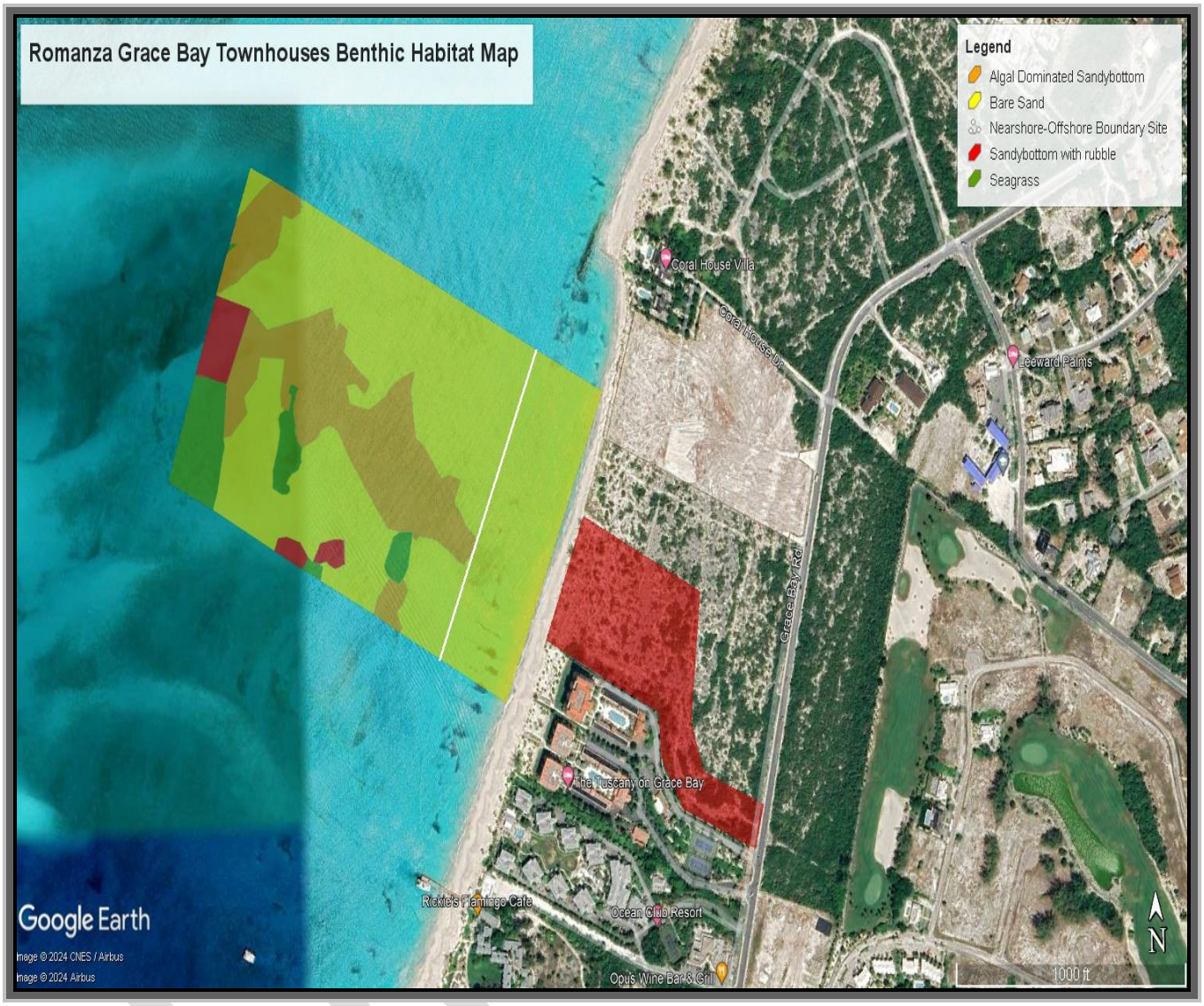


Figure 8.0: Benthic Habitat Map

Turtle Nesting Survey

There are six (6) species of marine sea turtle can be found throughout the Turks and Caicos Islands, including the Loggerhead Turtle (*Caretta caretta*), Green Turtle (*Chelonia mydas*), Leatherback Turtle (*Dermochelys coriacea*), Hawksbill Turtle (*Eretmochelys imbricata*), Kemp's Ridley Turtle (*Lepidochelys kempii*), and Olive Ridley Turtle (*Lepidochelys olivacea*). Of the six (6) species, the Green Turtle (*Chelonia mydas*) and Hawksbill Turtle (*Eretmochelys imbricata*) are observed foraging and nesting in the Turks and Caicos Islands (Eckert & Eckert, 2019).

There were no turtle nests or turtle tracks observed during the assessment. Previous Research suggests that nesting on Providenciales has declined, and nesting for these species is now limited to remote cays (Godley et al. (2004)). It is unlikely that the beach in front of The Project site is being used as a nesting site for either species; however, monitoring should be done during construction and post-construction to check for nesting activity on the beach. For both species, an additional nesting assessment should be done during peak nesting season.

Avian Assessment

No seabirds were observed during the assessment. This may be due to the windy conditions on the day of the assessment and the high boating traffic in the area. No nesting activity was observed along the beach in front of The Project site. The Project should not interfere with any seabird populations that may inhabit or utilize the area for foraging or nesting, as no work is scheduled for the beach or marine area.

DRAFT

2.3 Physical Environment Baseline Assessment

Data collection exercises were done to determine the topography, bathymetry, sediment type and water quality around the site. Wave climate databases were analysed to describe design wave events with an allocation for climate change impacts added. The physically collected data and statistical wave extracts were then used to simulate the wave climate in the wider area of Grace Bay. The results (described in this section and Section 2.2) were used to determine the design criteria for any proposed coastal works.

2.3.1 Topography of the area

The topography of the project site has a general elevation of less than ten-(10) feet above mean sea level and dips seaward from the landside. Localized high points occur randomly across the project site and appear to have been created during past earth moving exercises, namely land clearing and access road building.

2.3.2 Bathymetry for the site shoreline

Providenciales is located on a shallow bank with a fringing reef along the northern and western islands. To capture the bathymetry, satellite-based and physically surveyed data was used. Satellite elevation data was obtained from three sources: (i) the Gebco global bathymetry dataset for depths greater than 2000m offshore of the islands (ii) the DHI Bathymetry service, which provided large scale bathymetry for the islands of Providenciales and nearby cays and (iii) Satellite Derived Bathymetry from EOMAP for areas shallower than about 20m in depth.

DRAFT

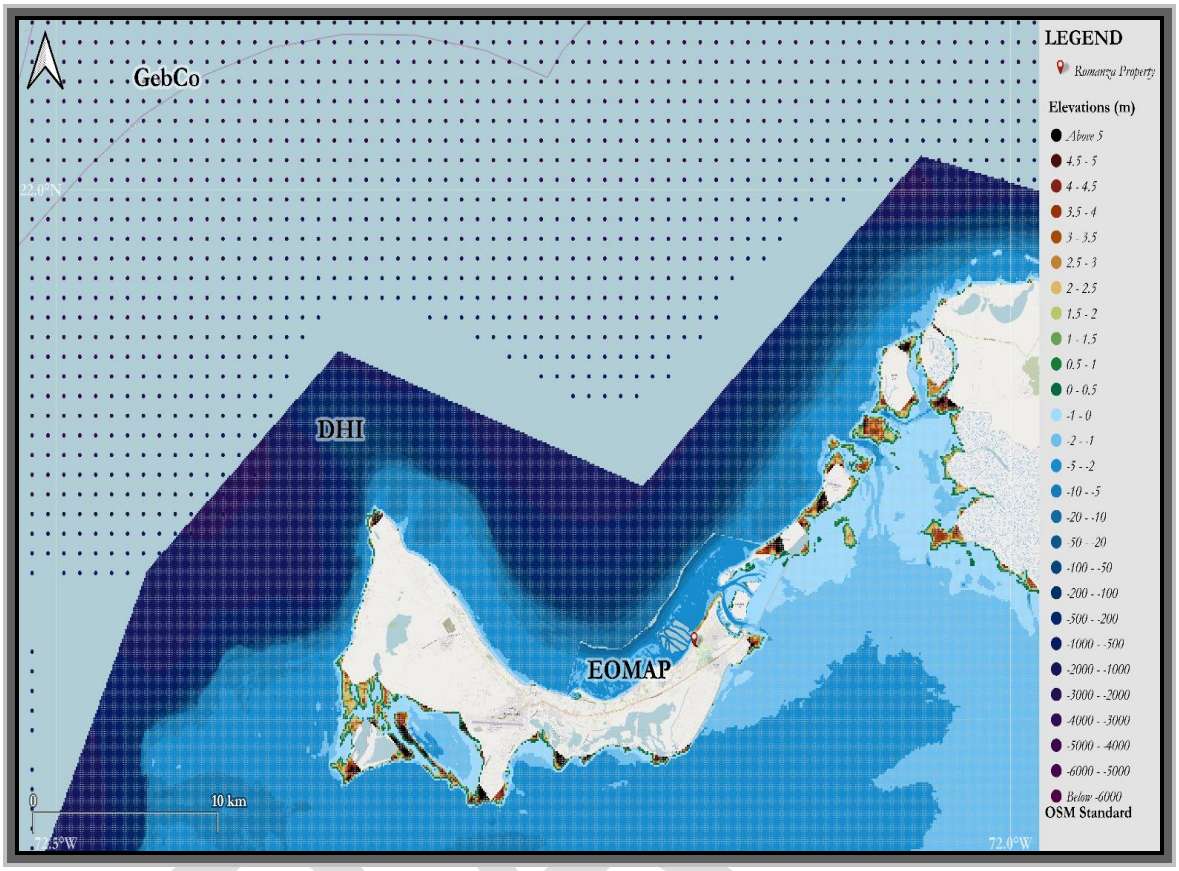


Figure 9.0: Deep water and shelf bathymetry points used for modelling of Providenciales.

Bathymetry and topography data points collected during on the ground surveys are shown in Figure 9.0.

Physical data collection was done using boat-based bathymetry survey techniques. The survey was conducted by fixing an echo sounder to a boat. The echo sounder then detected depths based on acoustic signals reflected on the seafloor. Horizontal positioning was measured using GPS equipment that was set to record horizontal position at the same time as the depth measurements. During the survey, the boat was used to traverse the nearshore zone making a series of tracks from just inside the reef in towards the shoreline, as shown in Figure 10.0. The area covered by the bathymetry tracks was about 1.5km wide (parallel to shoreline) and 1km long. Track depths were between 2m and 6m below MSL and reflected a gentle slope over the shelf of 1(vertical):600(horizontal).

Topography data was collected through beach profile and land surveys. A Real-Time Kinematic survey setup was used to measure profile points in an arbitrary 3-Dimensional space. Following the physical survey, data processing was done to vertically rectify the data to mean sea level (MSL) and to horizontally rectify the data to the Universal Transverse Mercator (UTM)18 coordinate system.

Nine (9) beach profiles were taken along the property with four taken outside of the property to capture the nearby beach slopes, as shown in Figure 10.0. Beach profiles covered an elevation range from 1.4m below MSL to 2.2m above MSL. The average beach slope along the property was 1(V):10(H). Towards the northeast, the slope was about 1(V):8(H) while towards the southwest the beach profile was a bit gentler at 1(V):12(H).

DRAFT

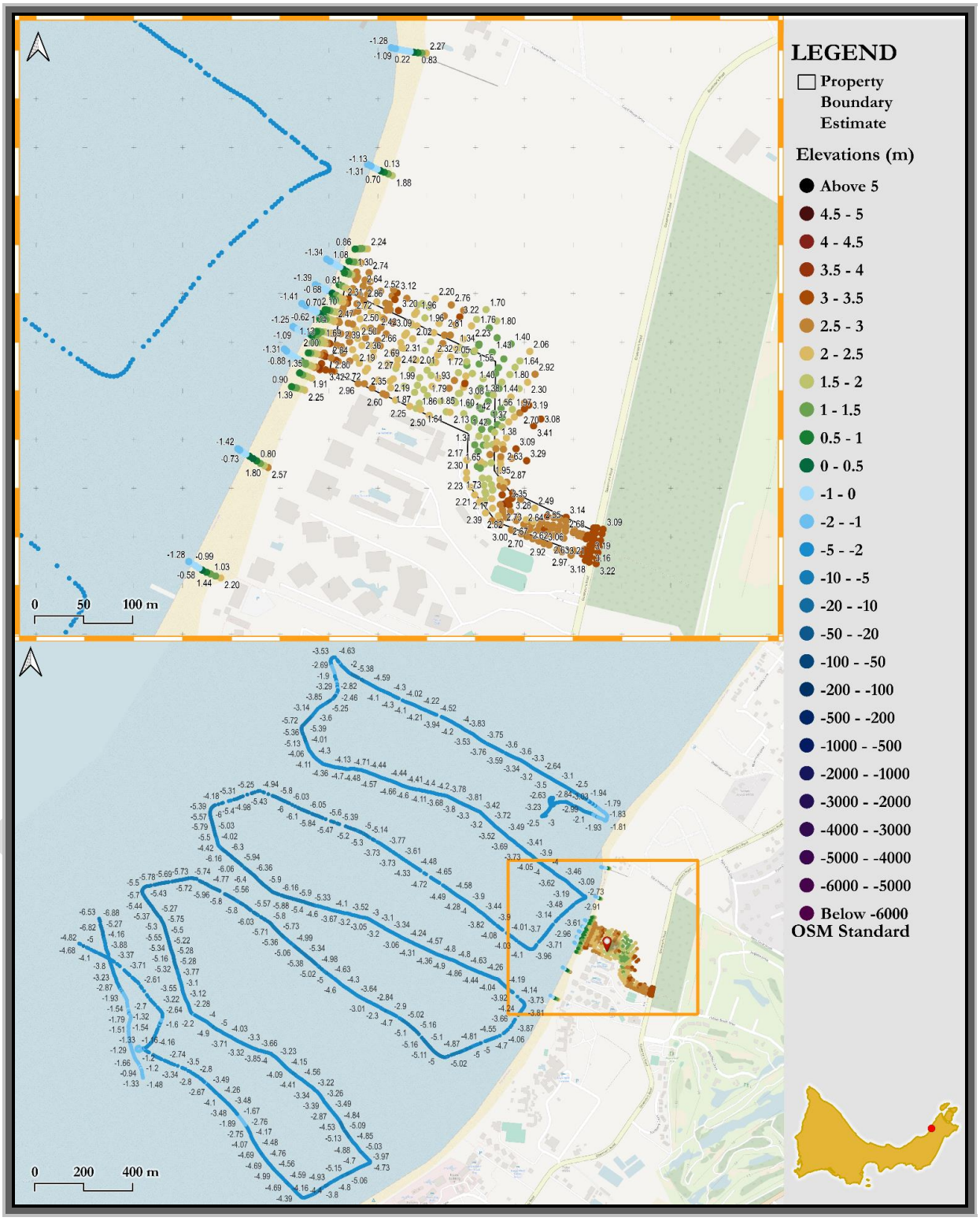


Figure 10.0: Topography and bathymetry points recorded during the data collection phase.

2.3.3 Geology

Carbonate formation dominates the geology of the proposed development site. Lithological descriptions of the subsurface geology to an average depth of 12 feet below ground level revealed a thin 16 inches layer of loosely compacted Holocene sand that transitioned to a well compacted and well cemented Limestone formation, Figure 11.0. Paleo soil zones were not observed in the excavated test pit. A soil penetrometer was used to measure soil bearing capacity at the test pit location 21°48'28" N / 72°09'56" W. The measured soil bearing capacity was 1460 kN/m^2.

2.3.4 Hydrology

The hydrogeology of the project site is characteristic of a classical Ghybeh-Hertzberg lens that is situated within the upper Lucayan formation. Recharge to the freshwater lens is derived from local rainfall. A thin freshwater lens approximately 8.5 feet thick was measured in the test pits. The average depth to the water table was measured at 44 inches and 39 inches at test pits 1 and 2, respectively. The depths to the water table in each test pit suggested that the direction of groundwater flow, at the time of measurements, was from inland outward towards the coastline. Groundwater flow is generally outward towards the coastline and is subjected to a swirling motion that is directly impacted by the semi-diurnal tides where two high tide and two low tide episodes occur over a 1-day period. Karst geology, surface water and fluvial features were not observed within the project site or the immediate and surrounding areas.

DRAFT



Figure 11.0: Subsurface Lithology



Figure 12.0: Subsurface Lithology

The development site is in a low-lying area susceptible to flooding during extreme rainfall events. During an extreme event, high rainfall intensity, low infiltration rates in the built-up areas, and high run-off coefficients can produce substantial run-off. The rational method was used to estimate the possible run-off that enters the site and flows towards the sea. The area of the catchment was 0.59 km2. The catchment area included the property and the neighbouring lots of Figure 12.0.

2.3.5 Sediment Analysis

Sand grains on a beach add to the aesthetics and comfort of a beach system. The grain sizes may also help in describing the transport patterns on the beach. To classify the sediment at Romanza, three samples were taken at different locations around the waterline. Sample 1 (SS1) was taken at the dry back of the beach, Sample 2 (SS2) was taken around the waterline where waves break, and Sample 3 (SS3) was taken in the nearshore. Following collection, these samples were sent to a geotechnical lab at the University of the West Indies (UWI), Mona to be visually inspected, air dried and subjected to a standard dry sieve analysis to determine their grain size distribution as well as other characteristic parameters. The results are summarized in Figure 12.0.

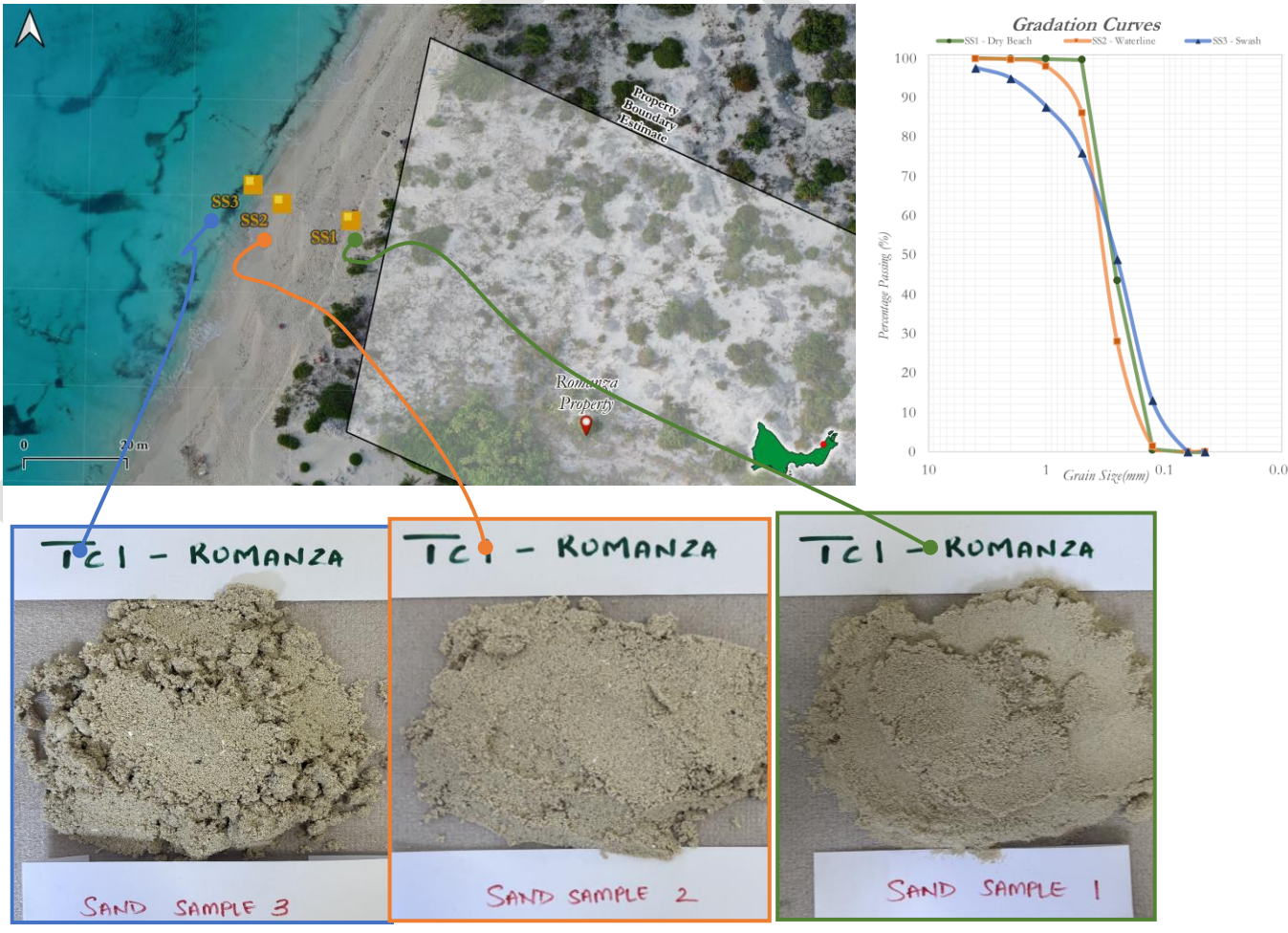


Figure 13.0: Sediment distribution sampling locations and pictures of samples taken

From a visual inspection all samples are light brown sand and are poorly graded. Poorly graded sand has similar sized grains across the entire sample, this is further shown in the grading curves which are steep thereby indicating little variation in grain size. The mean grain size (D_{50}) of each sample was also calculated and is compiled in Table 13.0.

Table 13.0: Sediment samples key diameters and sediment type percentages.

Specimen	Diameter (mm)				% Gravel	% Sand	% Silt	% Clay
	D_{50}	D_{60}	D_{30}	D_{10}				
SS1	0.279	0.324	0.211	0.152	0.1	99.9	0	
SS2	0.344	0.387	0.258	0.165	0.2	99.8	0	
SS3	0.259	0.351	0.184	0.111	5.1	94.8	0.1	

SS1 has a low mean grain size which is typical of the back of beach area and has been seen in previous projects on the island. At the back of beach area, sediment is generally transported by wind which carries finer sediment than breaking waves. SS2 was taken where waves break, and this action allows for larger grains to be churned up. There is more energy in this area which moves larger sediment. As a result, SS2 had the largest grain size of the three samples. SS3 had a grain size that was like the back of beach sample. The grain size is also fine which when combined with an active wave environment will generate significant sediment transport. Further investigations into the wave climate are explored in Section **Error! Reference source not found.**.

DRAFT

2.3.6 Climate and Meteorology

The hydrogeological environment of Providenciales can be described as a semi-arid tropical region, Figure 13.0 The climate conditions are characteristically long hot summers contrast with relatively cooler winter seasons. On average rainfall is relatively low (20 inches per year) and occurs mostly from August to December.

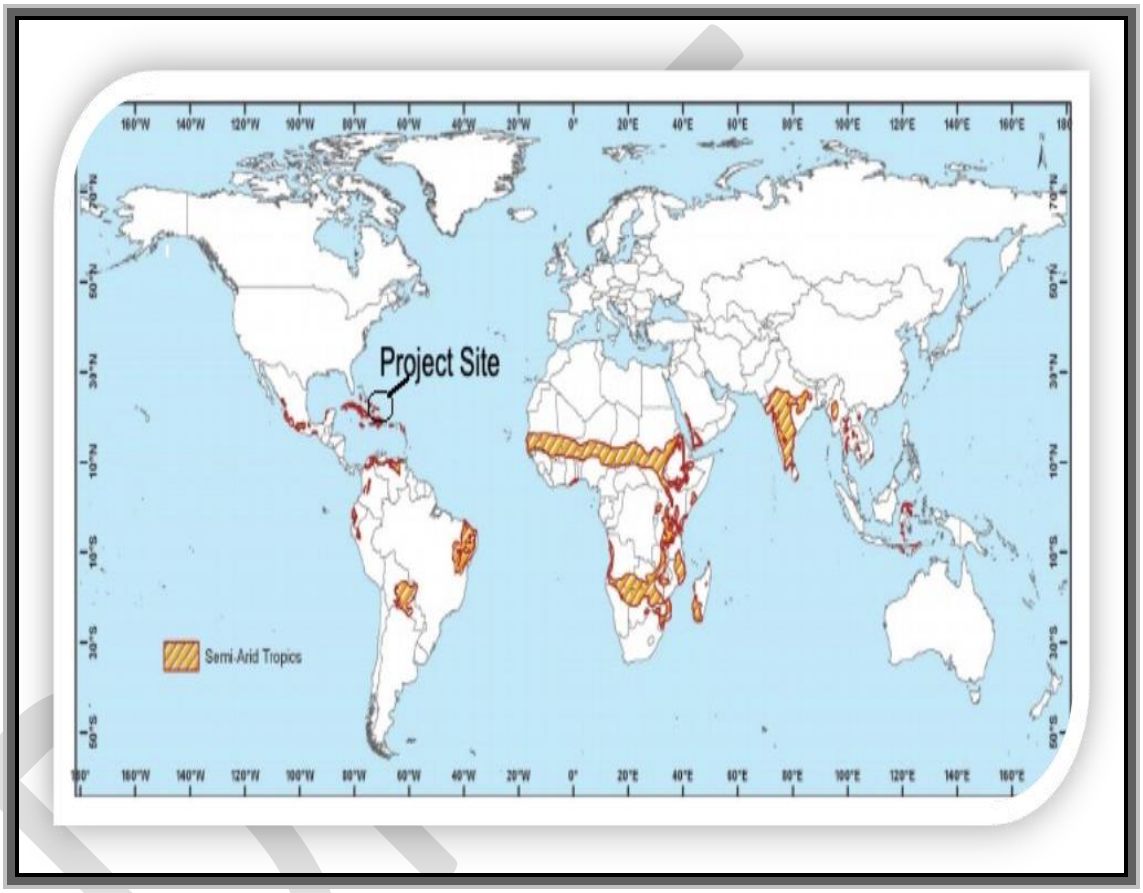


Figure 14.0: Semi-Arid Regions

Climate and meteorological data for the Turks and Caicos Islands are not directly monitored in real-time, instead, data is extrapolated from the southeastern Bahamas region that is monitored by the Bahamas Meteorological Department. Limited data suggests that the wet season extends from May to October and the dry season extends from November to April of each year. The hurricane season that extends from June through November directly impacts the rainfall amount that are derived from passing tropical depressions, tropical storms and hurricanes. The summer season is characterized by predominant southeasterly

winds and rainfall accumulation affected by intense events associated with the passage of tropical waves, tropical storms and hurricanes.

Historical meteorological data from the southeast Bahamas and Grand Turk (*Bahamas Meteorological Department - Bahamas Government*) suggests an average annual rainfall of approximately 28 inches with the greatest amount of rainfall occurring during the months of May and October each year. Temperatures average 29°C (85°F) in summer and 21°C (70°F) in winter. Maximum and minimum temperatures seldom exceed 32°C (90°F) or 16°C (60°F). Historical model data ***(source:*** *Meteoblue)* from 2009 to 2021 is illustrated below in Figure 14.0.

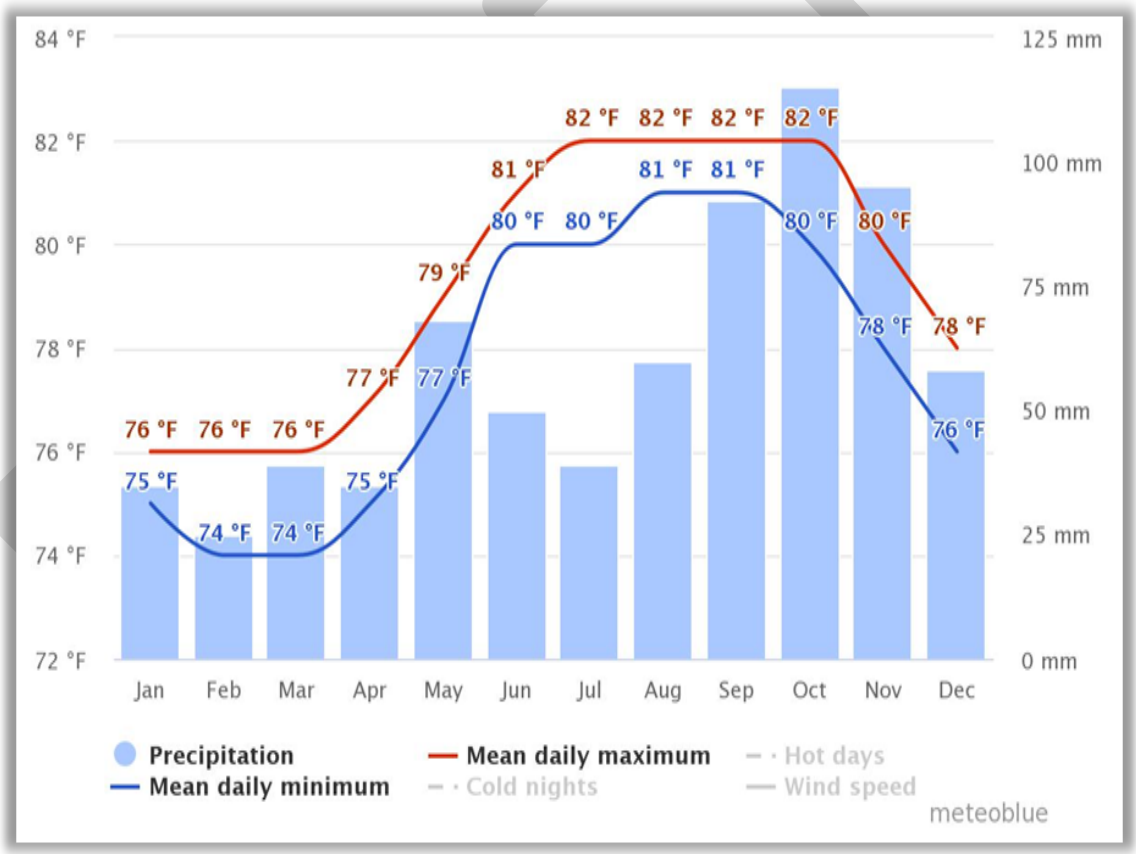


Figure 15.0: Historically Modeled Climate Data for Providenciales, TCI (2009-2021)

2.4 Baseline aesthetics

Aesthetics is a branch of philosophy dealing with the nature of beauty, art, and taste and with creation and appreciation of beauty. The aesthetic value of an area is based on the visual character and quality of the natural and human-made features of the area.

The baseline aesthetic assessment is defined by the major surrounding developments within the vicinity of the proposed development – bordered by Grace Bay Beach to the north, Grace Bay Road and the Royal Turks and Caicos Golf Club to the south, to the east is Leeward Palms Residential area and Leeward Development and to the west is Club Med as defined in Figure 15.0.

According to the National Physical Development Plan (2020), Grace Bay is the hub of Providenciales' tourism, clearly the most developed area of the island. It is a modern strip of development with a heavy emphasis on tourism, including hotel resorts, condominiums, restaurants, and retail stores.

The existing aesthetics quality of the area is characterized by the major high-rise developments in the area including Ocean Club East Resort, the Venetian on Grace Bay and The Tuscany on Grace Bay with floor levels rising between three to five stories. The Royal Turks and Caicos Golf Club is a dominant feature in the area and is a magnet for drawing visitors and economic activities to the area.

The Venetian on Grace Bay and the Tuscany on Grace Bay insert their bold European architecture character in the area. Other developments of significant architecture character in the study area include Coral House Villa, Coral Pavilion Villa. Leward Palms residential area, with modern low-density high-cost residences populated mainly by locals and the Leeward Development one of the oldest developments on Providenciales are extensions of the baseline study area.

DRAFT

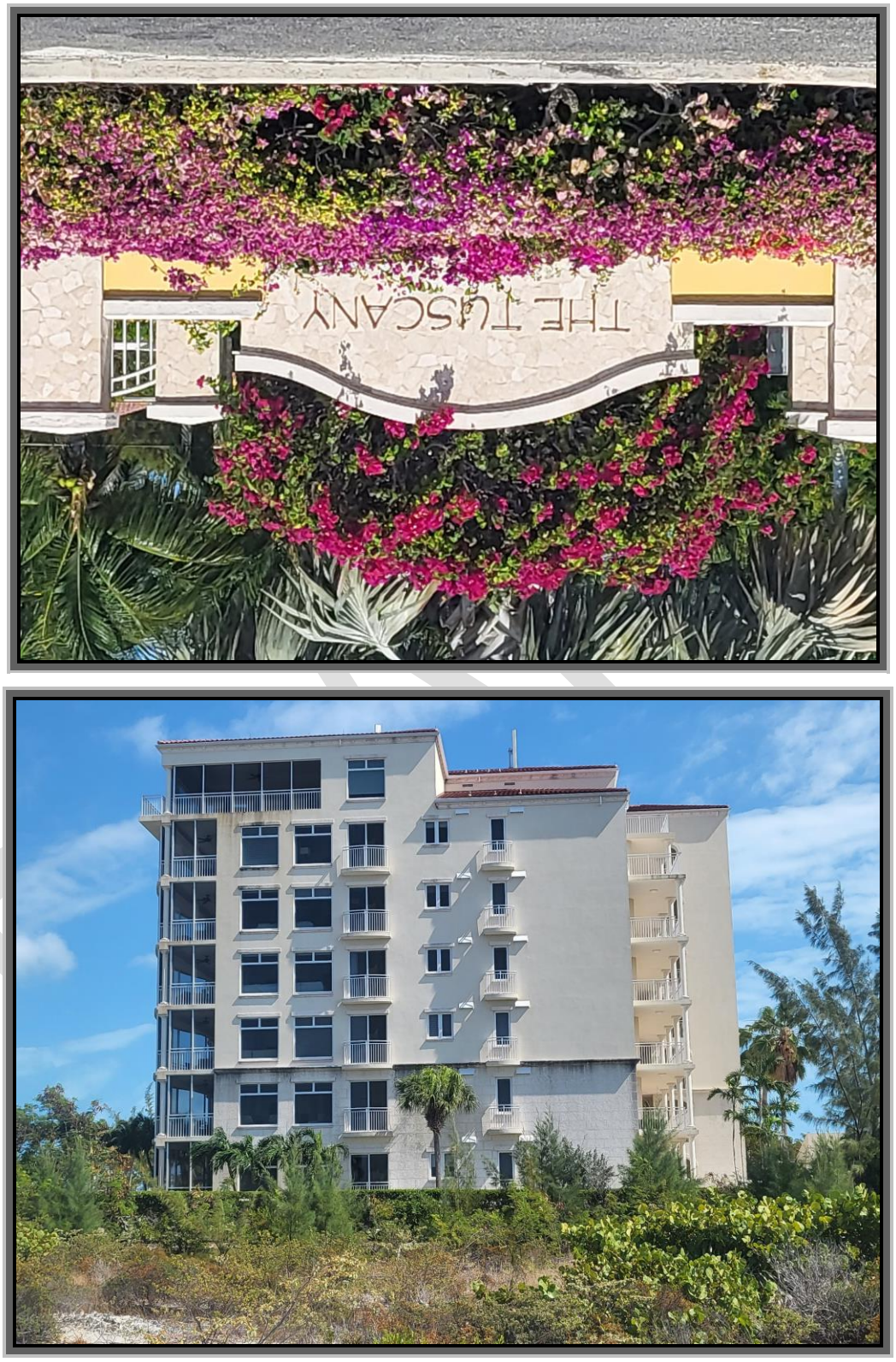


Photo 29.0: The adjacent Tuscany on Grace Bay Resort

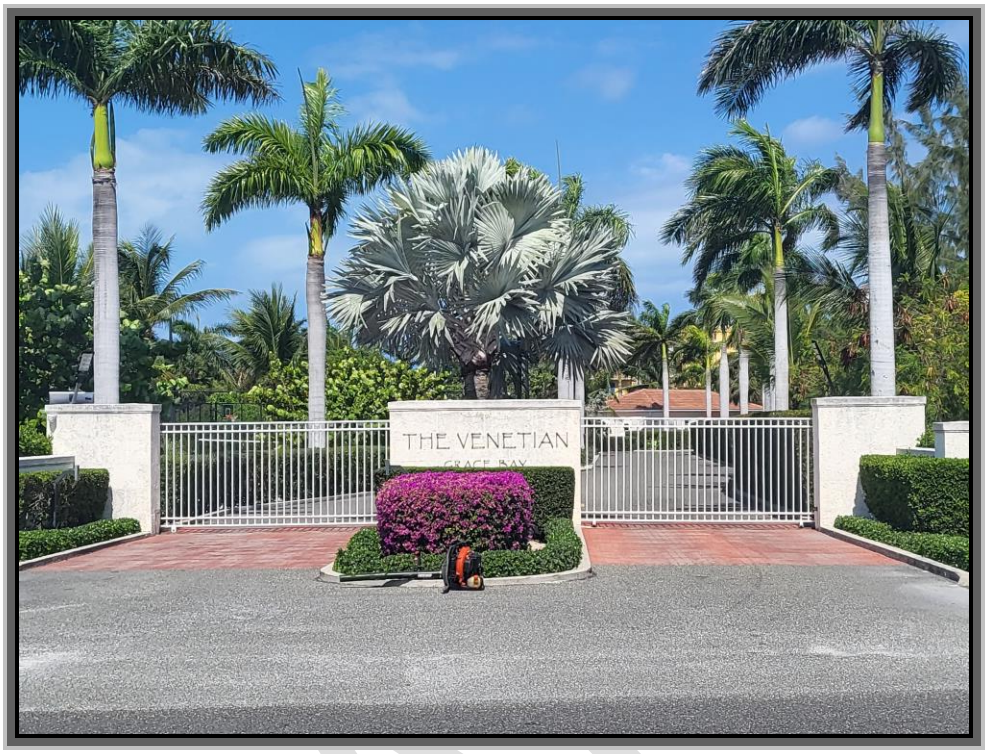




Photo 30.0: The Neighboring Venetian on Grace Bay Resort

Recognizing the growing importance of vertical high-rise development and the need for increased building densities, Providenciales Island Development Plan 2020 has the strip of beach front properties along Grace Bay beach from the east of the Venetian on Grace Bay Resort zoned for high-rise development.

The proposed Romanza on Grace Bay townhouse component of the development being 4-7 stories conforms with the existing building height of the adjacent development in the area, including Tuscany on Grace Bay and Venetian on Grace Bay resort development to the west., shown in the photographs below

DRAFT

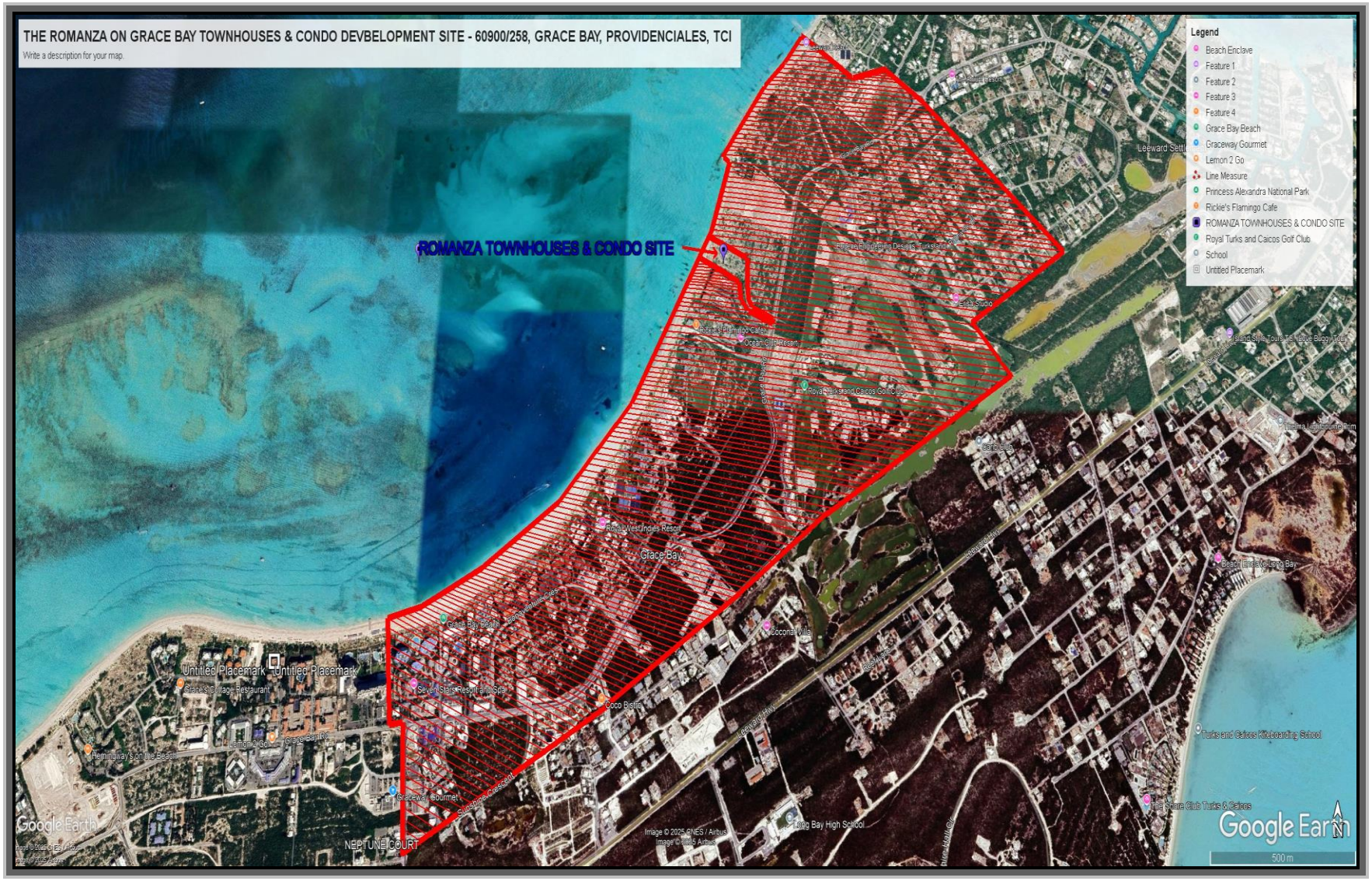


Figure 16.0: Boundaries of the Baseline Study Area for the Romanza on Grace Bay EIA

2.5 Baseline Coastal Processes and Dynamics

Sandy coastal environments, such as the shoreline along Grace Bay, are dynamic as they respond to wave events. To describe the wave processes at the coast, a few key scenarios have been investigated. The first is a look at general conditions at the property's beach which helps to indicate the long-term processes on the beach. Following this, significant erosive events are assessed by simulating a swell event in the area. Finally, severe events are examined by considering the hurricane wave climate and impacts on the property. The daily wave climate considerations are presented below in this section, the swell wave climate is shown in Section 2.5.1 and the hurricane wave climate is presented in Section 0.3.6

Daily wave climate

The operational wave climate at the project site is characterized by day-to-day, relatively calm conditions and by seasonal winter swells (December to May). The day-to-day conditions are created by the north-east Trade Winds. The seasonal swells, however, are generated by North Atlantic cold fronts and typically approach from the north to north-west sector. The waves then form a direct hit to the northern shoreline of Providenciales. Swell waves have longer periods thus leading to more aggressive wave conditions that can erode beaches and damage structures. It is these conditions that have the more profound impact on the site, even though, as a percentage of the year, their occurrence is relatively small.

The deep-water operational wave climate was established using the ECMWF Reanalysis v5 (ERA5) produced by the European Centre for Medium-range Weather Forecast (ECMWF). The ERA5 model reanalyses wave parameters including significant wave height, wave period, and mean wave direction as well as the wind speed and direction every hour from January-1979 to February 2024. These over 395,000 timesteps of data can be extracted at an enhanced resolution of ~31x31km (or ~0.25 deg) over the Caribbean.

Model data showed that waves offshore of Providenciales are predominantly from the north-east to east (occurring 90% of the time). The average wave height of the easterly waves is 1.4m with an average wave period of 7.8s. The ERA5 database was also searched for wind data over the period. The wind data extracted from the selected node indicated that winds tend to come from the

east with an average speed of 7m/s most of the year. Model wind directions agree with the literature review naming the easterly Trade Winds as the predominant winds in the area with an average magnitude of 7 m/s (Jury, 2013).

Figure 16.0 shows the wave height and wind speed distribution and the location of the node that was selected for the project.

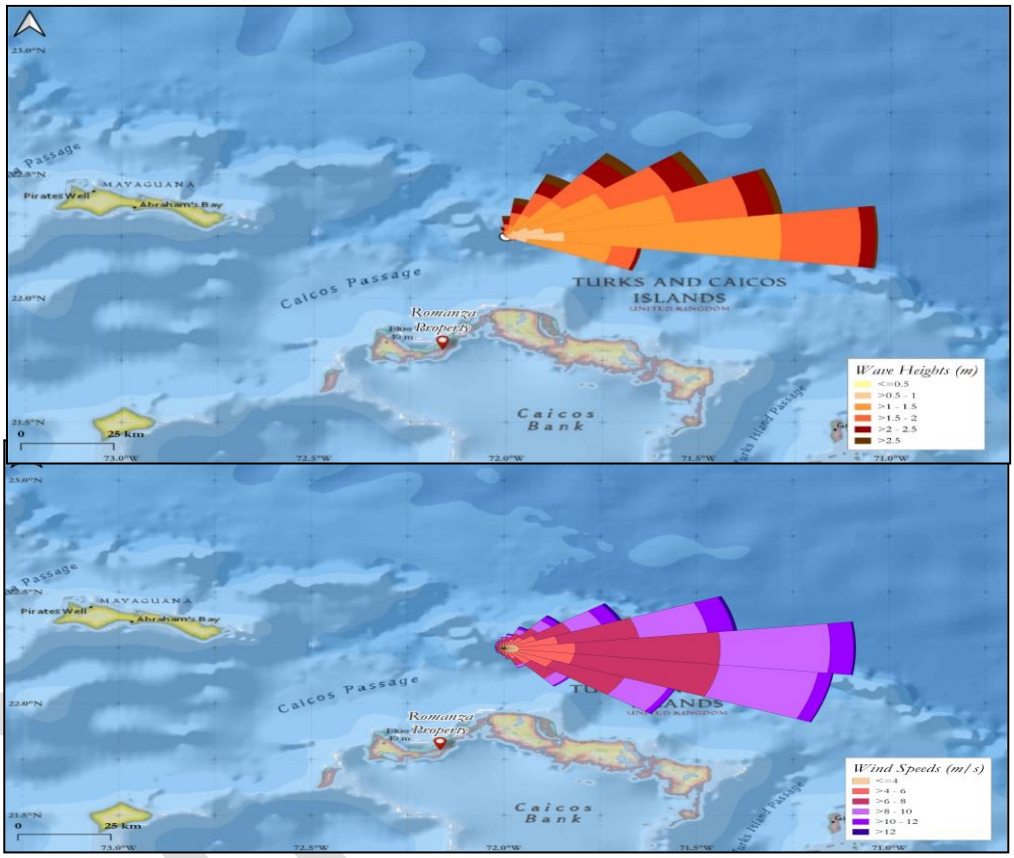


Figure 17.0: Offshore location where ERA5 data was extracted to describe the wave climate

The 44 years of wave data were analysed to determine how the offshore wave height data varied across the months of the year. The results are shown below in Figure 17.0. Wider shaded boxes indicate more wave height variance for a particular month. From November to April had the widest range of wave heights. Additionally, the average wave heights for each of these months was higher than for the rest of the year. Typically, the tourism season in the Caribbean falls between November and April. Currently the average wave heights are higher than the rest of the year (about 1.7m), however the outlier

conditions are less severe. The maximum wave height in the period was about 6.5m in the month of November.

Grey circles on the figure indicate the maximum 1% of waves for a selected month (over all data). July through to November had the highest top wave heights with September recording the highest outliers of wave conditions. This is to be expected as this period coincides with the hurricane season. Average monthly wave heights were between 1.2m and 1.75m across all the months. June had the lowest average wave height and the lowest range of values. The maximum condition overall was 9.7m which was related to the passage of Hurricane Irma in early September 2017.

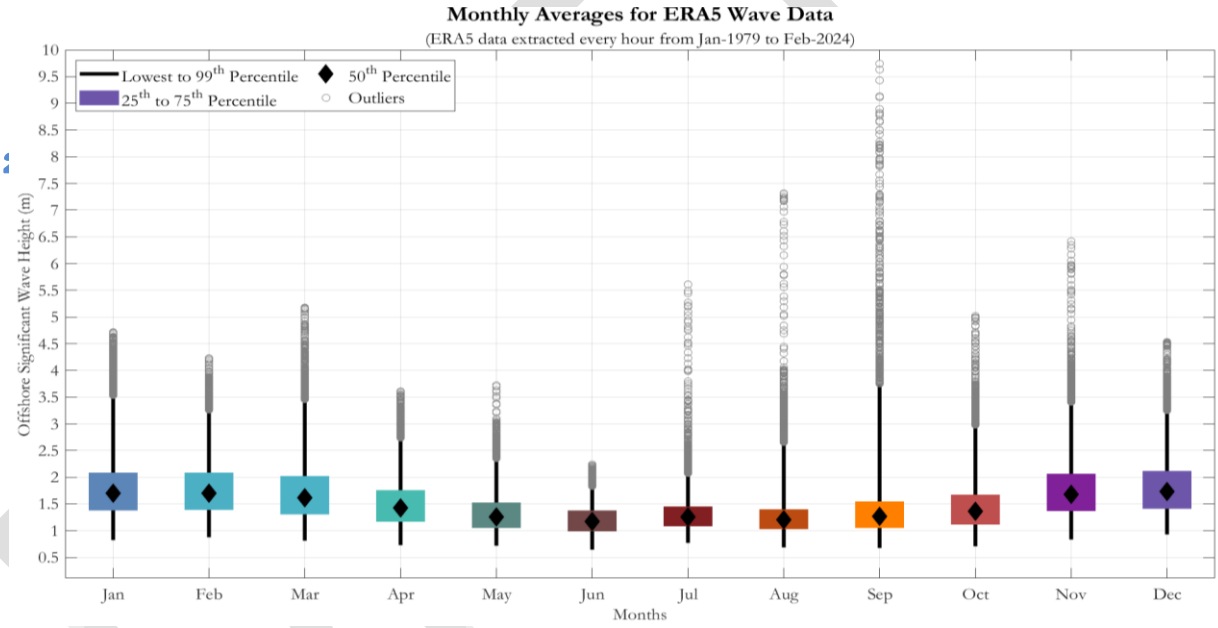


Figure 18.0 Monthly statistics of the data extracted from the ERA5 node used.

The mixed tidal signal within Grace Bay is described in detail in Section **Error! Reference source not found.**. The water elevation (tide) is important as it affects where the breaking of waves occur around the waterline. In the case of Providenciales, the tidal range is large enough to change the available recreational beach space throughout the day. Water level considerations were incorporated into the average wave climate analysis by first determining the distribution of waves across the tidal signal. Results of this analysis are shown in Figure 18.0 and Figure 19.0.

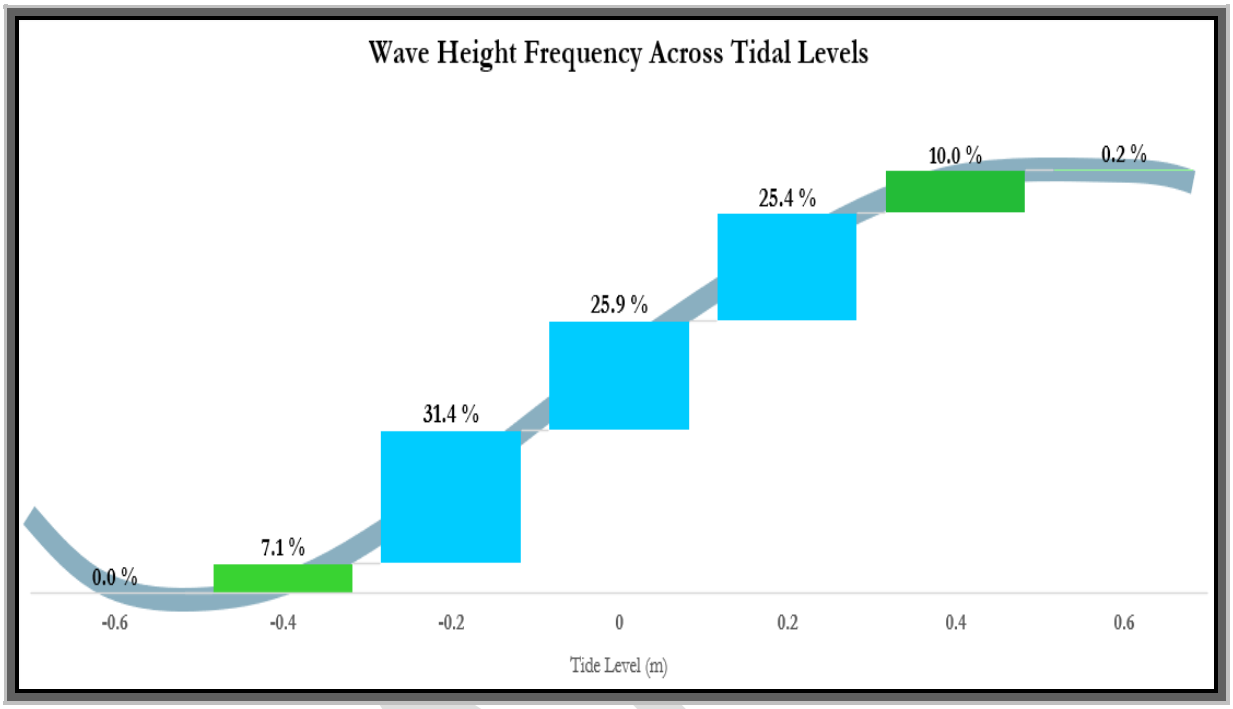


Figure 19.0: Summarised wave height distribution across 0.2m bins representing the tidal signal.

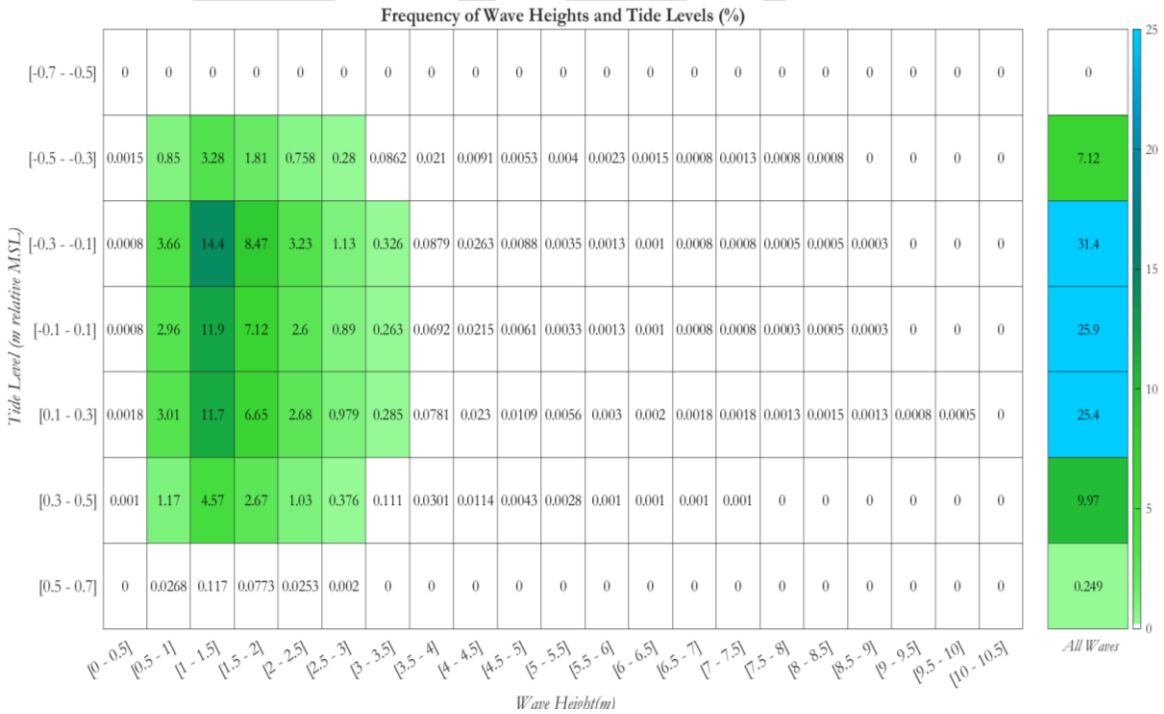


Figure 20.0: Wave height distribution across binned tidal data.

Wave heights were most frequent within the water level -0.2m bin (ranging between -0.3m and -0.1m). This highlights that there is asymmetry in the tidal signal. Wave height distributions were similar for the high tide bin (0.3m to 0.5m) and low tide bin (-0.5m to -0.3m).

The wave data obtained from the ERA5 node and tidal data were categorized using a quad-variate frequency analysis of wave height, period and direction, a process also known as "binning". This frequency analysis resulted in 1,845 different conditions or "events" representing a combination of wave height, peak period, wave direction and tidal level, each with a specific duration related to the number of occurrences over the 44-year period.

The ERA5 model is usually applied on spatial scales (grid increments) larger than 30km and outside the surf zone. As a result, the model alone is not at a sufficiently detailed scale to provide accurate nearshore wave data for the Romanza property. The project area's nearshore wave climate was therefore developed using a spectral wave model MIKE 21 SW (described in Appendix A) to simulate waves as they approach from the directions extracted and then move over the offshore bathymetry of the island to reach the project shoreline. The model was run in a semi-stationary mode with inputs of the wave heights, periods, and directions along the boundaries of the model domain. Boundary locations are shown in Appendix K.

The resulting nearshore wave climate data are plotted in Figure 16.0 as wave roses that show how wave heights vary across wave directions. Wave conditions have been extracted at five locations in the nearshore of the project site and by neighbouring properties. The points were in similar water depths of about 2m. The wave roses give a representation of the annual wave climate inclusive of swells. Overall results indicate that the wave directions do not vary significantly within the bay. For four out of five points the more western sector has larger waves with an average wave height of 0.3m. Other sectors have an average wave height of 0.1m.

DRAFT

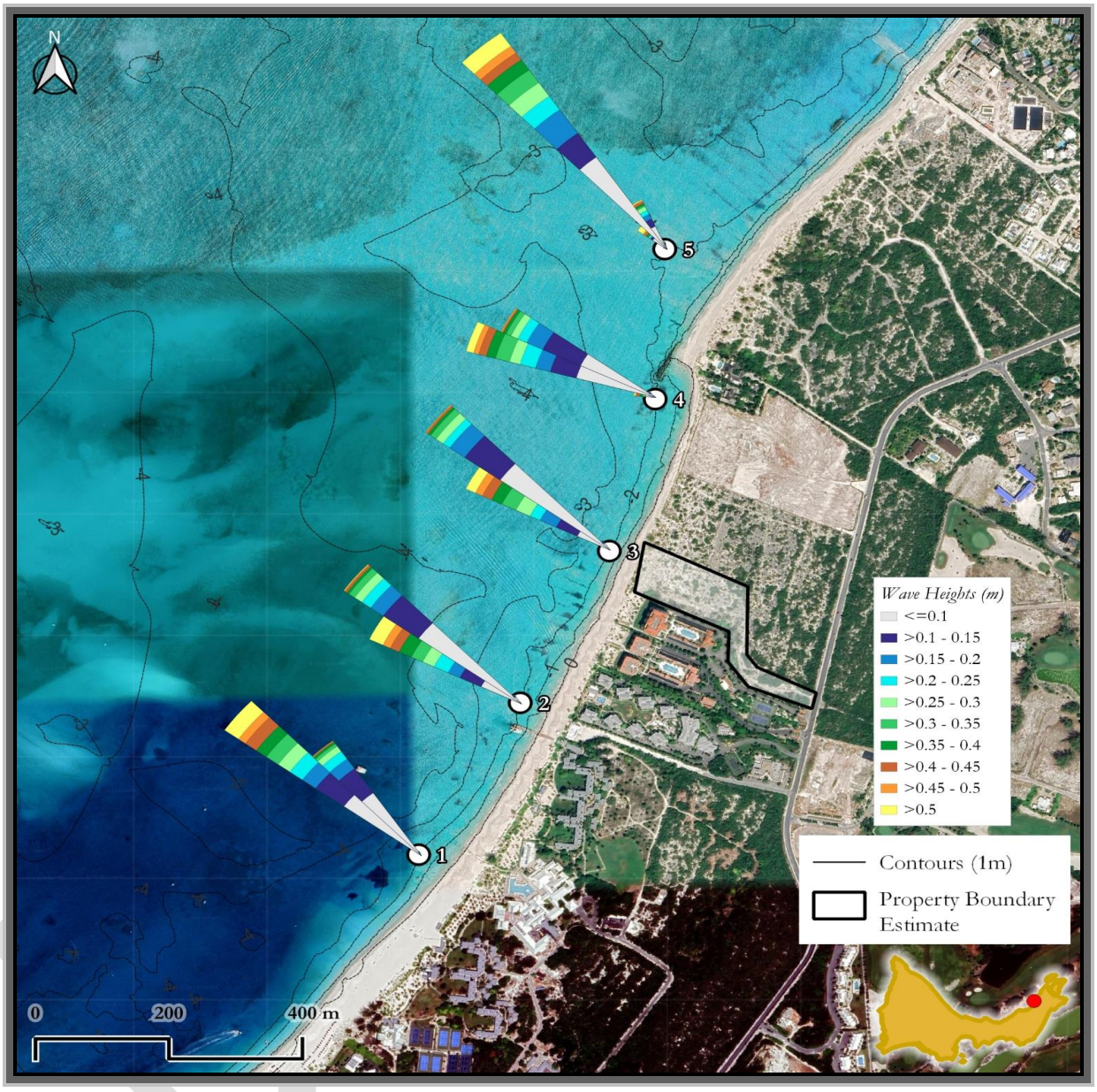


Figure 21.0: Nearshore wave roses (1 to 5) extracted from statistical binning simulations.

The offshore reef formation induces some partial breaking of waves which reduces the nearshore wave heights along the project area. The most south-westerly wave rose (1) shows that waves typically approach from the north-west sector with an average wave height of 0.15m and 99th percentile wave of 0.62m. Wave approach is generally perpendicular to the shoreline at this wave rose which could generate sediment drift from the waterline into the nearshore.

Wave roses 2 and 3 have a similar distribution. Wave rose 2 was extracted to the west of the property and Wave rose 3 was taken in front of the Romanza property. Both wave roses have an average wave height of 0.10m and 99th percentile wave height of about 0.60m. Extreme waves are slightly lower at Wave rose 3 however the difference between the 300m stretch is negligible.

Wave rose 4 was taken to the northeast of the property. At this location there is a T-head breakwater that has created a shadow zone with a beach that is narrower than nearby beaches. The breakwater has affected the shoreline orientation and nearshore waves. Wave rose 4 indicates a wave direction that is from the north-west and west-northwest. A very small percentage (about 1.3%) of high energy waves come directly from the west with wave heights up to 0.5m. Wave rose 4 has an average wave height of 0.10m.

Wave rose 5 was extracted about 500m to the north of the project site. The dominant direction was from the north-west with about 94% of waves coming from that direction. The average wave height was marginally higher than the other wave roses with a value of 0.13m. The 99th percentile wave height was 0.65m.

Key wave climate results are plotted in **Error! Reference source not found.** as maps. The figure shows the mean annual wave climate to the top and the 99th percentile waves to the bottom. The 99th percentile wave represents the conditions exceeded 1% of the time which is equivalent to approximately 4 days per year. This gives a representation of a more extreme wave climate inclusive of swells.

The mean annual climate shows that waves typically come from the north outside of the reef platform, the waves then refract over the seafloor and approach the project site from the north-west. Further to the west of the site, the mean wave direction is from the north. To the east, the mean wave direction is from the north-west which is similar to conditions by the site. Average wave heights outside of the reef were about 0.4m and they were 0.1m along the beach areas, which corresponds to the wave roses presented prior.

The simulation of the 99th percentile condition represents a possible strong swell event. Since the wave directions may be different for various wave heights, only the wave heights are plotted in the results. Generally, a perpendicular wave direction at the shoreline would produce the most erosion for the coasts and

may be assumed in this scenario. The 99th percentile waves show the effects of the gap in the reef to the west of the site. West of the shoreline larger waves can propagate further into the bay with the 1m waves about 0.8km away from the shoreline. The Romanza property benefits from edges of the reef platform in the 99th percentile condition. Waves of 1m height are about 1.5km away from the shoreline in this area. Within the nearshore band, waves are generally between 0.4m and 0.6m at the project site. To the north of the project site had higher waves propagating further onto the beach face with up to 0.6m in wave height.

The 99th percentile waves go up to the vegetation line which provides reasonable verification of extreme conditions when compared to physical features.

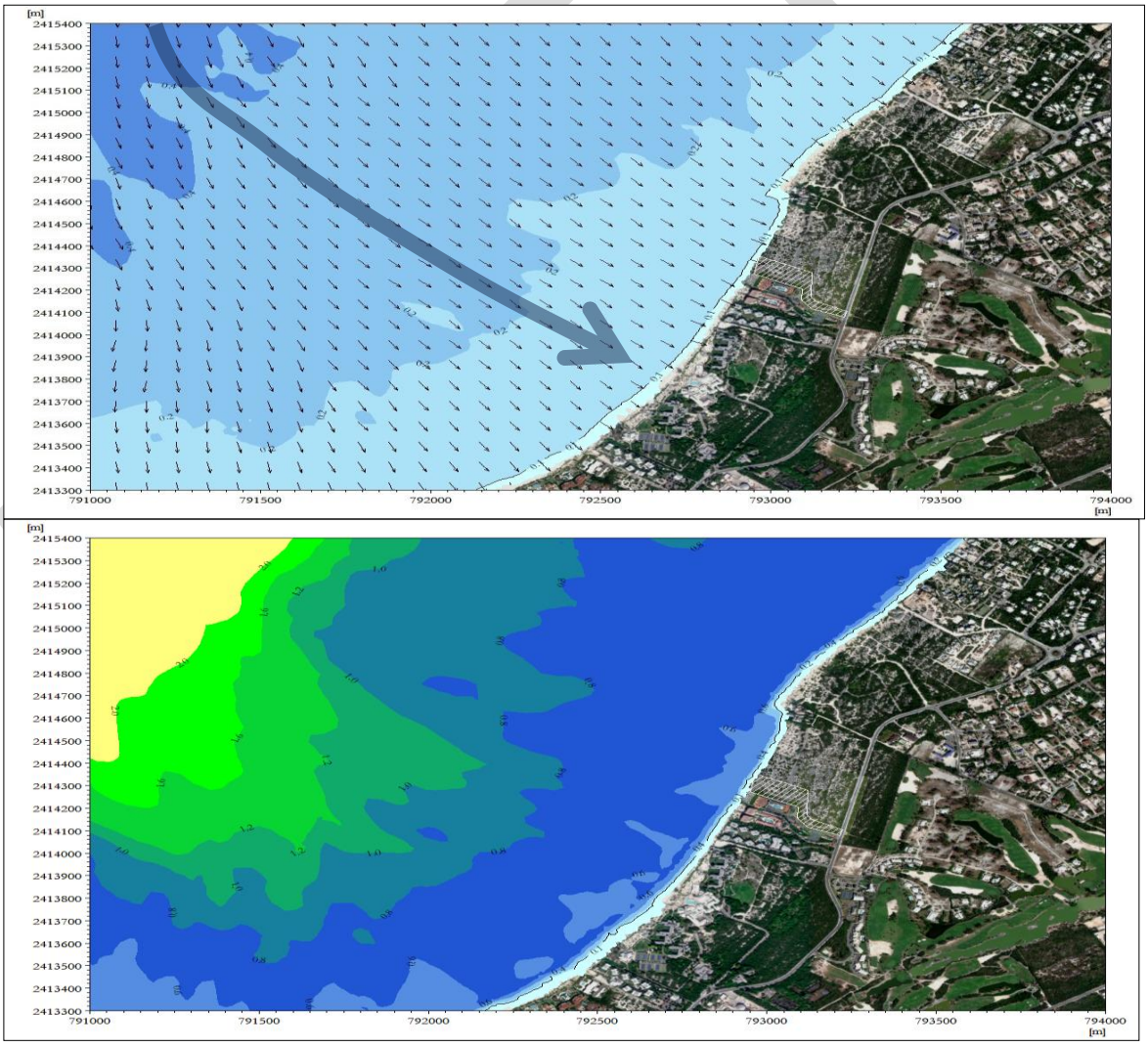


Figure 22.0: Daily wave climate Figure results for the average conditions (top) and 99th percentile waves (bottom).

2.5.1 Currents and tides

Based on a review of available literature, the main oceanic current stream around Turks and Caicos is the Antilles Current to the east. This current is a branch of the North Equatorial Current and runs from the Atlantic Ocean to Turks and Caicos in a north-western direction. Closer to Grand Bahama, it merges with the Gulf Stream by the eastern coast of North America. This current is said to be highly variable in magnitude, nutrient dense and rich in fish species such as Mahi Mahi.

The Antilles Current and surrounding streams are shown in Figure . The current is not studied as often as the stronger near Gulf Stream. In 2019, the variability of the ocean current was assessed for a period of over 10 years of current data which was measured with five different methodologies. Results indicated that there was no immediate seasonal link with the flow of the current, however, the flow was predominantly to the north-west in August to September (Meinen et al., 2019).

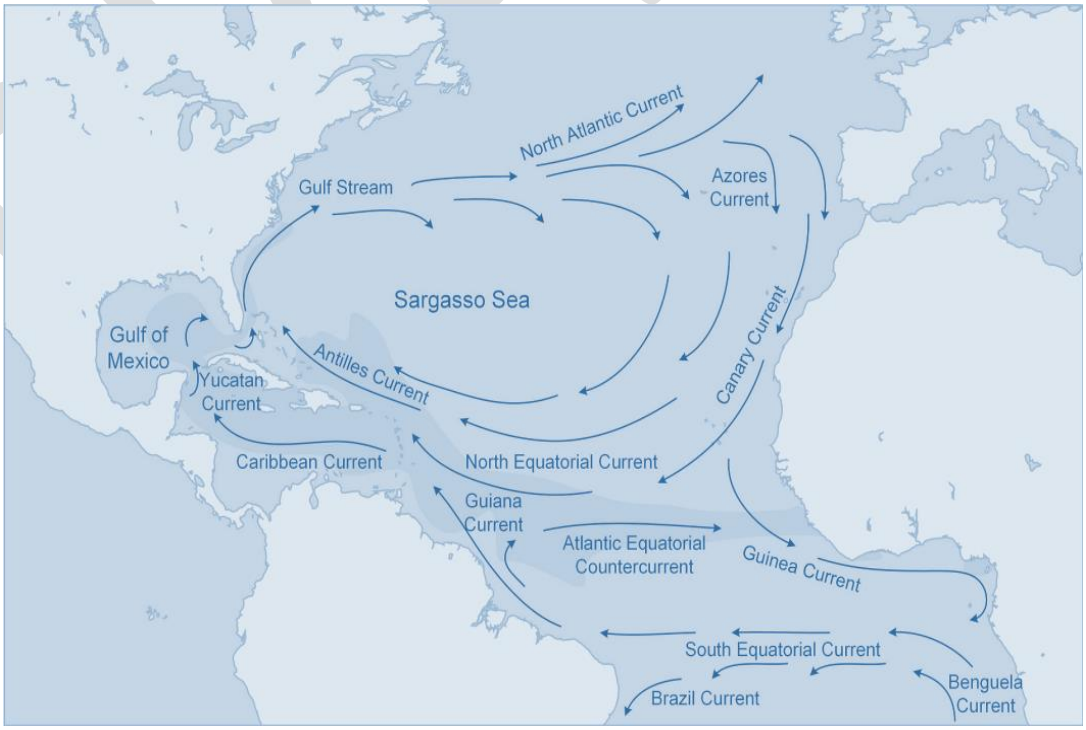


Figure 22.0: Dominant Ocean currents in the Northern Atlantic Ocean.

Global Tide Model

Global tide models have been developed by various research institutions and are generally accepted as sufficiently accurate for investigations of this size. Typically, these tide models are based on harmonic analyses of measured tide gauge data, or from processed satellite observations. An example of 28 days' worth of tidal data is shown in Figure 23.0. The tidal signal has an unequal semi-diurnal pattern. This means that over a day there are two high tides levels of different magnitudes and two low tide levels, also with different magnitudes. The signal and magnitude correspond to the general literature on the area which designates the regime as a micro-tidal (Sealey et al., 2019).

The tidal signal shown in figure 23.0 highlights the presence of spring and neap tides. During spring tides there is larger difference between the high tide levels in a day; while in a neap tide, the higher tide levels are closer in magnitude and generally half the magnitude of the neap tides. The tide signal changes from Spring to Neap every two weeks. Typically, the spring tides in the area vary between -0.4m and +0.5m (tidal range of 0.9m). Neap tidal levels are between 0.25m and -0.2m (0.45m tidal range).

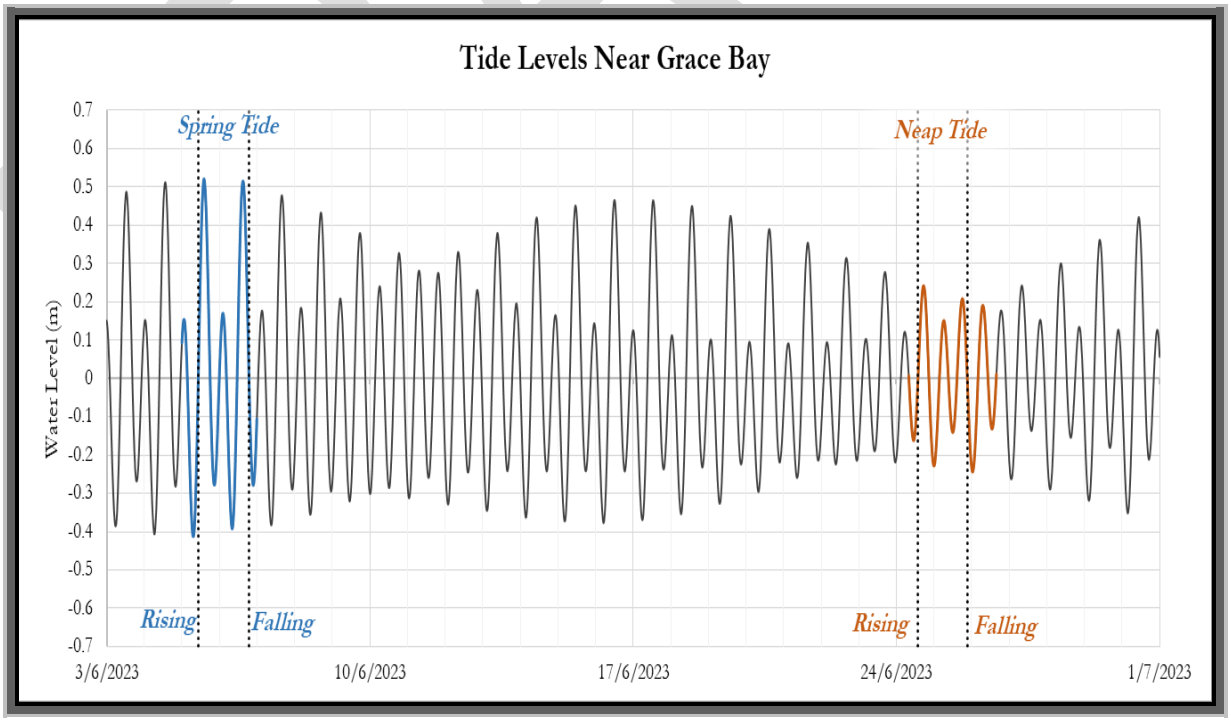


Figure Error! No text of specified style in document.4.0: Predicted tide levels near to Grace Bay in June of 2023.

Water levels from the global tide model were used as inputs to force a hydrodynamic numerical model and derive daily currents around the project area. Unfortunately, the global tide model does not capture the long-term and seasonal fluctuations of the Antilles Current. The contribution of oceanic currents on the nearshore current patterns is quite small and is therefore excluded from this analysis.

Nearshore Tidal Currents

Operational hydrodynamics were modelled over a 30-day simulation period to include both spring and neap tides throughout a monthly cycle. The simulation ran from June 1st to July 1st, 2023, which would reflect the variation shown in Figure 23.0. Inputs to the model were space- and time-varying water levels from the DTU tide model. Tidal water surface elevation ranged from a maximum of 0.51m in the spring signal to 0.2m in the neap signal. This combination was used to represent calmer wave conditions in the bay. This would highlight any areas that would have low currents and possibly poor circulation.

In addition to water levels, the corresponding wave data from the ERA 5 deep water wave model was used in the model. June was chosen because the wave data shows that this month typically has lower energy waves (previously shown in Figure 17.0). This would better isolate the possible tidal effects on the Grace Bay area. Deep water wave heights were an average of 1.1m and approached from the north-east and east sectors. The wave conditions near to the project site were like the average wave climate conditions, with wave heights between 0.05 and 0.3m in the nearshore.

Current speed and directions were extracted and plotted in Figure 24.0 and Figure 25.0 at different stages of the tide (ebb or falling tide and flood or rising tide) throughout the 30-day simulation period. The figures use a narrow scale with a range of 0.02 to 0.22m/s due to low currents speeds observed in the simulation. In subsequent sections of the report, swell event simulation results address higher current conditions.

During the simulated spring cycle (Figure 24.0) the following is noted:

- Current directions were very different between the rising and falling tide.

- During the rising tide, the current directions were moving towards the south offshore of the reef platform. Across the bank, the current directions moved in a northwest to southeast direction. Within a 400m zone of the waterline, the currents generally moved towards the southwest. To the north of the property, there was a small gyre and nearshore currents changed directions and moved towards the northeast.
- During the falling tide, the currents were generally focused through the gap in the reef. To the west of the project site, currents move towards the east then wrap back around to move towards the west-north-west bearing. To the north of the site, the currents move towards the west and eventually met up with previously described current stream at the break in the reef. In front of the project site a weak gyre occurs with currents generally moving towards the south-west.

- Current speeds were lower in the rising tide than the falling tide. During the rising tides, speeds were mainly below 0.04m/s. Higher currents were at the reef and likely related to waves partially breaking there; the speeds in this location were up to 0.06m/s. During falling tides, current speeds were up to 0.2m/s in the reef gap and about 0.06m/s at the project shoreline.

During the simulated neap cycle (Figure 25.0) the following is noted:

- Current directions were again different for the rising and falling.
  - During the rising tide, the current directions offshore were towards the south. Over the bank, the current directions changed to flow towards the east and then within the nearshore zone, the currents moved towards the northeast.
  - During the falling tide, the neap tide current directions were like those in the spring. Currents moved towards the gap in the reef then flowed out towards the west-northwest. Within the coastal zone of Romanza, the currents moved towards the northeast.

DRAFT

- Current speeds were very low for both the rising and falling tide. Generally, the speeds were below 0.02m/s for both instances.

Generally, the results showing overall very low currents (with some higher currents at the reef) could indicate that the tidal regime in the wider study area is governed by wave breaking and has a smaller impact from tidal currents. Further investigations into wave generated currents will be explored in subsequent sections.

DRAFT

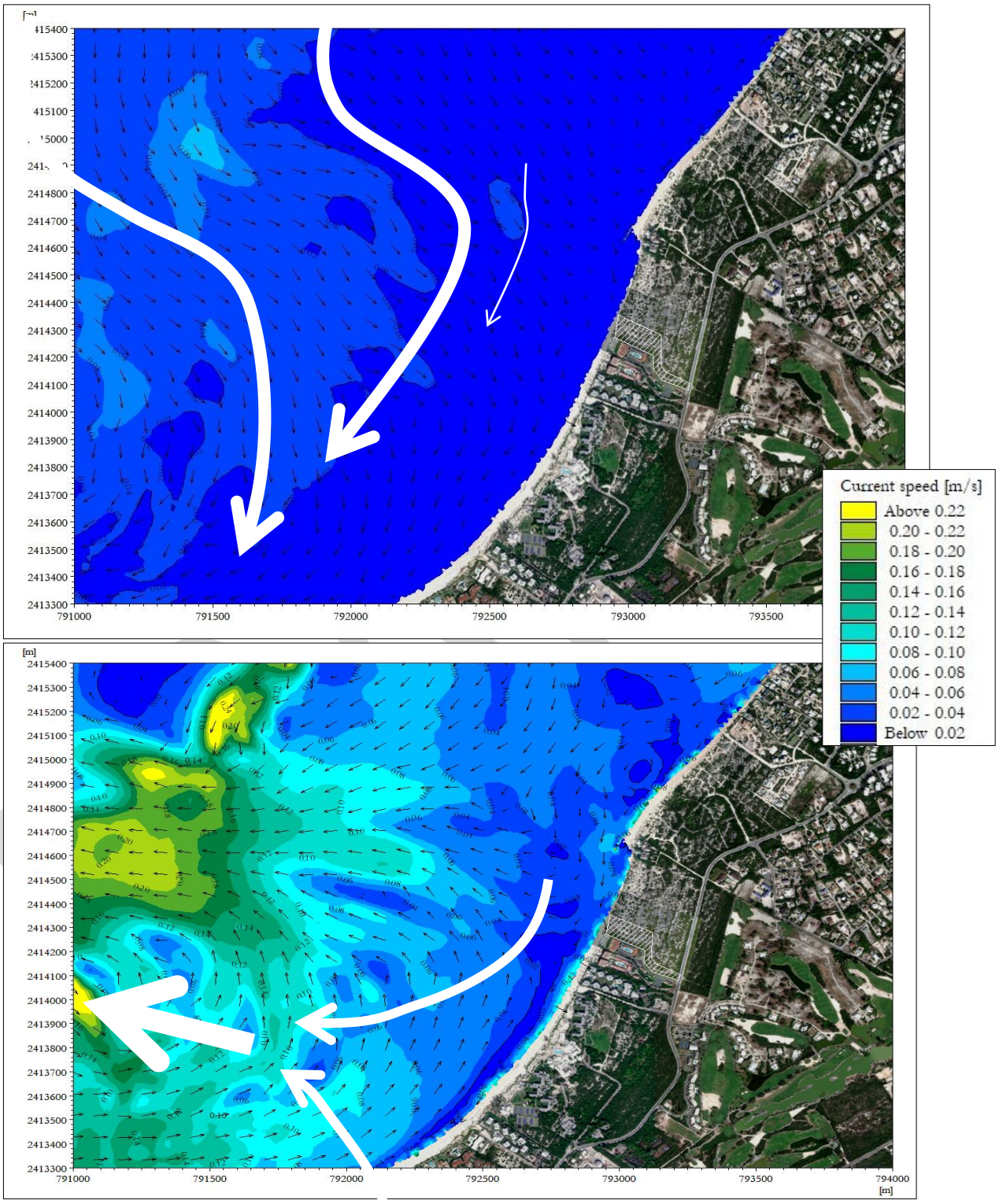


Figure Error! No text of specified style in document.5.0: Current speeds and patterns during the spring tidal signal (rising above, falling below).

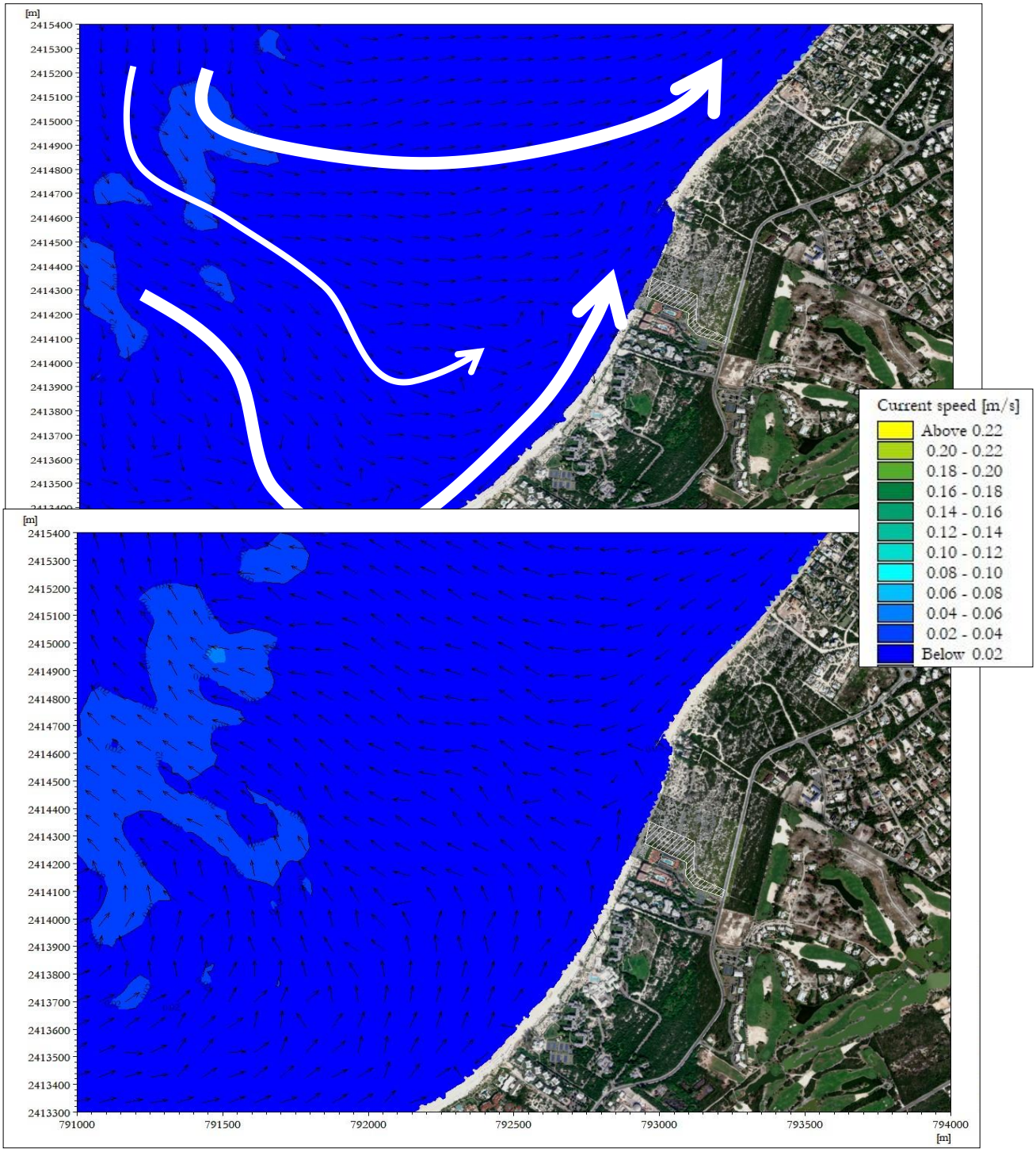


Figure Error! No text of specified style in document.6.0: Wave generated currents for the mean condition and 99th percentile condition

Wave Generated Currents

From the previous results, there are very slow currents in the bay during a low wave simulation with tidal currents. The balance between tides and wave effects determine which phenomenon governs on a coast (Davis & Hayes, 1984). The graph below can be used to discern the dominant feature (Figure 26.0). Using the Total Tide Tool the mean tidal range for Turks and Caicos is calculated as 0.5m. The daily wave climate shows that in Grace Bay waves outside of the reef are 1.2m (120cm). This would produce a wave dominated regime.

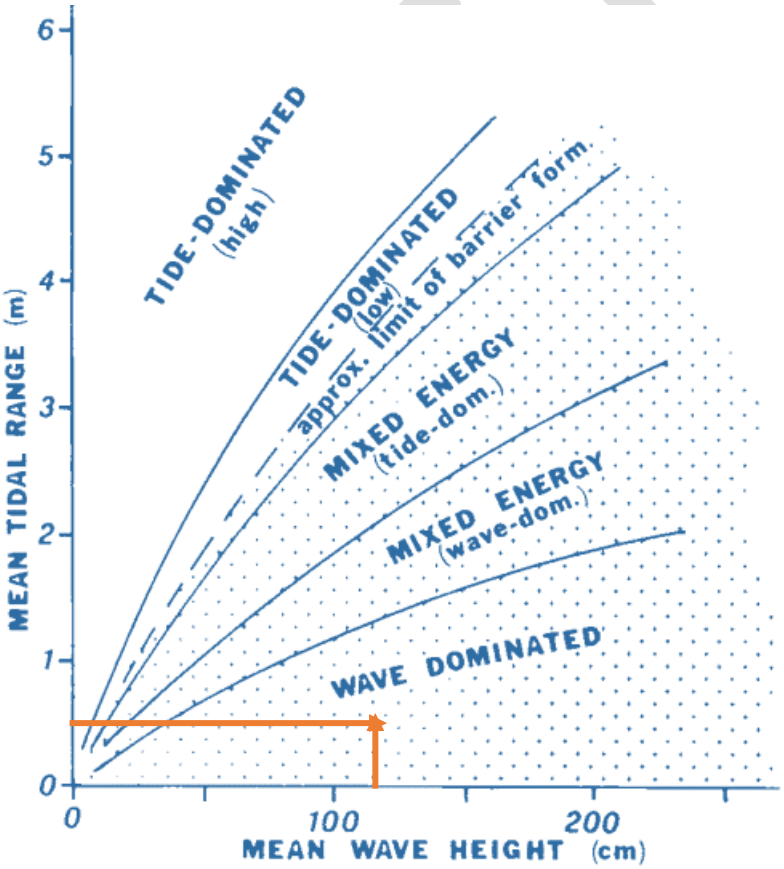


Figure Error! No text of specified style in document.7.0: Curves used to determine whether the coast is wave- or tide-dominated adapted from Davis & Hayes, 1984.

To further investigate these effects, the binned wave and water level conditions described prior were run in a coupled mode to determine the wave-generated currents for each case. The results for the mean wave-generated currents and the 99th percentile currents are shown in Figure 27.0. The mean wave-generated currents were like the results of the spring-falling tide, with currents flowing towards the southwest by the property. The current speeds are still quite low at about 0.05m/s in the nearshore of the project site. The more severe condition of 99th percentile wave-generated currents show much higher current speeds over the entire bay, particularly at the reef, where there were currents speeds of about 0.8m/s. Close to the project site the currents were up to 0.2m/s at the beach face.

The overall speed of these currents provides further support that the area is wave-dominated. Wave-dominated regimes are typical of the Caribbean, where most mean tidal ranges are below 0.8m (Kjerfve, 1981). The small magnitude of average currents may indicate that sediment movement is more episodic and resulting from individual wave events. Sediment transport regimes are explored further in the following section.

DRAFT

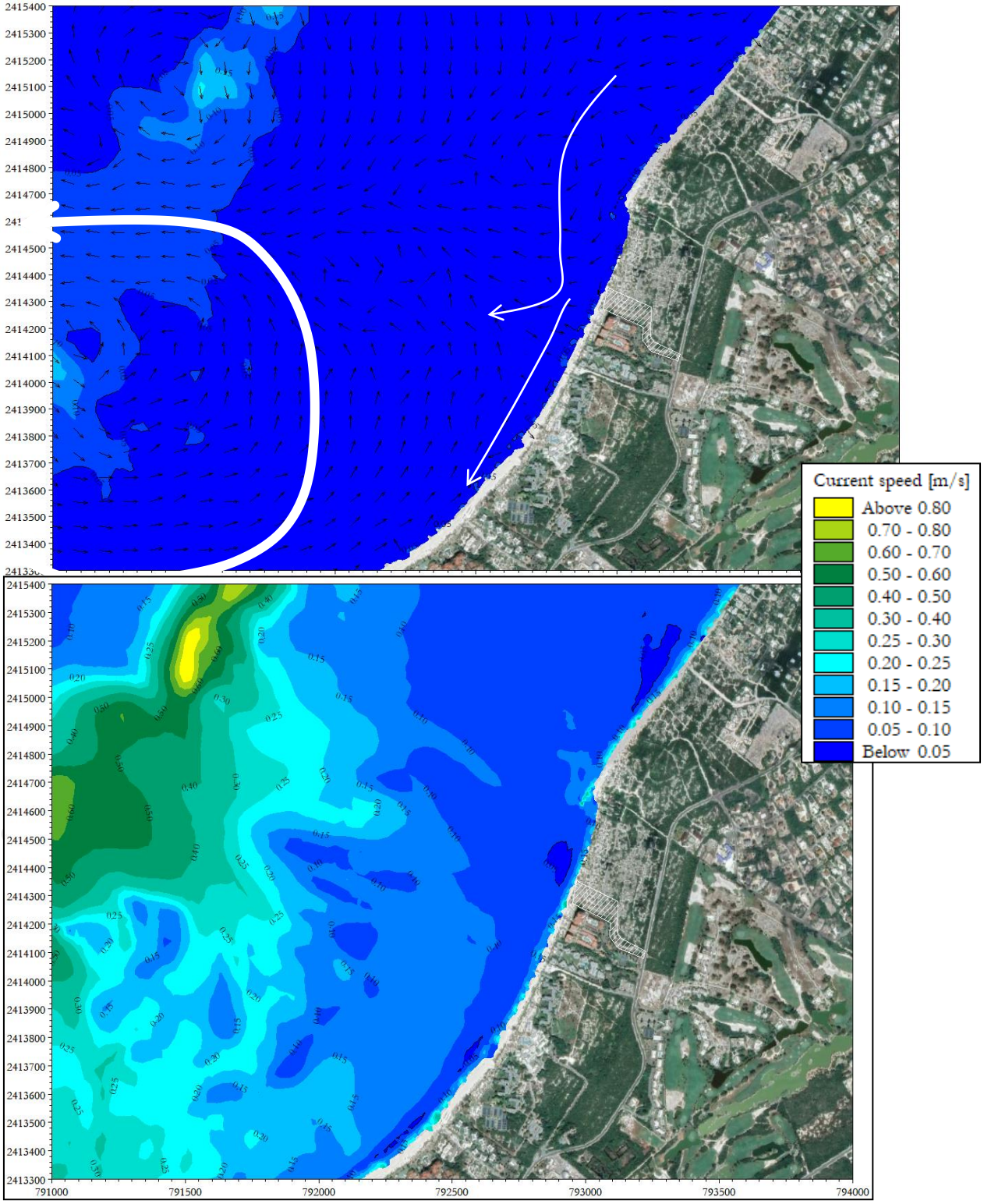


Figure Error! No text of specified style in document.8.0: Wave generated currents for the mean condition and 99th percentile condition.

2.5.2 Sediment transport

Sediment transport occurs on multiple time scales, all of which affect the stability of a beach. In the long term (multiple years) it is typical to have net transport along the shoreline that reflects average conditions. As the name transport suggests, sand grains move along the nearshore depending on the dominant drift direction. To maintain a stable beach, the sand flowing into a beach area and the sand flowing out should be in equilibrium. If there is an imbalance, over time there will either be accretion or erosion.

In the short-term, (a few days or even hours) high energy waves can erode beaches leaving scarps. Long period swell waves churn up sediment in the water column and deposit the sediment further offshore. Fortunately, the erosion that is experienced just after a swell event is typically not permanent as the long-term patterns of sediment transport would slowly move the offshore sediment back onto the beach area.

Two methods have been used to assess sediment transport in the study area. The first method assesses long term transport parallel to the shoreline and the other simulates a swell event. Both methods represent one component of more complex phenomena. However, this analysis will aid in determining which methods govern transport for the project site.

Long Term Sediment Transport Patterns

Sediment transport along the shoreline (parallel) was analysed by performing sediment transport modelling using a profile line that ran from the sea up to the property. The profile end was within the bay so that sheltering effects of the reef platform were incorporated. The DHI model Lit Drift was used to calculate the longshore sediment drift in the area. The inputs to the program were annualised wave conditions at the end of the profile, the depths along the profile and the sediment grain size properties (particularly in Section **Error! Reference source not found.**.2).

Figure 28.0 shows the profile location, underwater contours and wave conditions at the end of the profile as a wave rose. Sediment transport results indicate that over a typical year there is about 36,200 m^3 of transport to the southwest and almost negligible transport to the northeast. The dominant drift toward the southwest is related to most wave conditions approaching at an

angle from the northwest. This would generate sediment transport along the shoreline at a tangent towards the southwest.

A small percentage of waves (less than 5%) approached at an angle that was perpendicular to the profile. The LitDrift program was not able to estimate the transport in these cases as those perpendicular waves would generate cross shore transport, something that is not included in that model. To overcome this limitation, a perpendicular swell event has been separately modelled to investigate how the sediment would move perpendicular to the shore, as described in the following sub-section.

The alongshore sediment transport at various distances away from the waterline have also been plotted in Figure Error***! No text of specified style in document.***. This shows that most transport occurs within a 50m zone starting at the waterline. This area has a maximum depth of about 3m. The most active section of the profile is between the waterline and 10m seaward. This is where waves would break (at an angle) and move sediment in the corresponding direction, for this case the drift direction is predominantly to the southwest.

The wave condition results show that waves normally approach from the northwest and north-northwest. Most wave heights are below 0.5m and the average wave height at this location is 0.15m.

DRAFT

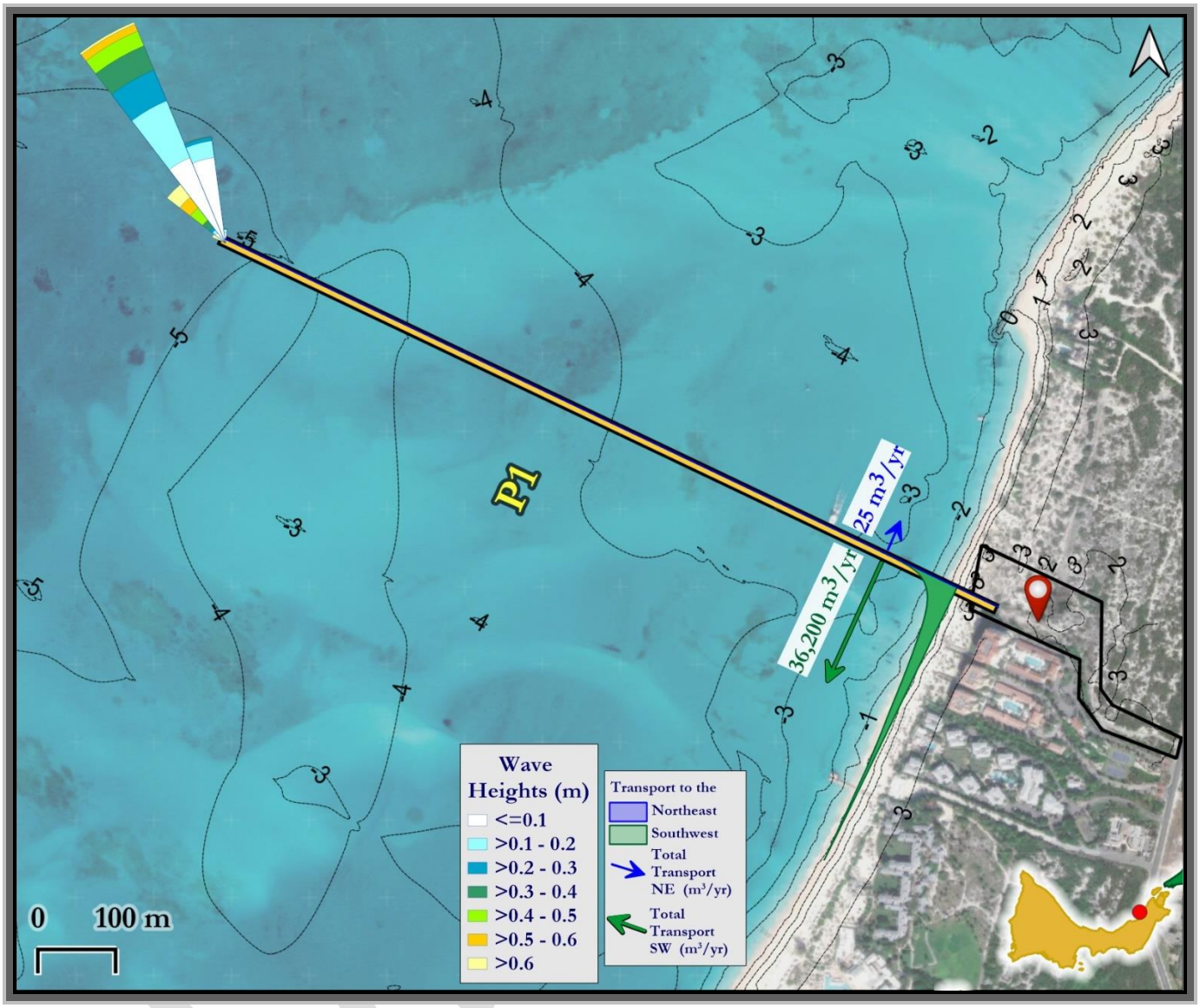


Figure Error! No text of specified style in document.9.0: Lit Drift results along the profile showing sediment drift to the west and to the east.

Figure 29.0 shows the wave conditions that were used in the analysis and the quantity of sediment transport that the condition would generate in a year. The transport scales are heavily exaggerated for the transport to the northeast since the volume was quite small. More frequent wave conditions (red and orange dots) did not generate high quantities of sediment transport in the bay. Rather, it was the higher waves that approached from the northwest that cause significant alongshore sediment transport. The result shows that larger transport to the southwest is generated by waves that come from the north to

northwest. Transport towards the northeast was linked to waves that approached from the west-northwest direction.

Overall, the results indicate a dominant drift towards the southwest, which is supported by the shadow zone to the northeast and build-up of a wider beach area to the southwest.

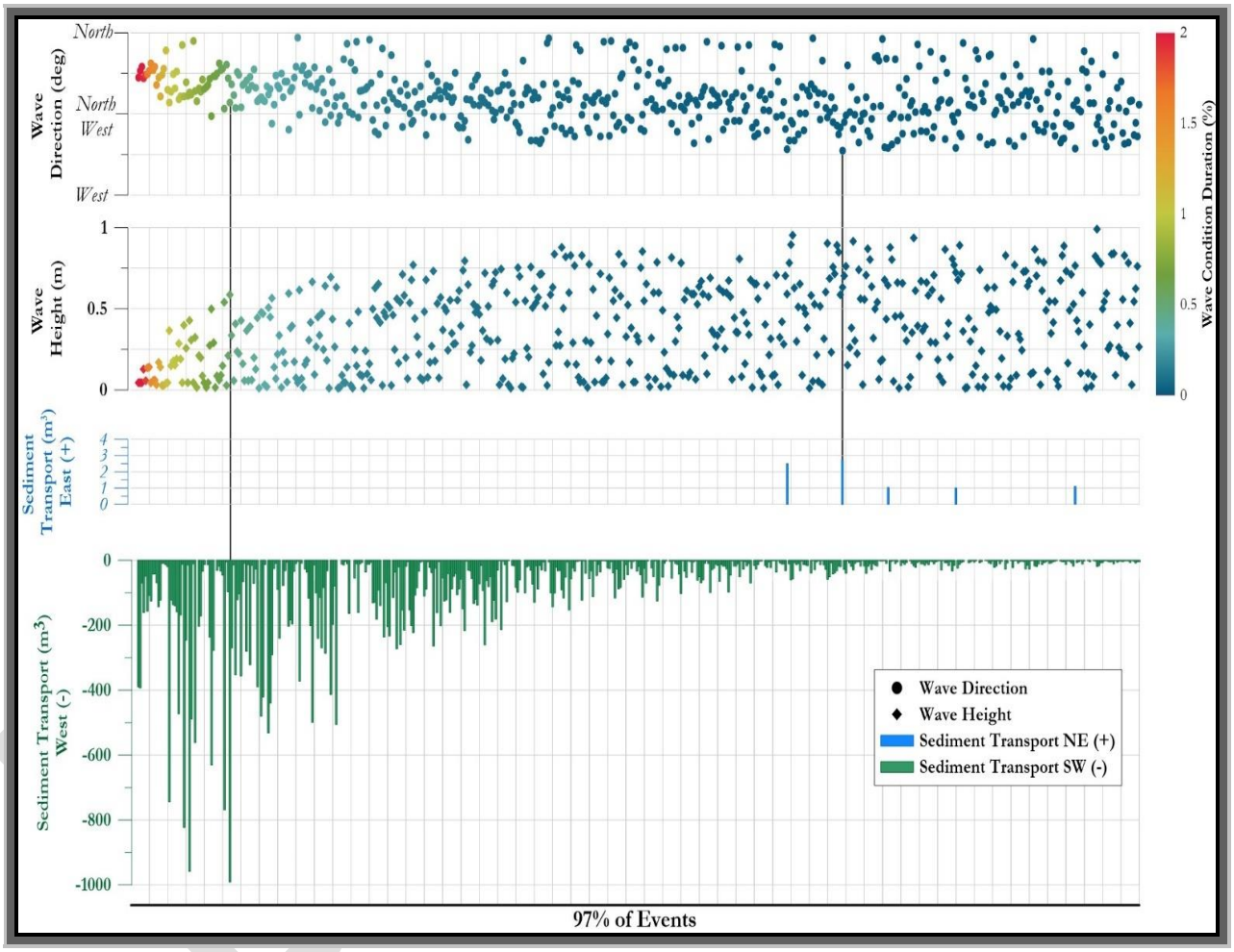


Figure 30.0 Wave conditions to show what wave properties generate sediment movement.

Swell Event

During the months of November to April the Turks and Caicos Islands and the wider Caribbean are subject to energetic swell waves. Swell waves originate

from distant storms in the northern Atlantic Ocean that then propagate to the islands over several days. Swells may cause significant erosion and approach the project shoreline from an atypical offshore direction (north). Grace Bay is vulnerable to these effects because the orientation of the shoreline is perpendicular to swells which causes the most severe impact.

To assess the impacts associated, a swell event was simulated using the numerical wave, current and sediment transport model. This process began by filtering the previously describe ERA5 database to find suitable swell events that affect the project shoreline. The filtering showed that one of the top events occurred from the 3rd to the 6th of March 2018. This event had wave heights between 3m and 5m offshore, peak wave periods of about 14s and approached from the north for most of the event. The time series of the event has been graphed below in Figure 30.0.

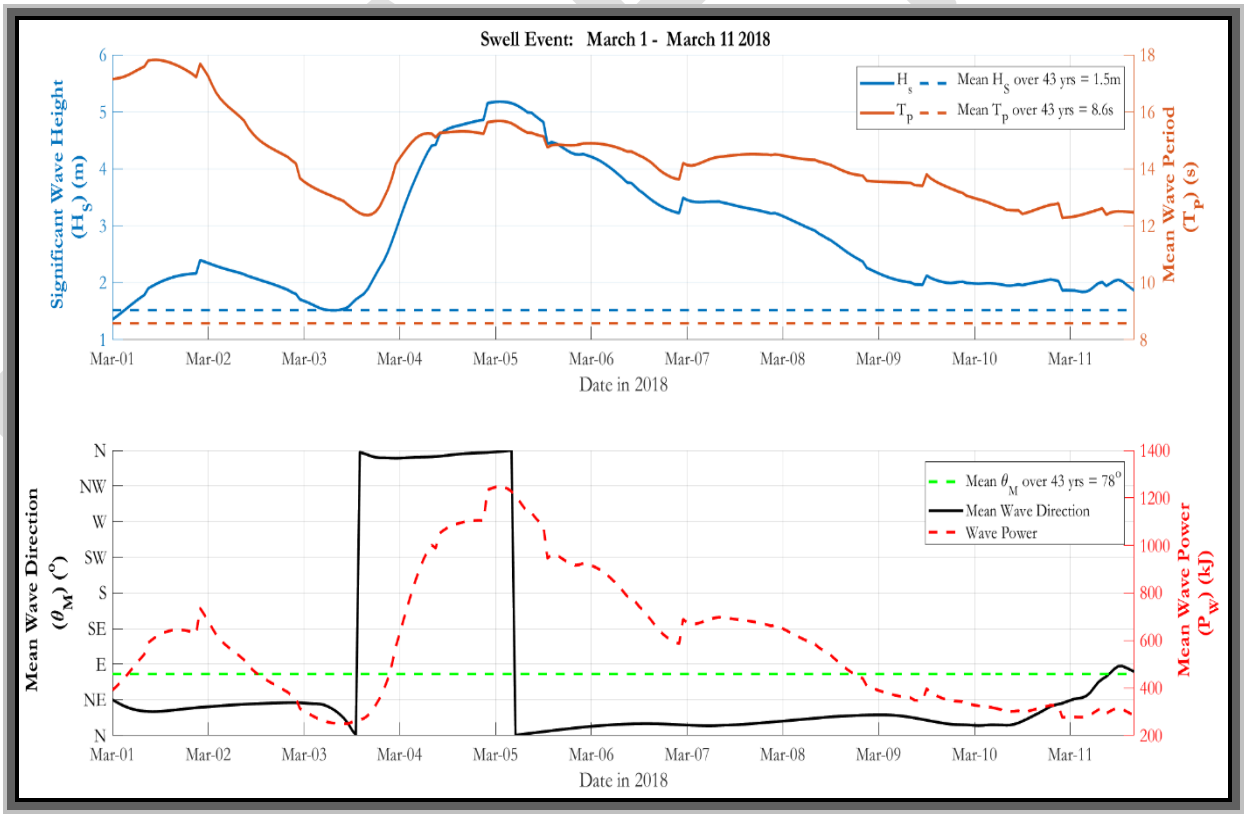


Figure 31.0: Offshore wave conditions during swell event of March 2018.

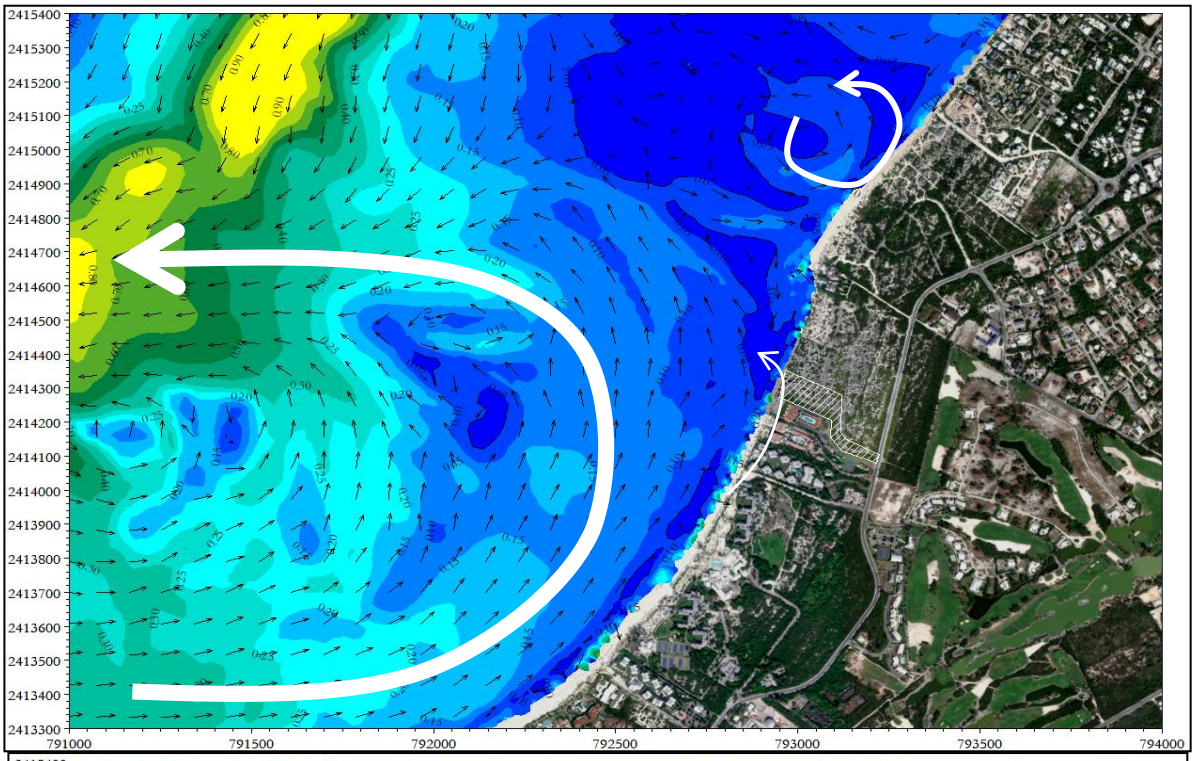
The wave conditions described above were transformed from deep water into the shoreline of Providenciales using a coupled MIKE 21 model. The model included hydrodynamic (water surface), waves and sediment transport modules. The results of the simulation are shown in Figure 31.0 and Figure 32.0. The wave height and current results were taken from the timestep peak (highest waves) of the event and the sediment transport results were extracted at the end of the three-day simulation.

The current speeds were largest along the reef with magnitudes between 0.7m/s and 1.1m/s. Within the bay the current speeds were low with about 0.1m/s in the nearshore of the Romanza site and along the shoreline. up to 0.4m/s at the headland and 0.3m/s in the nearshore of the project site. To the west of the site, currents moved in a large loop starting by moving towards the east, then north and final direction being towards the west out through the gap in the reef. Towards the north-east of the site, multiple gyres were formed. This beach section had a combination of alongshore and cross shore transport. Along the site, the flow was towards the north which is opposite to most of the tidal current regimes.

Waves outside of the reef were about 3.2m in wave height. As has been seen previously, the reef provided sheltering to the property and northern beaches. In Figure 32.0, this can be seen with the varying spread of colours representing wave heights between 1m and 3m wave lines. Over the reef crest, the wave heights decreased from 3.2m to 1m over a stretch of about 300m. Conversely, through the gap there was about 1,100m between the two wave heights. In the nearshore of Romanza property, the wave heights were 0.6m which would correspond to a 99th percentile event as described in Section **Error! Reference source not found.**.1

The offshore wave direction was from the north-northwest at this timestep. Within the bay, the direction changed to be from the west-northwest. Based on the Lit Drift results, a west-northwest approach direction would correspond to northeasterly transport. At the property's coast, the waves were approaching from the west-northwest which is about perpendicular to shoreline and would generate the most cross shore sediment movement.

DRAFT


2415400
2415300
2415200
2415100
2415000
2414900
2414800
2414700
2414600
2414500
2414400
2414300
2414200
2414100
2414000
2413900
2413800
2413700
2413600
2413500
2413400
2413300
791000
791500
792000
792500
793000
793500
794000

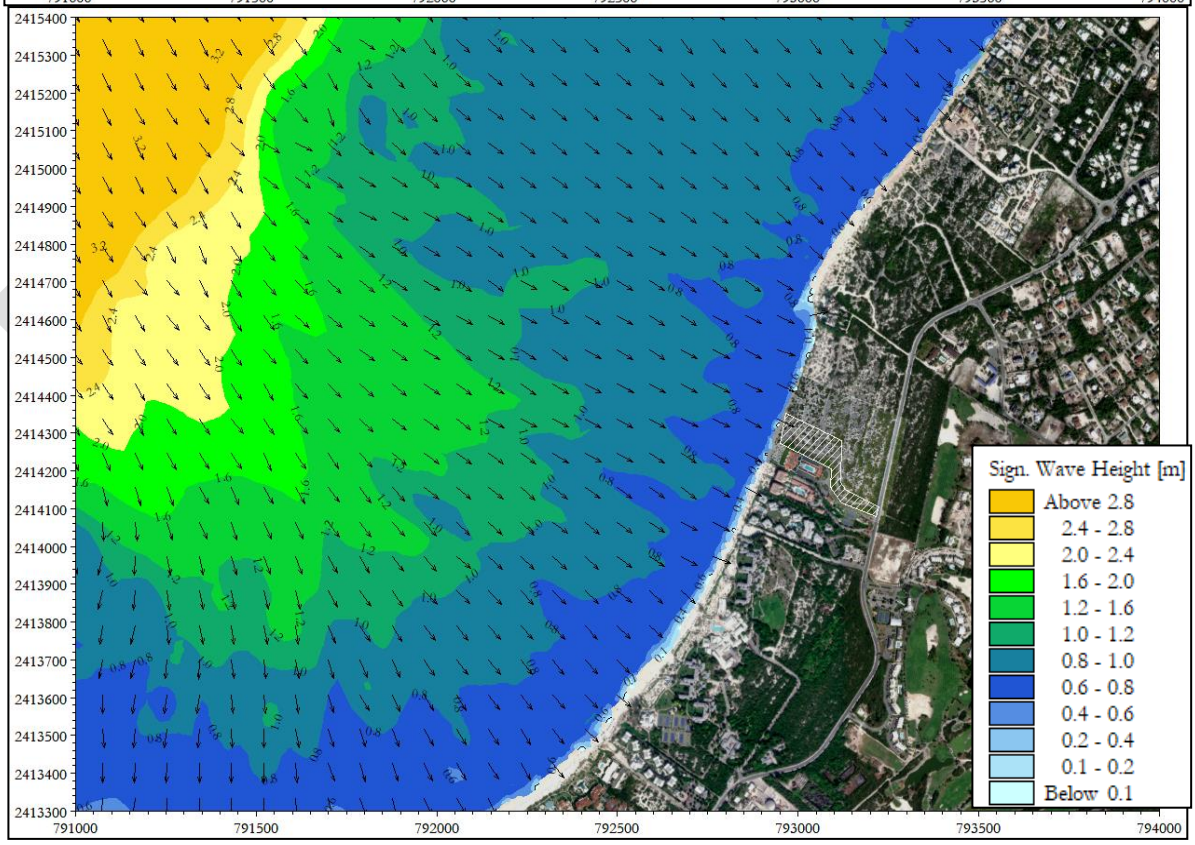

2415400
2415300
2415200
2415100
2415000
2414900
2414800
2414700
2414600
2414500
2414400
2414300
2414200
2414100
2414000
2413900
2413800
2413700
2413600
2413500
2413400
2413300
791000
791500
792000
792500
793000
793500
794000
Sign. Wave Height [m]
Above 2.8
2.4 - 2.8
2.0 - 2.4
1.6 - 2.0
1.2 - 1.6
1.0 - 1.2
0.8 - 1.0
0.6 - 0.8
0.4 - 0.6
0.2 - 0.4
0.1 - 0.2
Below 0.1

Figure 32.0 Swell currents (top) and wave heights (bottom) at the peak of the swell event.

The sediment movement at the end of the simulation (Figure 32.0) shows areas of erosion (yellow to red to purple) and areas of accretion (green to blue). This figure has been zoomed in to the property to get a better view of the sediment movement. Generally, sand was eroded from the back of the beach and deposited at the base of the swash zone. There was average erosion of up to 0.3m around the waterline near to the property. Results of the simulation also show erosion along neighbouring properties of up to 0.3m.

DRAFT

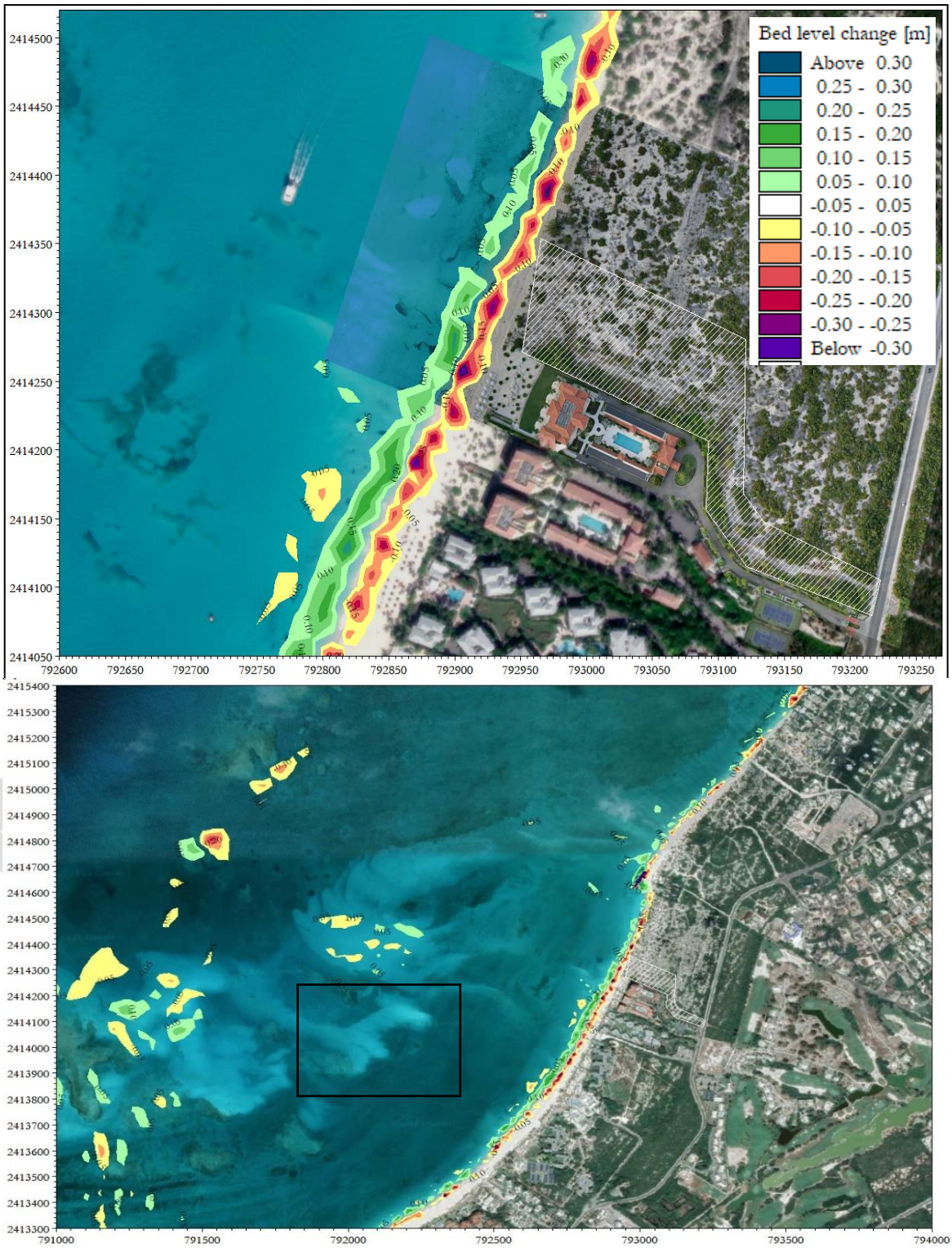

Bed level change [m]
Above 0.30
0.25 - 0.30
0.20 - 0.25
0.15 - 0.20
0.10 - 0.15
0.05 - 0.10
-0.05 - 0.05
-0.10 - -0.05
-0.15 - -0.10
-0.20 - -0.15
-0.25 - -0.20
-0.30 - -0.25
Below -0.30
2414500
2414450
2414400
2414350
2414300
2414250
2414200
2414150
2414100
2414050
792600
792650
792700
792750
792800
792850
792900
792950
793000
793050
793100
793150
793200
793250
2415400
2415300
2415200
2415100
2415000
2414900
2414800
2414700
2414600
2414500
2414400
2414300
2414200
2414100
2414000
2413900
2413800
2413700
2413600
2413500
2413400
2413300
791000
791500
792000
792500
793000
793500
794000

Figure 33.0: Sediment transport result showing the change in bed level at the end of the swell simulation with simplified vectors showing the direction of transport.

Wave Run-up on Beach Slopes

An important consideration during swell events is wave run-up on the site. Wave run-up occurs when a wave breaks and a portion of the remaining wave energy runs up the face of the shoreline. The elevation of the run-up is dependent on the surface characteristics of the "swash zone". If this area is a smooth impermeable beach, a higher run-up can occur. Conversely if a rough armour stone slope or a vegetated surface is encountered, the run-up would be reduced.

Due to the localized variability of wave run-up and the fact that it is a dynamic component, storm surge computations do not typically include wave run-up. It is, however, calculated and used in the design of coastal structures. Figure 33.0 shows both static and dynamic components of the storm surge which, when added together, produce the final inundation levels for consideration.

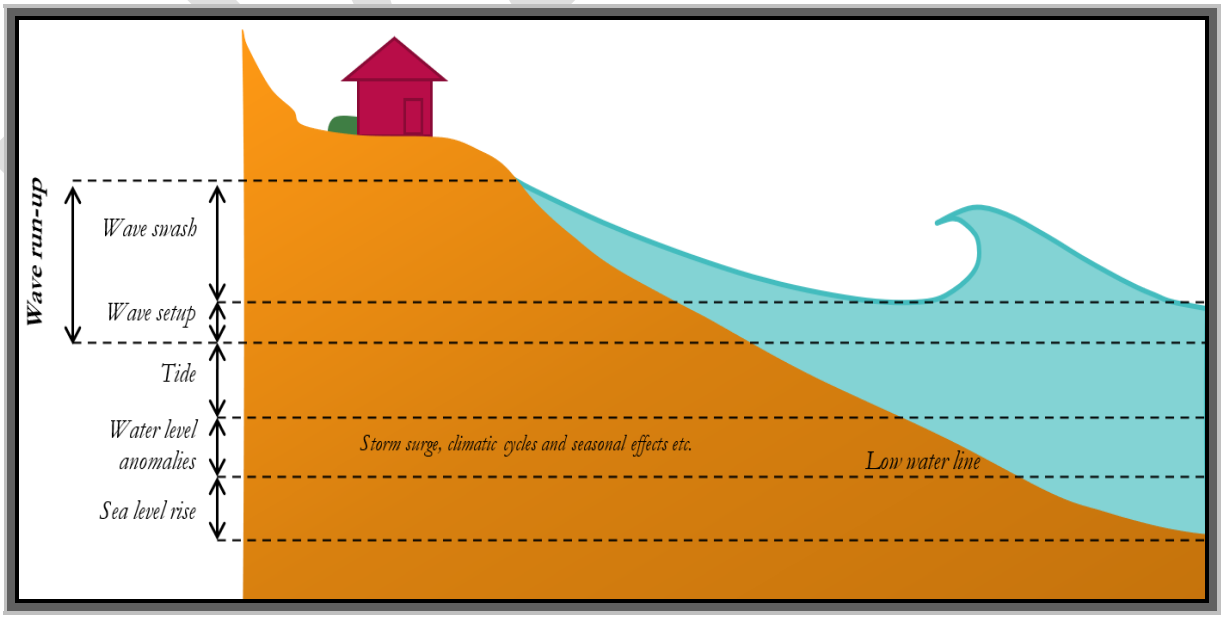


Figure 34.0 The water level components that contribute to coastal flooding adapted from (Vitousek, et al., 2017).

Romanza's coast has moderate slopes of about 1(V):10(H) which would increase the distance that wave inundation onto the project site. The beach profiles show that there is a dune present with elevations up to 3.2m near the property boundary. Further inland the topography shows a depression on the property with elevations of around 2.2m. Because of this feature, it is important to check wave run-up and overtopping on this property to properly quantify the high run-up levels and possible inundated areas on the site.

The XBeach model (Roelvink, 2009) was applied in a one-dimensional format to simulate the storm-induced water level changes for the swell event detailed prior. The profile was taken within the estimated property boundary of the site (Figure 34.0). The profile was extracted using a simple routine in GIS software that merged the topographic data, bathymetry tracks and EOMAP satellite-derived bathymetry. The data was interpolated to provide one-dimensional profiles that extend perpendicularly from the shoreline to about the 5m depth contour along the project site and input to the XBeach model.

Swell winds and wave parameters were extracted from the MIKE 21 model at the end of the profile. The parameters were then formatted and used as input for the model. The model uses a non-hydrostatic formulation for the water surface which makes it suitable for modelling run-up as well as beach and dune erosion. The sediment characteristics (shown in Table 13.0) were also used in the model to properly predict sediment movement.

DRAFT

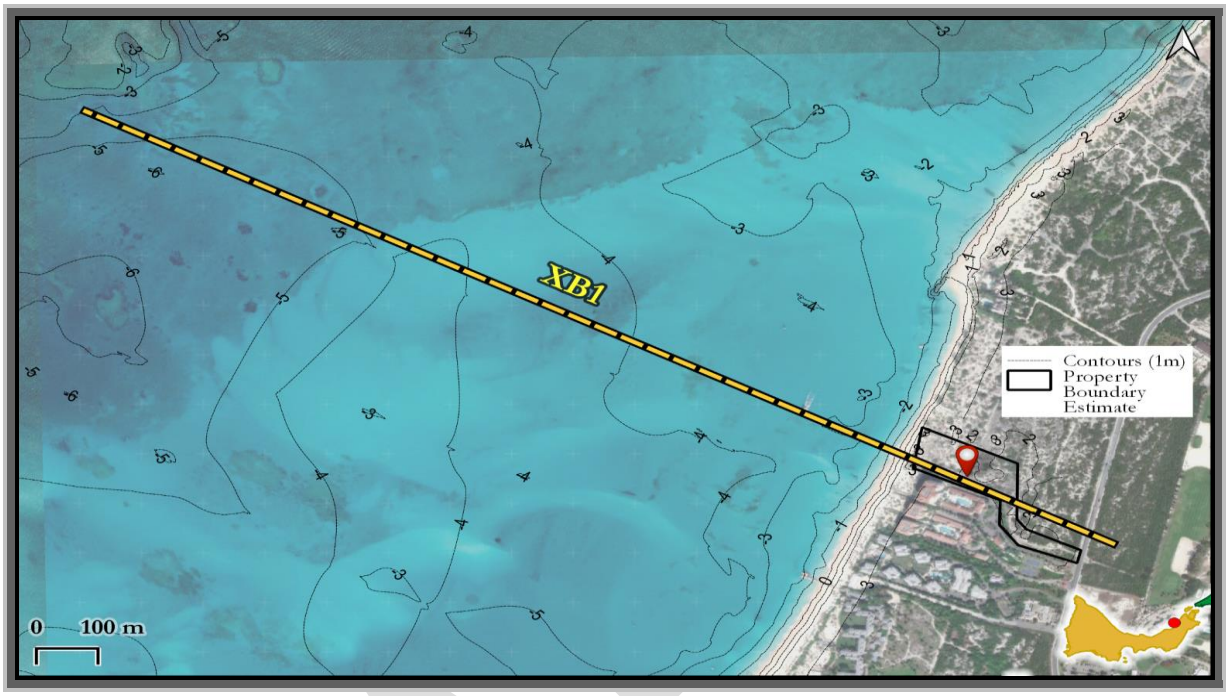


Figure 35.0: XBeach profile used to assess wave run-up on the Romanza property.

The results of swell event testing in XBeach are presented in Figure 33.0. The results highlight that most sediment movement occurred in a 20m zone around the waterline. The added dynamic component of wave run-up showed a run-up level of 1.1m and a maximum scour of 0.5m at the back of the beach slope. The eroded sediment was deposited at the base of the beach slope at depths up to 1m. The beach width was similar at the end of the event; however, the back of beach slope had steepened to 1(V):6(H). Fortunately, the property has adequate setback from the waterline. As a result, the property was not inundated during the event.

DRAFT

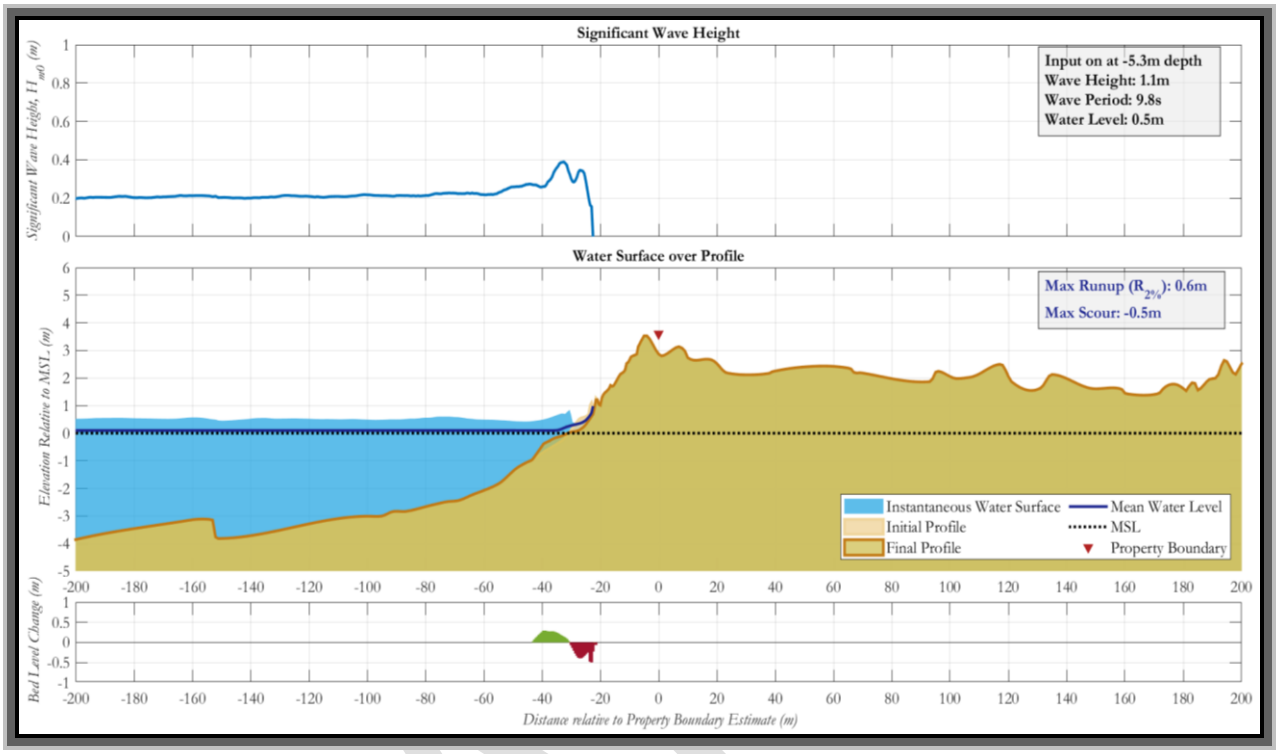


Figure 36.0: Wave run-up and scour results for the swell event of March 2018 ran in XBeach.

2.5.3 Erosion and Accretion

Some classifications may be used to describe changes in width on a beach: eroding, accreting or stable. Erosion may be described as reduction of beach width while accretion may be described as an increase in beach width. These processes occur on multiple time scales which help to determine if a beach is stable or not. For instance, if a beach show amounts of erosion and accretion which are balanced (or equal) over time, the beach may be classified as stable. If there is an imbalance this would suggest that, in the longer term, the beach is showing a trend of erosion or accretion.

Long-term erosion and accretion patterns have been analysed by assessing aerial imagery. A shoreline analysis along the property's beach front and along neighbouring shorelines was done. This process involves retrieving as many years as possible of satellite imagery for the location and having those images georeferenced to the same horizontal coordinate system. Afterward, each shoreline is digitised by considering where the blue water changes to light sand. As the line digitised may be considered as always wet, these lines are used to represent the progression of the low water mark over time. Measured beach profiles show that the average slope is 1(V):10(H). Over the tidal signal there may be up 10m shift in the waterline which is considered as the error range for analysis.

It is important to note that this analysis highlights a few instances of a dynamic process and generalises periods of sediment transport. The analysis used publicly available satellite imagery which had an irregular frequency in the time in between images. The satellite images were taken from 2003, 2012, 2013, 2015, 2017, 2018, 2021 and 2023. Three satellite images (2013, 2018) were taken within the typical swell season between November and April. At this time there are typically higher energy waves which may result in a narrower beach. Three other satellite images (2017, 2021, 2023) were captured in September. Of note, the 2017 image was taken a few days after the passage of Hurricane Irma to the south of Providenciales. The other images were taken under calmer summer conditions. The results of the plotting are shown in Figure 36.0.

Five profiles were extracted to show localised changes within the area of interest over the period. The first profile was taken 500m to the northeast of the property while the last was taken about 500m to the southwest of the property. The third profile was taken in front of the Romanza property. For each profile the beach width at an instance (date of imagery used) is measured and compared to the following imagery date. To normalise the data, the change in beach width is divided by the amount of time that has passed, which then provides a rate of erosion or accretion over that period. The results of the profile analysis are shown in Figure 37.0.

Beach width change rates are used to describe the intensity of beach change with following categories (Luijendijk et al., 2018)

- Accretion: >0.5 m/yr.

- Stable: -0.5 to 0.5 m/yr.
- Erosion: -1 to -0.5 m/yr.
- Intense erosion: -3 to -1 m/yr.
- Severe erosion: -5 to -3 m/yr.
- Extreme erosion: <-5 m/yr.

DRAFT

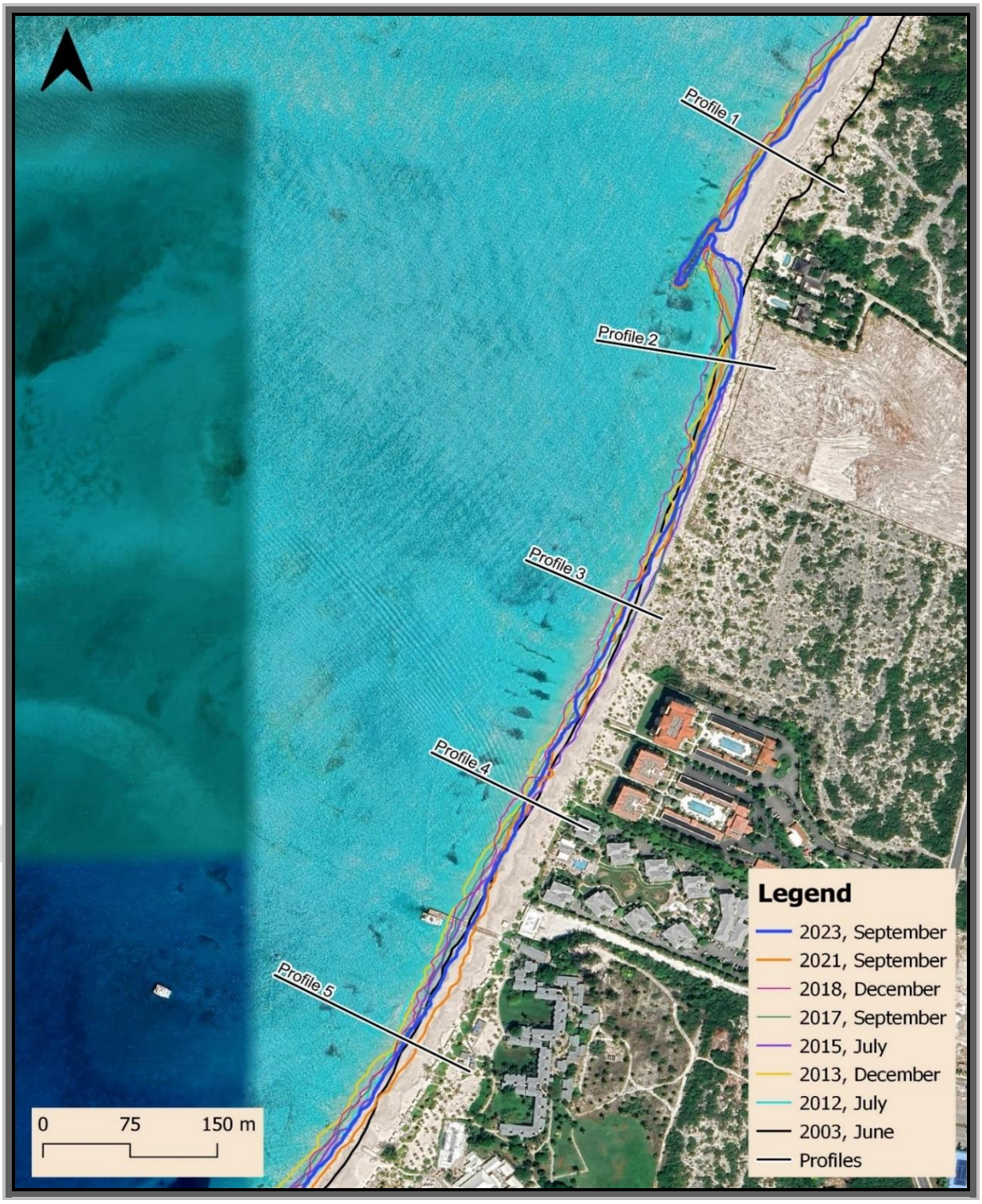


Figure 37.0: Shoreline change analysis for the Romanza townhouses property from 2003 to 2023 (overlain on 2023 imagery)



Figure 38.0. Profile analysis done to show possible erosion and accretion around the project site.

Profile 1 results showed an increase in beach width from the starting image in 2003 to the 2012 image. This is likely related to the introduction of the T-head groyne sometime between 2003 and 2012 that would have led to sediment buildup in this area. Following the installation of the groyne the beach width changes have been fluctuating within a narrow range of ±2m/yr. The overall rate shows accretion at a rate of +2m/yr., however, the most recent rate shows a trend of erosion, thus this profile does not show a definite trend of either erosion or accretion.

Profile 2 was extracted in the shadow zone created by the groyne and generally eroded with a maximum rate of -9.3m/yr. This high erosion rate is supported by the beach width being significantly narrower in this area than others. For the 2023 imagery the beach width in this area was 13m while Profile 3 had a beach width of double that at 26m. The average rate of beach change was about -1m/yr. (intense erosion), however, the rate was -4m/yr. for the last two years of the analysis. This could indicate an intensifying of erosion in this area.

Profile 3 was extracted in front of the Romanza property. This profile was generally stable with an average rate of +0.3m/yr. Two outliers of high erosion in 2015 and high deposition in 2018 were noted. However, these trends were seen across all profiles analysed which may indicate an offshore event affecting all profiles. The March 2018 swell event (which was analysed in Section **Error! Reference source not found.**) occurred nine months before the 2018 image was captured. The rest of 2018 had "average" conditions with an average offshore wave height of 1.5m. The March event may have led to deposited sand in the nearshore from offshore which was then moved slowly for the rest of the year. However, with the limited instances of data this is mostly speculative.

Profile 4 was taken about 200m to the southwest of the property. This profile experienced a narrower range of fluctuations than Profile 1, 2 and 3. For the 2023 satellite image, the analysis seems to show a movement of sand from the northeast to the southwest. This is shown as Profile 2 had erosion while Profile 4 had deposition. The average beach width change rate was +0.4m/yr. which shows a trend of stability.

Profile 5 was taken about 500m to the southwest of the property boundary. This profile showed little variation over the first two years of the analysis. However, in more recent images there is more fluctuation. For this profile the erosion

DRAFT

rates tend to balance out the accretion rates. This results in a low rate of +0.3m/yr. beach width change (stable).

In addition to the beach width changes, an analysis of the beach width measured from the vegetation line was conducted for Profile 3. Figure 36.0 shows the initial beach width in 2003 of 19m and the subsequent movement from 2012 to 2023. This analysis shows that there were two significant accretion periods. Particularly between 2017 and 2018 which may be related to offshore swells or the 2017 hurricane season churning up sediment that was gradually deposited in the nearshore. This width has been eroding since then. The beach width was 33m in the 2018 imagery and has reduced to 25m in the 2023 imagery.

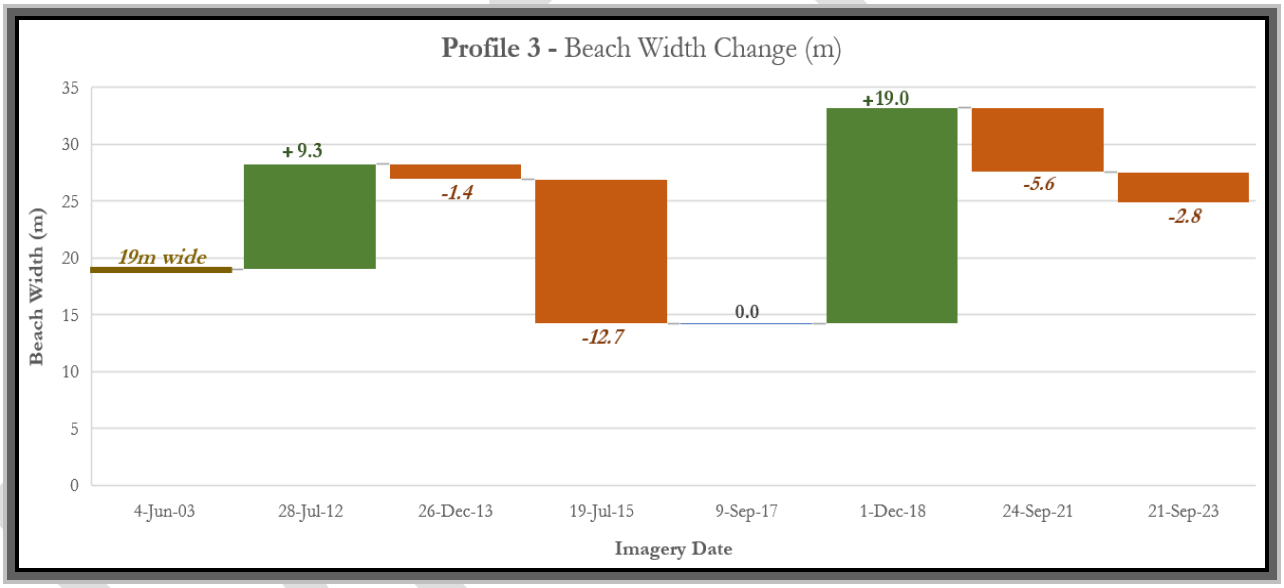


Figure 39.0: Beach width movement in front of the Romanza property when compared to the 2003 shoreline.

Generally, the fluctuations along the profiles range from an erosion rate of (-) 9.3m/yr. to an accretion rate of (+)15m/yr. his range is quite wide and linked to external factors such as structural intervention. Trends were analysed for each profile but also across the images. The 2015 image showed erosion for all profiles which may have been related to the passage of a wave event. The image may also have been taken at a point of high tide which may indicate a narrower beach than. The 2018 image showed accretion for all profiles. For this image, it may have been taken during low tide which would falsely show a wider beach in

the analysis. Since the images are compared from one year to the next, it is also possible that the hurricane passage in 2017 eroded sediment that was now being moved back on to the beach area in the 2018 image.

As was alluded to before, this analysis examines instances over a dynamic period. There are a few limitations associated with this process that are listed below:

- Seasonality issues – sandy beaches have seasonal cycles of erosion and accretion. The number of images collected could not fully capture intra-annual changes in beach width and as such it is important to consider the averages that are presented for each profile in conjunction with the individual shorelines that are digitised.
- Tidal fluctuation error – the tidal levels for an image could not be estimated because the satellite images did not have a timestamp associated with their retrieval. Using an estimation of the beach profile and the tidal range it may be assumed that the waterline can be ± 5m away from the actual shoreline.
- Digitizing error – There is human error associated with digitizing the shoreline
- Pixel error – The pixel size in orthorectified images is 1.1m, which means any feature smaller than 1.1m cannot be resolved.
- Rectification error – Satellite images are rectified which is done to reduce displacements caused by lens distortions, earth's curvature, light refraction, camera tilt, and terrain relief. This rectification is however done by the eye and is affected by the shadows in an image.

2.5.4 Coastal dynamics

The northern coast of Providenciales is exposed to the Atlantic Ocean. Fortunately, the fringing reef generally protects the shoreline from high energy waves. Closer to the Romanza site, there is a gap in the reef that leaves property lots to the southwest more exposed than lots to the northeast. Even with the varying reef heights, the average wave climate in the Grace Bay area is relatively calm.

DRAFT

Stronger swells can approach from the north-west and north and move sediment away from the beaches. These events typically erode sand from the back of beach area and deposit sand in the nearshore. Outside of swells, the typical sediment regime shows a dominant south-westerly drift, which is supported by the shared beach being wider to the southwest.

At the time of the beach profile survey (March 2024) the beach slope was moderate at 1(V):10(H). The sediment is medium sand, which provides a luxurious beach experience for patrons. However, this finer sand can be more susceptible to erosion during high energy events that churn up sand.

Based on the desktop and physical investigations done, the overall state of the beach area is stable. Table 14.0 summarises the key coastal parameter results in the nearshore of the project site.

Table 14.0: Summary table of modelling results in the nearshore of the project site.

Parameter	Value	Unit
Average Wave Height	0.1 to 0.15	m
99th Percentile Wave	0.6	m
Average Wave Generated Currents	0.05	m/s
99th Wave Generated Currents	0.2	m/s
Low Tidal Current (Neap)	0.02	m/s
Low Tidal Current (Spring)	0.04	m/s
Net Sediment Drift	Southwest	
Swell Wave Height	0.6	m
Swell Current Speeds	0.1	m/s
Swell Erosion on Beach Face	0.5	m
Swell Wave Run-up on Beach Face	0.6	m

2.6 Water quality

Baseline water quality conditions were assessed by testing for multiple indicative parameters in the area. Sampling was undertaken with planning and shipping assistance from a local consultant and Provo Water company in

Providenciales. Two samples were taken, one in front of the property (WQ1) and one about 100m southwest of the property to represent the downdrift water quality (WQ2).



Figure 40.0: Water quality sampling locations for the study and photo taken during the survey (top-right).

The samples were collected on March 27, 2024, between 12:45 and 1:15pm from mid-depth of the water column (about 1.5m above the seabed). The predicted tidal height was approximately 0.16m below mean sea level during the sampling. The tidal range for the sampling day was 0.5m (which indicates neap tides). Offshore, wind speeds were between 5 and 9 knots and coming from the northeast. Offshore waves came from the north with wave heights between 1.8m and 2m (Hornik, 2024).

In situ testing was done for the salinity and temperature of the samples. Samples were then put in two groups, the first group was put on ice and stored for testing on Providenciales. The second group of samples were frozen and

shipped to the University of Maryland for low nutrient testing. Low nutrient testing began by doing an initial test to generate an "expected value" for a particular parameter. Following this, multiple quality control (QC) tests were done and compared to the "expected value". Difference calculations followed for each QC test result and the percentage change recorded. All expected values were within ±10% of QC test values. This value represents the range of the water quality results.

All results of testing are summarised below.

Table 15.0: Water quality data collected for the project site.

Parameter	Unit	Method Detection Limits	Method	Value	
				WQ1	WQ2
Dissolved Oxygen	mg/L	-		7.3	7.6
Temperature	°C	-		26.3	25.9
Salinity	ppt	-		32.9	32.4
pH	pH units	-		7.79	7.84
Depth	ft	-		10	10
Depth	m			3	3
Turbidity	NTU	-		5.6	1.57
Total Dissolved Solids	mg/L	*25*		28,000	28,200
Total Coliform	CFU	-		TNTC	TNTC
Escherichia Coli (E. Coli)	CFU	-		0	0
Ammonium	mg N/L	*0.009*	*SM4500-NH3 G-2011*	0.009	0.009
Nitrite	mg N/L	*0.0009*	*EPA 353.2 Rev 2.0, 1993*	0.0034	0.0009
Nitrite + Nitrate *(cadmium)*	mg N/L	*0.0009*	*EPA 353.2 Rev 2.0, 1993*	0.0059	0.0057
Total Dissolved Phosphorus	mg P/L	*0.0015*	*EPA 365.1*	0.0085	0.0047
Total Dissolved Nitrogen	mg N/L	*0.05*	*EPA 353.2*	0.24	0.19
Chlorophyll, Total *(Fluorometer)*	µg CHLa/L	*0.68*	*EPA 445.0, SM10200H.3*	0.68	0.68
Phaeophytin *(Fluorometer)*	µg CHLa/L	*0.46*	*EPA 445.0, SM10200H.3*	0.46	0.46

Chlorophyll, Active *(Fluorometer)*	µg CHLa/L	*0.69*	*EPA 445.0, SM10200H.3*	0.69	0.69

TNTC- Too Numerous to Count

Both samples had similar recordings of dissolved oxygen, temperature and pH. Dissolved oxygen readings for both sites indicate that the water column had sufficient oxygen to support marine life. The pH of both sites was comparable to the average pH of seawater (8.1) (EPA, 2024).

Turbidity values were considered high for both samples, which is related to high waves churning up sediment in the nearshore. This value would need to be reanalysed before the start of construction as the typical turbidity is likely lower than the value shown in these results.

Both samples recorded similar levels of total dissolved solids within the water column. This parameter represents the presence of dissolved inorganic materials (such as metals or salts). For seawater the expected reading is up to 35,000 mg/L (Boyd, 2015). Therefore, the values are in range for sea water.

Salinity readings were similar for WQ1 and WQ2, these values were at the lower end of the expected seawater salinity of 33-37ppt (NOAA, 2023). Total Dissolved Phosphorus was identified to be of a higher concentration at site WQ1 than at site WQ2. This observation was similar for Total Dissolved Nitrogen, Cadmium and Ammonium.

No E. coli was detected in the water samples which indicates that no excretive waste was present. On the other hand, total coliform was recorded as being too numerous to count for both sites. Total coliform could include several groups of bacteria, including those naturally occurring within the sediment.

Active Chlorophyll, Phaeophytin, and Total Chlorophyll had values that were at the method detection limit for the testing routine. Therefore, there is a low presence of photosynthetic microorganisms within the water column. These parameters would have otherwise been an indicator of high nutrient content which ultimately leads to growth of phytoplankton (inclusive of some species of algae).

Generally, parameters for the property water sample (WQ1) tested were of slightly higher concentrations than the results for the downdrift sample (WQ2). This may indicate possible dilution when moving from the east to the west (downdrift).

2.7 Socio-economic

Since the collapsed of the salt industry in the late 1960s and for the past five-decades tourism has been the main industry that drove the economy of the Turks and Caicos Islands. The section offers an overview of the socio-economic aspects of tourism development in the TCI and the role it plays in providing an economic livelihood for the government and people of the islands. An analysis of the present baseline population, employment and economic activities is provided.

2.7.1 Demographic

The 2022 population of the Turks and Caicos Islands is estimated at around 47,720. However, it is believed that the actual population is much higher than this. According to the 2012 population census the islands population was 31,458.

In 1970 the TCI population was 5,558 (Census 1970). However, during the past decades the islands have experienced explosive population growth. The 1980 population increased by 33.4% over the 1970 figures and the 1990 population increased by 54.17% over the 1980 figures. The island's population continued to grow over the preceding years, the 2001 population by 73.4% over the 1990 figures and the 2012 population by 58.2% over the 2001 figures. Table 15.0 below shows the population distribution by islands and population growth during the past five decades.

DRAFT

Table 16.0: Population Distribution by Island 1960 -2012

Island	1960	1970	1980	1990	2001	2012
Salt Cay	448	334	284	208	120	108
Grand Turk	2,180	2,287	3,089	3,691	3,976	4,831
South Caicos	840	1,018	1,380	1,198	1,063	1,139
Middle Caicos	532	362	396	272	301	168
North Caicos	1,150	99	1,278	1,275	1,347	1,312
Parrot Cay	-	-	-	-	58	131
Providenciales	518	558	977	4,821	13,021	23,769
Total Population	**5,668**	**5,558**	**7,404**	**11,465**	**19,886**	**31,458**
Growth of Population (%)	0	-1.9	33.4	54.17	73.4	58.2

Source: Statistical Office, Department of Economic Planning and Statistics

The TCI 2012 population census also revealed that the population of the islands was relatively young, with the age group of 0-14 years old accounting for 20.97% of the population and 15 years and over making up approximately 74.84% of the population, while 65 years old and over representing just 4.87% of the population. The Male-Female Ratio of the 2012 population of the TCI stood at 99.1%. The island's young population has implications for future growth and development. Table 16.0 below shows population by status, sex and age and Table 17.00 shows the distribution of population by labour force participation and unemployment by islands in 1999.

Table 17.0: Population by Status, Sex and Age

Category	1960	1970	1980	1990	2001	2012
Total Population	**5,668**	**5,558**	**7,413**	**11,465**	**19,886**	**31,458**
By Sex						
Male	2,552	2,635	3,580	5,837	9,897	15,230
Female	3,116	2,923	3,833	5,628	9,989	15,372
Male-Female Ratio	**81.9**	**90.1**	**93.4**	**103.7**	**99.1**	**99.1**
By Age Group						
0-14 Years Old	2,557	2,618	3,067	3,687	5,692	6,698
15 Years Old & Over	2,782	2,597	3,871	7,204	13,436	23,904
65 Years Old & Over	329	343	475	574	575	1,337
Age Dependency Ratio	**103.7**	**114.0**	**91.5**	**59.1**	**48.0**	**33.6**

Source: Statistical Office, Department of Economic Planning and Statistics

Table 18.0: Distribution of Population, Labour Force Participation & Unemployment by Islands, 1999

Description	Population		Labour Force Participants		Unemployment		Under-employment Rate
	No	%	No	%	No	%	
Grand Turk	4,198	24.4	2,133	22.9	237	20.3	11.1
Middle Caicos	408	2.4	178	1.9	40	3.4	22.5
North Caicos	1,562	9.1	647	6.9	54	4.6	8.4
Providenciales	9,780	56.9	5,723	61.5	690	58.9	12.0
Salt Cay	131	0.8	77	0.8	15	1.3	20.0
South Caicos	1,115	6.5	555	6.0	134	11.4	24.1
Total	17,194	100	9,312	100	1,170	100	12.6

Source: Survey of Living Conditions 1999

2.7.2 Employment

The rapid growth and development of the TCI during the past three decades, led by tourism, has resulted in increased employment opportunities, particularly in the hospitality and construction industries, however, the unemployment was 9% in 2022 (Statistical Department). In 2017, there was a total of approximately 23,027 jobs available throughout the TCI and a local contingent of only 8,589 local workers (National Skills Audit Report). This meant that there were more jobs available than there were qualified and experienced locals available to fill those jobs. The report concluded that the labour-force participation rate is higher among non-islanders than TCI Islanders.

Based on the Turks and Caicos Islands present population composition, the various industries that make up the local economy have a relatively young labour force pool to draw from. Table 18.0 below provides a snapshot of the labour for characteristics of the Turks and Caicos Islands in 2014.

Table 19.0 – Labour force characteristics, 2014

Description	Male	Female	Total	Belonger	Other
Total population	15,127	15,429	30,556	13,424	17,131
Population 15 years & over	11,909	12,206	24,115	9,432	14,683
Labour Force	9,613	8,820	18,433	6,879	11,554
Employed Labour Force (LF)	7,826	7,203	15,029	5,909	9,120
Unemployed Labour Force (LF)	1,787	1,617	3,404	970	2,434
Outside the Labour Force (LF)	1,410	2,457	3,867	1,680	2,187
Employment Rate	81.41	81.67	81.53	85.90	78.93
Job Seeking Rate (%)	18.59	18.33	18.47	14.10	21.07
% age of population under 14 years	21.27	20.89	21.08	29.74	14.29
% age of population under 14 years &	78.73	79.11	78.92	70.26	85.71
% age of population under 14 + - outside the LF	9.32	15.92	12.66	12.51	12.77
LF as % of total population	63.55	57.17	60.33	51.24	67.44
LF as % of total population 14 +	80.72	72.26	76.44	72.93	78.69

The National Skill Audit Report 2017 noted that Turks and Caicos Islanders dominated the public administration and security sectors of the economy, whereas non-islanders are largely engaged in the hospitality and construction sectors. Table 19.0 shows the labour force by industry/sector, 2014. The islands rely heavily on expatriate work to service the growing local economy.

Table 20.0: Labour Force by Industry/Sector, 2014

Industry	Male	Female	Total	Belonger	Other
Agriculture, Hunting, Forestry & Fishing	154	57	211	55	156
Mining & Quarrying	7	5	12	5	7
Manufacturing	200	169	369	95	274
Electricity, Gas & Water Supply	205	55	260	148	112
Construction	1,097	129	1,226	307	919
Wholesale & Retail, Repairs of Motor Vehicle	766	788	1,554	666	888
Hotels & Restaurant Services	2,345	2,228	4,573	1,526	3,047
Transport, Storage & Communication	567	355	922	586	336
Financial Intermediation	138	287	425	324	101
Real Estate, Renting & Business Activities	574	370	944	425	519

Public Administration, Defense etc	863	846	1,709	1,097	612
Education	154	415	569	191	378
Health & Social Work	97	274	371	136	235
Other Community, Social & Personal Service	298	342	640	186	454
Private Households with Employed Persons	160	633	793	34	759
Industry not specified	201	250	451	128	323
Total Employed Labour Force	7,826	7,203	15,029	5,909	9,120
Unemployed	1,787	1,617	3,404	970	2,434
Total Labour Force	**9,613**	**8,820**	**18,433**	**6,879**	**11,554**

2.7.2.1 Labour and skills demand construction phase

The construction phase of the Romanza on Grace Bay Townhouses and Condo Tower Development is expected to take approximately two-years, and it will generate approximately 150 construction jobs to the TCI economy during this phase of the development. Generating approximately 15 million dollars to local economy in wages and salaries.

Approximately 123 or 75% of the labour force employed during the construction phase will be Belongers and 37 04 25% expatriates.

2.7.2.2 Labour and skills demand operational phase.

The Romanza on Grace Bay Hotel and Condominium resort will be managed and operated by an international renowned brand that would bring its international management experience and flavour to the operation. Approximately 120 persons will be employed across all management and non-management levels during the operation of the hotel facility. During the operation of the facility management would mandate that approximately of 75% of the staff compliment will be Belongers and 25% expatriates.

2.7.3 Safety and security concerns within the Community

The recent spike in violent crime in the TCI, particularly on Providenciales has sent shock waves through the local, regional, and international communities, particularly those destinations where most of TCI visitors come from. The increase crime rate on Providenciales is a major source of concern for all stakeholders, the Tourist Destination Management Officer (Formerly the Tourist Board), government, the local police, and local, regional, and international tourism promotion agencies.

The once safe, peaceful, and tranquil environment that tourists and locals were once accustomed to is in jeopardy of been seriously destroyed.

The adoption of stringent security measures to ensure the safety of hotel guests and staff will be major consideration throughout the design, construction, and operational phases of the hotel facility. The designers of the facility have utilized the peculiar configuration of the site boundaries to limited accessibility to the site thereby enhancing overall security.

2.7.4 Economic impact – short-term and long-term

During the past decade, the economy of the Turks and Caicos Islands has been performing at an exceptionally high level. In 2022, the economy grew at a rate of 9 percent. The government's annual budget for the fiscal year 2023/2024 is estimated at 424 million dollars, which is aimed at achieving the government's social, economic Romanza on Grace Bay townhouses and condo development is likely to impact other sectors of the TCI economy and administration of the islands, including housing, health care, and education. The development proponents will consider these sectors during the construction and operational phases of the development.

2.8 Other relevant parameters identified during the scoping exercise.

The Terms of Reference (TOR) as issued by the DECR is extensive and covers the relevant coastal parameters.

Table 20.0 below summarises some of the key coastal parameters as results of the baseline assessment of coastal processes and dynamics in the project site's nearshore environment.

DRAFT

SECTION III

3.0 Legislative and Regulative Context

To address the rapid rate of physical development in the islands over the past three decades, the government has enacted several planning and environmental legislations that aim to ensure resilient development and strike the right balance between realizing the full potential of the tourism sector and national economic development without seriously impacting the island's fragile environment.

This section of the report examines relevant laws and regulations, including those listed below, that are appropriate to ensure that the proposed Romanza on Grace Bay Townhouses and Condo Tower Development is constructed and operated at an acceptable local and international standard.

3.1 TCI Development Plan/Master Plan

The National Physical Development Plan (NPDP) 2020 for the Turks and Caicos Islands is the legal document regulating physical development in the Islands. The Department of Planning is the government agency responsible for physical development management. Guided by the recently approved NPDP (2020), the Planning Department takes a proactive approach to developmental planning. Development proposals and applications for development permission are assessed based on their compliance with the NPDP (2020).

The NPDP (2020) noted that Providenciales, which has experienced an extensive building boom in the last two decades, is known for its numerous developments, specifically along Grace Bay. According to the National Physical Development Plan 2020, Providenciales is the densest and most populous island in the Turks and Caicos archipelago and is famous for its high-end resorts and white sandy beaches. It is considered the most 'urban' and developed; Figure 40.0 is an Area Concept Plan for Grace Bay (NPDP 2020). Grace Bay is uniquely a tourist destination and should be maintained and infilled. The Romanza on Grace Bay Townhouses and Condo Tower Development is an example of that infilled development the NPDP 2020 recommended for the Grace Bay area.

DRAFT

The NPDP 2020 reported that there is currently a very limited brand hotel presence in the TCI as compared to other competing destinations. The proposed Romanza on Grace Bay Townhouses and Condo Tower Block is a luxury style residences development, with a mixture of townhouses and condominium residences that conforms with the land use zoning, building densities and building heights for the area. There are existing developments with similar density and building heights in this area of Grace Bay including the Tuscany on Grace Bay and the Venetian on Grace Bay resorts.

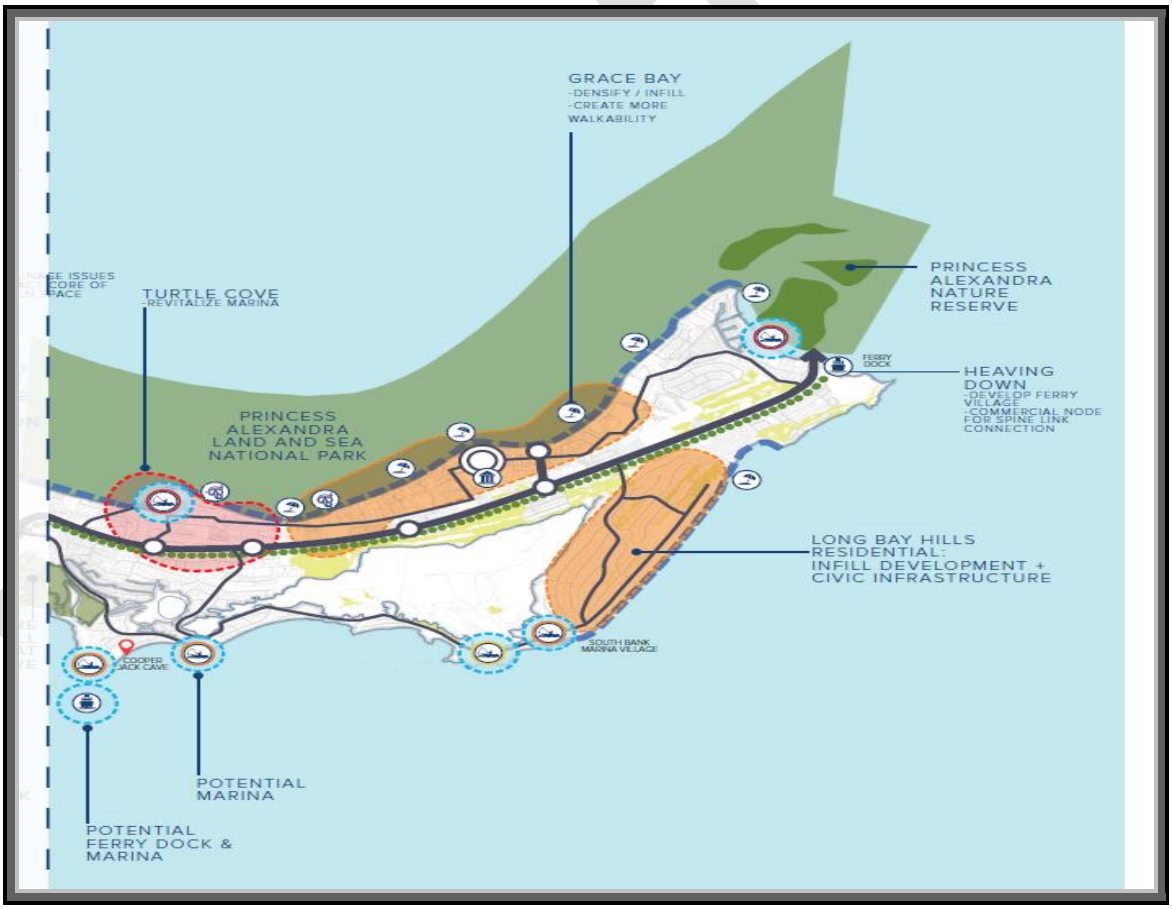


Figure 41.0 – Island Framework Plan, Grace Bay, Providenciales (NPDP 2020)

3.2 TCI National Physical Development Plan 2020

The National Physical Development Plan (NPDP) 2020 for the Turks and Caicos Islands is the legal document regulating physical development in the Islands. The

Department of Planning is the government agency responsible for physical development management. Guided by the recently approved NPDP (2020). The Planning Department takes a proactive approach to developmental planning.

Development proposals and applications for development permission are assessed based on their compliance with the NPDP (2020). The Romanza on Grace Bay Townhouses and Condominium development conforms to the land use zoning, density, and building heigh requirements of the recently approved NPDP 2020.

3.3 TCI Physical Planning Ordinance

Section 34 (1) of the Physical Planning Ordinance of the Turks and Caicos Islands (2014) authorizes the Physical Planning Board, while considering an application for hotel development, to consider several factors to make a proper decision. These factors include inter alia:

- The impact of the proposed development on the ecology of the island where it is to take place.
- The impact of the proposed development on the natural or built environment and the uses of the adjacent land, and,
- The benefits likely to accrue to and the disadvantages that may be imposed on the economic, social and welfare facilities, including prospects of employment and the effect on the infrastructure of the islands, because of the proposed development.

The Romanza on Grace Bay Townhouses and Condo Tower Development 's Terms of Reference (ToR) for this Environmental Impact Assessment Study was prepared under Section 32 (10b) of the Physical Planning Ordinance (2014) and conditions 3 and 4 of the Grant of Detailed Development Permission (PR 16016, dated September 29, 2022).

The Grant of Outline Development Permission for the Romanza on Grace Bay Townhouses and Condominium development PR. 16739 was issued by the Physical Planning Board and the Department of Planning on October 3, 2023. The Terms of Reference for this study was issued on December 7, 2022.

The Romanza on Grace Bay Townhouses and Condominium development design team has complied with the relevant standards and requirements of the physical planning ordinance and regulation of the TCI, including development guidelines and policy, the Physical Planning Ordinance (PPO), the Physical Planning Regulations (PPR), the TCI Building Code, and Development Manual.

As this project advanced to the final construction design phase, it will be guided by the requirements of the Physical Planning, Development Manual and TCI Building Code requirements

3.4 TCI Development Manual

The Turks and Caicos Development Manual specifies planning and development standards for the Turks and Caicos Islands. It provides guidelines for developers wishing to carry out development in the islands, including the erection of buildings or structures or building operations, as defined under the Physical Planning Ordinance.

The Manual provides for the following:

- A logical approach to understanding the planning and development process.
- A guide to the process – the task, the sequences, and the decision-making.
- A description of relevant techniques and standards which should guide development.

The planners, architects, and engineers for the Romanza on Grace Bay Townhouses and Condo Tower Development referenced the TCI Development Manual throughout the design and planning stage in the design process, and it was a useful source of design standards and requirements for development in the TCI.

3.5 TCI Building Code

The Physical Planning (Building) Regulations made under the Physical Planning Ordinance 2014 require any person wishing to erect a building or structure or carry out building operations as defined in the Physical Planning Ordinance to comply with such building standards as may from time to time be contained in

and published by the Department of Planning, such as the Turks and Caicos Islands Building Code.

The proposed Romanza on Grace Bay Townhouses and Condo Tower Development is designed to meet the latest edition of the Turks and Caicos Building Code requirements. The Code sets out the requirements for the use of materials and construction methods to conform to the minimum standard provided by the Code. The project is designed to consider the use of sustainable and resilient construction methods and materials to conform to the Code's minimum requirements. The building is designed to be resilient to fire hazards, hurricanes, and earthquake loads.

3.6 National Parks Ordinance

The development is located adjacent to Princess Alexandra National Park (PANP). As such, the developer is cognizant of and concerned about its overall environmental value and will continue monitoring the site to minimize the effects of construction and development activities.

PANP is a protected area consisting of both coastal and marine waters and the coastline of the northern coast of Providenciales (Figure 41.0), Turks and Caicos. This protected area includes Grace Bay Beach, The Bight Beach, The Bight Reef (Coral Gardens), Leeward Beach, Smith's Reef, and many northern barrier reefs off Providenciales. PANP was declared a national park in 1992, covering six thousand five hundred thirty-two (6,532) acres of coastal and marine waters. The TCI National Parks Ordinance (2014) makes provisions for certain types of developments to be permitted on the boundaries of a National Park for the public's enjoyment once development is carried out in an environmentally sound manner.

DRAFT



Figure 42.0 – Princesses Alexandra National Park, Grace Bay, Providenciales

Due to the natural resources of Turks and Caicos contributing an estimated economic value of 45.5 million USD per year to the tourism industry (Wolf's Company, 2016), it is important to have protected areas, such as the PANP, established to safeguard TCI's biodiversity. In addition to this, the effective management of the PANP also plays a crucial part in maintaining ecosystem balance and preserving important habitats in Turks and Caicos as the extensive mangroves and fringe reefs found within and around the reserve act as a nursery for fish species as well as protect the surrounding coastline of Providenciales from storm surges in the event of a natural disaster (Pienkowski, n.d.).

Works within PANP are limited to the creation of a swim zone. The Developer will encourage staff, residents, visitors, and guests at Romanza Grace Bay Townhouses to abide by this Ordinance. This includes but is not limited to:

- No littering, including being mindful of the wind blowing trash into the sea.
- Do not remove corals, sand, shells, and dead or alive wildlife from the beach or ocean.
- No fishing of any kind.
- Do not feed the wildlife, including fish, turtles, birds, and reptiles.
- Do not walk on the dunes; walking should be limited to the walkways
- No open fires without a proper permit and license from the Department of Environment & Maritime Affairs (DEMA).
- Noise should be kept to a minimum.

3.7 Coastal Protection Ordinance and Subsidiary Legislations

The development is located along the coastline, and as such, it will abide by the articles set out in the Coast Protection Ordinance. Coastal works are limited to recreating a swim zone.

In abiding by the Coast Protection Ordinance, sand will not be dug or removed from the beach, and the Developer will discourage staff, residents, visitors, and guests at Romanza Grace Bay Townhouses from littering or depositing waste along the coast. Solid Waste Management for operations and construction will be followed to ensure waste is properly disposed of and is not blown onto the coast and into the open water.

3.8 Mineral (Exploration and Exploitations) Ordinance and Subsidiary Legislations

Mineral Resources are the most precious assets of the nation which need to be protected and subjected to reasonable use to satisfy the short-term needs for mineral materials and the long-term goals of social and economic development. The Minerals (Exploration and Exploitation) Ordinance and Subsidiary Legislation 2014 of the Turks and Caicos Islands make provisions concerning the management and protection of mineral resources regarding geological exploration, mineral exploitation, and protection of untapped mineral resources.

During the construction phase of the proposed development, the requirements of the Mineral (Exploration and Exploitation) Ordinance of the TCI will be adhered to. However, the project would not directly or indirectly involve mineral exploration or exploitation activities.

3.9 Marine Pollution Ordinance and Subsidiary Legislation

The development is located adjacent to open water, so the developer will continue monitoring the site to minimize the effects of construction and development activities. Pollution of the marine environment is unlikely to happen as no direct work is scheduled for the marine environment.

The Developer will encourage staff, residents, visitors, and guests at Romanza Grace Bay Townhouses to abide by proper Solid Waste Management Protocols to ensure that debris does not enter the marine environment. They will also ensure the proper collection and storage of waste for disposal.

3.10 Fisheries Protection Ordinance and Subsidiary Legislation

As the development is adjacent to the PANP, fishing or removal of marine life, including corals, is prohibited (National Parks Ordinance).

Destructive fishing practices such as using explosives, toxic substances, electricity, dredging, suction, and trawling devices for fishing are detrimental to fisheries and the marine ecosystem. They are prohibited under the Fisheries Protection Ordinance. The construction and operation of the proposed Romanza on Grace Bay Townhouses and Condo Tower Development will conform to all requirements under the Fisheries Protection Ordinance (2014).

The management of the hotel facilities would not engage directly in activities such as fishing excursions, scuba diving, or snorkeling; these activities would be outsourced to third-party vendors.

During the operation of the hotel facility management would adhere to the Fisheries Protection Ordinance (2014) requirements, particularly as they relate to sourcing, preparation, and serving seafood.

3.11 Wild Birds Protection Ordinance

Due to the proximity of open water, seabirds and shorebirds may be encountered along the coast. The Development will abide by the Wild Bird

Ordinance, and staff, residents, visitors, and guest at Romanza Grace Bay Townhouses will be discouraged from:

- Killing, wounding, or attempted killing or wounding of Wild Birds.
- Taking, removing, or destroying nests or eggs.
- Selling any Wild Bird or parts of a Wild Bird that may have been killed, wounded, or taken.
- Selling of Wild Bird nests or eggs.

Should a wounded Wild Bird or a Wild Bird nest or eggs be discovered, the area will be sectioned off, and officials from the Department of Coastal Resources (DECR) will be contacted for further steps.

3.12 International Treaties and Conventions

International Treaties and Conventions are laws and agreements that govern international maritime affairs and ship pollution prevention. The three main categories that international conventions address include maritime safety, Prevention of maritime pollution, and liability and compensation, especially concerning damage caused by pollution.

The Romanza On Grace Bay Townhouses and Condominium development project will abide by any appropriate international treaties and conventions during its design, construction, and operational phases, particularly regarding operational standards and practices.

3.13 Turks and Caicos Islands Vision 2040

Vision 2040 of the Turks and Caicos Islands is a rallying call for the Government and people of the Islands. The Government will spearhead it through progressive policies and legislation. The vision foresees a united Turks and Caicos Islands by 2040 that will be a global leader in all levels of prosperity and human development. The Island's people will be positioned to be fully responsible for their collective future as a nation. There will be a more resilient country that balances economic, social, and environmental development for the significant benefit and prosperity of all the people of the islands,

However, the degree to which Vision 2040 can be attained will depend mainly on the strength of the planning systems and mechanisms implemented. The Department of Planning development guidelines and environmental standards will assist in achieving this vision for the future.

3.14 Turks and Caicos Islands Environmental Charter 2021

The Turks and Caicos Islands Environmental Charter 2021 is a set of environmental commitments between the United Kingdom Government and the Government of the TCI. In it the TCI Government is committed to protecting the Amos of the United Kingdom on September 26, 2001, includes a set of guiding principles that the U.K Government and the TCI Government and for the people of the TCI to integrate environmental conservation and planning policies for implementation in the TCI. The EIA study is guided by this Charter. These guiding principles include the following:

1. To recognise that all people need a healthy environment for their ell-being and livelihoods and that all can help to conserve and sustain.

2. To use our natural resources wisely, being fair to present and future generations.

3. To identify environmental opportunities, cost and risks in all policies and strategies.

4. To seek expert advice and consult openly with interested parties on decisions affecting the environment.

5. To aim for solutions which benefit both the environment and development.

6. To contribute towards the protection and improvement of the global environment.

7. To safeguard and restore native species, habitats and landscape features and control or eradicate invasive species.

8. To encourage activities and technologies that benefit the environment.

DRAFT

To control pollution, with the polluter paying for the prevention or remedies.

9. To study and celebrate our environmental heritage as a treasurer to shre with our children.

3.15 Turks and Caicos Islands Climate Change Charter 2021

Due to the low-lying nature of small island states like the Turks and Caicos Islands, climate change poses significant challenges to the TCI, including coral bleaching because of higher temperatures; reduce rainfall because of changing weather patterns will up a stain on already limited water supplies and rising sea-levels with contribute to flooding of coastal areas and the complete undulation of some coastal areas.

The Turks and Caicos Climate Change Charter 2021 is a set of principles and actions adopted by government to address the impacts from climate change in the islands. Some of the principles, actions and strategies that are incorporated into environment conservation polices, planning and development policies include the following:

1. Protect the environment by utilizing natural resources wisely, and safeguard and restore native species and habitats.

2. Conserve Water by ensuring a sustainable supply of fresh water.

3. Encourage Green Economy by incorporating "Smart Economy" strategies and diversification of the economy.

4. Improve Infrastructure – Harding economic and social infrastructure.

5. Improve Health, by enhancing and protecting human health.

6. Raise Awareness by communicating the value of natural assets and show how to manage them sustainably.

7. Involve stake holders and seek expert advice and consult opening with interested parties.

8. Consider Environmental Impacts – Identify environmental opportunity cost, risk in all policies and strategies.

The impact of climate change on the proposed development was addressed in detailed in other sections of this report and mitigation measures are recommended to address identified climate change impacts.

3.16 Others relevant laws and regulations

Other appropriate laws and regulations that planners, architects, engineers, and managers have considered during the design and would consider during the construction and management of the Romanza on Grace Bay Townhouses and Condominium facility are the Fire Services and Prevention Ordinance, the Crown Land Ordinance, the National Parks Ordinance, and Public and Environmental Health Ordinance.

The Fire Service and Prevention Ordinance applies during the hotel facility's design, construction, and operational phases to ensure that it adheres to local and international fire code requirements.

The Crown Land Ordinance is appropriate because Crown land is involved with the proposed development. A portion of the site (60905/204) is leased from the Crown and the Government of the TCI under a special lease agreement.

DRAFT

SECTION IV

4.0 Project Description of Construction and Operation and Alternatives

The Romanza Grace Bay Townhouse and Condominium Development will be constructed on the Northeastern Coast of Providenciales. The property is located within the Grace Bay Settlement and is bounded by the Princess Alexander National Park (PANP) on the northern side.

The parcel of land dedicated to The Project is seven (7) acres. The proposed work includes constructing thirty-two (32) townhouse units, including swimming pools, a poolside bar, a restaurant building, a reception/gym building, a staff building, a tennis and sports court, a garage enclosure, a boardwalk, and a gatehouse. There are no proposed marine works scheduled for The Project. Still, due to the nearby protected area (PANP), construction works should be monitored to ensure environmental impacts are avoided or reduced.

4.1 Description of the proposed project/components

The Romanza development is poised to provide a luxury townhouse and high-rise condo experience for owners and patrons. The narrow shape of the property has been maximised to provide a clear look out to the sea from most houses or apartments. Romanza is located on the exposed northern shoreline of Providenciales which increases the vulnerability of the property to future climate change impacts such as more frequent storms.

Over the long-term, with the option in place, the development will benefit from reduced exposure to hazards such as hurricanes. To achieve this goal, it is important that the design criteria are outlined with possible natural hazards considered. The design criteria can then be used to outline possible concepts that are technically feasible for the area. Finally, other factors such as permitting, costs and possible impacts should be used to produce an optimal concept for the project area.

Under the sub-consultancy arrangement set out, the focus of option development is confined to the property with the aim of reducing surges. Other features such as land grading, general landscaping, building services and

building floor plans are assumed to be addressed within other subsections of this EIA.

Plan

Swim Zone

The scope of work for the existing beach in front of the property includes creating a swim zone and installing beach equipment such as chairs and umbrellas.

Swim Zone

The swim zone is approximately one hundred thirty meters (130 m) in length and will extend approximately one hundred meters (100 m) from the shoreline. It will be designated with anchored buoys to prevent boats from entering the area. No dredging is required to create a swim zone.

Beach Equipment

Beach equipment such as chairs, beach shade, and beach umbrellas will be placed on the beach to facilitate beachgoers once The Project is completed.

Equipment

No heavy equipment is required for the creation of the swim zone. The proposed works are as follows:

- Attaching anchors to the Buoys
- Placing Buoys and anchors in a semicircle configuration in the shallow water.

4.2 Project Justifications

Turks and Caicos is renowned for its beaches, which attract many tourists to the country every year. The development seeks to ensure that both locals and tourists have access to some of Turks and Caicos' best qualities. In turn, the increase in tourism in the area will directly and indirectly benefit nearby communities.

DRAFT

The development plans to create a swim zone and install beach amenities such as chairs and umbrellas. These amenities will attract beachgoers and encourage them to spend more time in Providenciales. Furthermore, the creation of a swim zone will provide safety for swimmers as the area has high boating traffic.

The habitat near the shore consists of bare sand void of flora and epifauna. Seagrass, sand with rubble, and agal-dominated sandy bottom patches are further offshore. The placement of buoys and an increase in beachgoers are not expected to impact on the marine benthic community.

4.2.1 Project Justification Socio-economic

Whilst the target market for the proposed luxury residences is tourism, the impact of this development has the potential of assisting the government in meeting its housing targets as some of the units may be occupied by long-term residents.

Direct and indirect economic benefits to the government of the TCI in the form of duties, resort bed tax and resort fees. Direct and indirect benefits to the community in the form of employment opportunities during the construction and operational phases of the development. The residents of Providenciales will benefit from frequenting the associated amenities, like bars and restaurants. The development will generate direct and indirect economic benefits to the patrons.

4.2.2 Project Justification Ecological

With these environmental and physical concerns as a framework for the design, the objectives for the concepts developed are:

- Reduce storm surge inundation on site during severe events.
- Confine all options to within the property area.
- Maintain the vegetation line, so that, regulatory setback lines are maintained.
- Promote the inclusion of vegetation in the options to match surrounding properties.
- Provide a sea-view for houses on the property.

DRAFT

The justification for the coastal intervention is based on the compounding threats of climate change. Climate change impacts include slow moving threats like sea level rise. However, a more pressing threat is the projected increase in the frequency and ferocity of hurricanes within a given hurricane season (IPCC, 2021). This may lead to multiple major storms passing within a year as in 2017 with Hurricane Irma and Maria.

For the case of Romanza, implementing preventative coastal works provides resilience along a coastline. Resilience is regularly defined as the ability to "bounce back" or "adapt". With properly designed coastal works in place there would be less coastal inundation on the property. This would reduce the amount of damage to infrastructure, reduce downtime needed to recover after a hurricane's passage and provide safe shelter for owners or other guests.

4.3 How the proposed project will affect erosion or accretion.

Sediment transport patterns were studied in two forms, short-term and long-term. Short term movement was looked at through the simulation of a swell event and hurricanes. Sediment moved from the back of beach area to the underwater base of the beach slope. The site was not affected by swell waves and therefore the proposed on-land solution would not affect the regime in the short-term. However, significant dune erosion of up to 1.7m was modelled in the storm events. In these cases, sand from the property dune would be eroded and deposited onto the beach face.

Long term trends were investigated using satellite imagery and the average wave climate. Imagery showed that the beach is dynamically stable, with an average rate of change of +0.3m/yr. over the images assessed. Assessing the annual wave climate showed that the net sediment transport is to the southwest in a 20m band around the waterline. Figure Error***! No text of specified style in document.*** shows the LitDrift results for the proposed option (described in Section **Error! Reference source not found.**) which show similar results as under existing conditions.

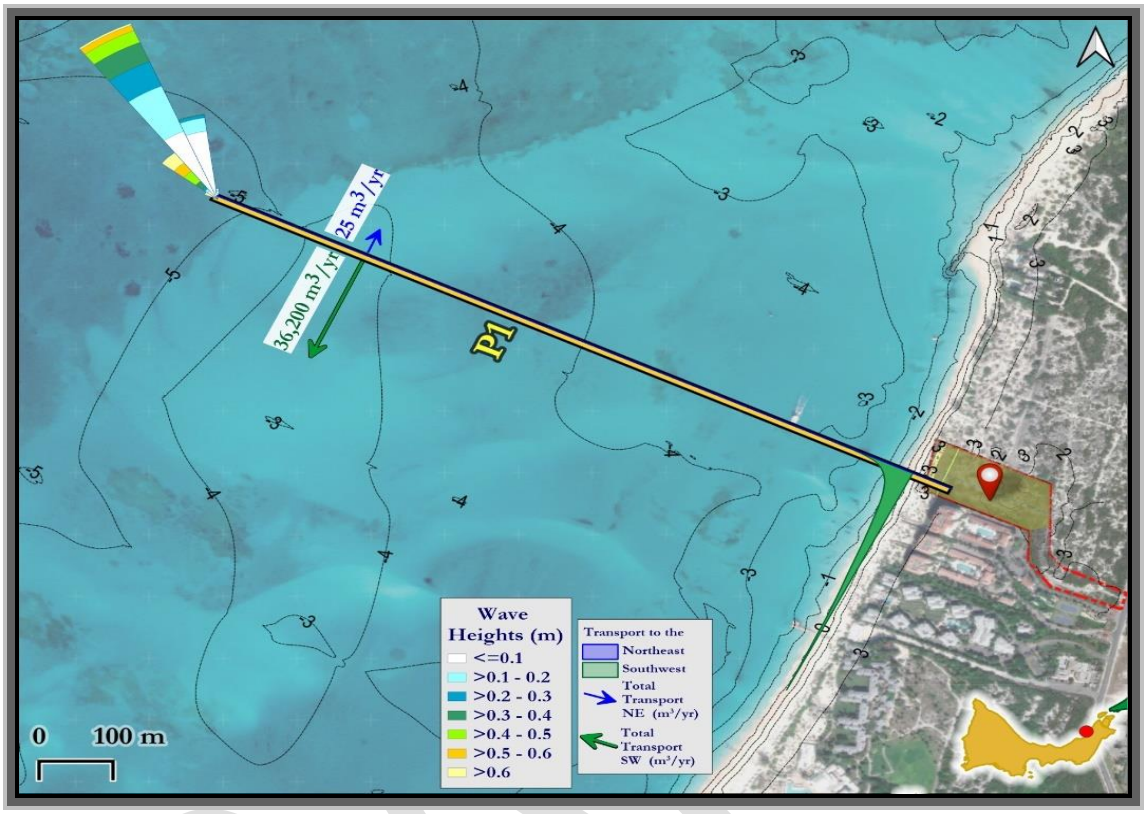


Figure Error! No text of specified style in document.3.0: LitDrift result with proposed option in place.

The proposed design will be confined within the property boundary which will not affect long-term processes around the waterline. With the concept in place, there will be less erosion on the property during hurricane events while other wave events will have a similar erosion/accretion pattern. The calculated differences in storm erosion/accretion on the property is explored in Section 2.5.3.

4.4 Coastal/beach development and management – beach access

The Romanza property has a dune at its boundary towards Grace Bay with an average elevation of +3.2m above MSL. The property is setback 15m to 30m from the waterline and is not predicted to be adversely affected by daily conditions or swells. However, the design storm simulations showed inundation of the entire measured profile, which would impact the townhouses. Thus, the previously described design considerations and criteria were used to develop an option

that would fit the overall aesthetic of the shoreline and provide protection against coastal inundation in major hurricanes.

Features of the design concept include:

- Maintaining the "sea view" by having two fill levels on the property which strike a balance between protection and openness.
- Increasing the dune crest elevation to +3.7m above MSL and side slope of 1(V):3(H) (with 530m^3 of sand).
- Planting suitable drought and salt resistant vegetation onto the dune to strengthen it.
- Excavating 750m^3 of in situ material to place a buried revetment which will reduce scour on the property and provide a source of sand for the dune heightening.
- The 30m-wide buffer zone between the vegetation line and the property setback would also be raised to +3.7m above MSL. It is anticipated that the landscape architect on the team would properly incorporate vegetation to further strengthen the fill material.
- Recommending a finished floor level of +4.5m above MSL. This level was determined from calculating the maximum run-up level for the 100-year storm and adding a 0.3m freeboard.
    - This has been incorporated into the concept as a fill volume for the building footprint (13,000m^3). This volume was based on an estimate of 40% of the property being used for buildings. The construction method for this level has been left up to the discretion of the civil engineering team on the project.
    - The entrance road would slope up to the building finish floor levels at a 1(V):40(H) slope.

Views of the design plan and typical cross section are shown in Figure 43.0 and Figure 44.0. The dashed red line represents an estimate of the property boundary based on plans shared with the consultant. The option footprint is to be entirely confined within the property boundary. In Providenciales, the setback line is an offset of the vegetation line. Therefore, if the vegetation line is

moved, the setback line is also moved. To prevent a shift of the master plan, the vegetation line was maintained.

DRAFT



Figure Error! No text of specified style in document.4.0: Design option plan view showing overall fill zones.

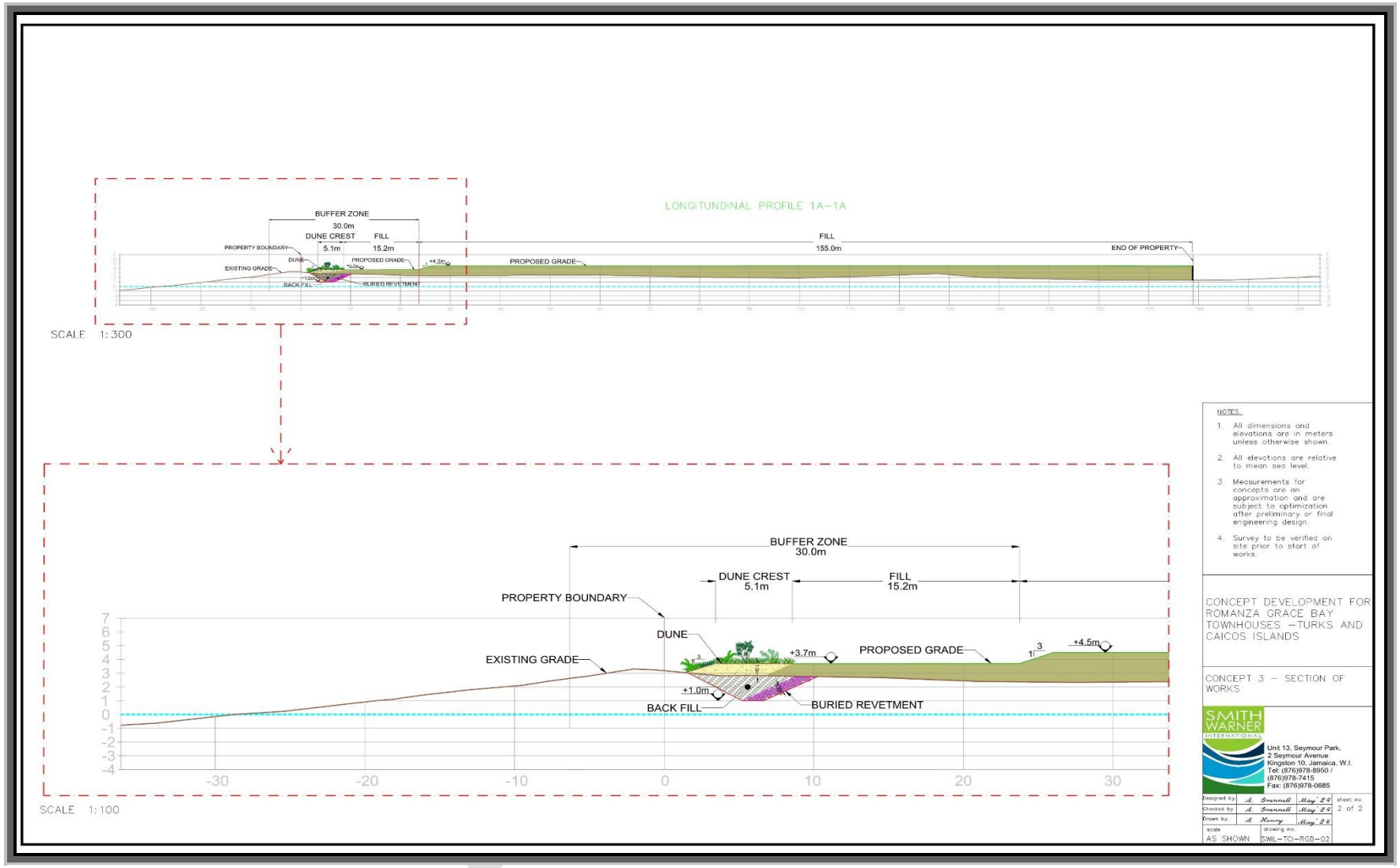


Figure Error! No text of specified style in document.5.0: Design option typical cross section.

The design option also requires small boulders and fill material. Boulders would have a mean diameter of 0.3m and diameter range of 0.25m to 0.35m. 50% of the boulders placed should fall within the middle third of the size range. The design worksheet for the revetment is shown below in Table 21. 0.

Table 21.0: Boulder sizing for buried revetment

Revetment Design Worksheet

Client: Oswald Williams
Project: Romanza Grace Bay
Designer: Ashley-Jade Grennell
Date: May 20, 2024

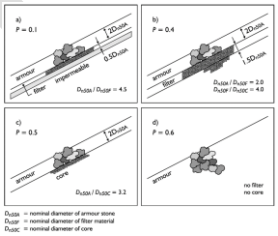
Physical Design Parameters

Foreshore slope (cot alpha)	1:10	-
Foreshore slope (decimal)	0.100	-
Armour unit density (phor)	2500	kg/m3
Water density (phow)	1025	kg/m3
Buoyant density (s)	1.44	-
Structure slope (cot alpha)	1.5	>=1.5
stability coefficient (K_d)	2	-
Damage number (S_d)	2	-
No. of units displaced per Dn (N_{od})	0.2	-
Structure Permeability (P)	0.6	-

Design Wave Parameters

Wave height at Toe ($H_{s,toe}$)	0.95	m
Water depth at toe of structure (h)	0.3	m
Peak wave period (T_p)	16.7	s
Duration of storm	8	hrs
Transitional wave height (H_{tr})	0.28	m
Root mean square wave height (H_{rms})	1.25	m
H_{tr}/H_{rms}	0.22	-
Wave height exceeded by 2% of incident	1.93	m

Notes



Slope (Iribarren) Parameters

mean energy wave period (Tm-1,0)	15.18	s
Iribarren no. $\xi_{s-1,0}$	13.0	-
Mean wave period (Tm)	13.92	s
no. of waves (N)	2069	no.
wave steepness	0.00	-
iribarren no. (ξ_m)	11.9	
Deep water ξ	3.8	*surging*
Shallow water ξ	3.8	*surging*
Very shallow water ξ	3.9	*surging*
$h/H_{s,toe}$	0.3	

Filter and/or Core Layer Specifications

D_{50A}/D_{50F}	-	
D_{50F}/D_{50C}	-	
D_{50A}/D_{50C}	-	

Gradation Notes and Factors

Rounded rock is less stable than equant rocks. Damage generally greater than predicted by van der Meer for widely graded armouring.

Narrow graded armour D_{85}/D_{15} = 1.25 to 1.5	1.25
Widely graded armour D_{85}/D_{15} = 2 to 5	1.5
Widely graded rip rap D_{85}/D_{15} = 2.25 to 2.5	3

Rock Sizing Table (By Equation)

Van der Meer - Deep Water $h/H_{s,toe}$>3

Armour Layer	Nominal	Range	Filter Layer	Nominal	Range	Core Layer	Nominal	Range
D_{n50} (m)	0.20	(.18 - .22)	D_{n50F} (m)			D_{n50C} (m)		
$D_{n50,max}$ (m)	0.38	(.34 - .43)	$D_{n50F,max}$ (m)			M_{50C} (kg)		
M_{50} (kg)	20	(14 - 27)	M_{50F} (kg)					
$M_{50,max}$ (kg)	142	(100 - 195)	$M_{50F,max}$ (kg)					
Layer thickness (m)	0.4		Layer thickness (m)					

Van der Meer - Shallow Water $h/H_{s,toe}$ <3

Armour Layer	Nominal	Range	Filter Layer	Nominal	Range	Core Layer	Nominal	Range
D_{n50} (m)	0.29	(.26 - .33)	D_{n50F} (m)			D_{n50C} (m)		
$D_{n50,max}$ (m)	0.56	(.5 - .62)	$D_{n50F,max}$ (m)			M_{50C} (kg)		
M_{50} (kg)	64	(45 - 87)	M_{50F} (kg)					
$M_{50,max}$ (kg)	435	(306 - 597)	$M_{50F,max}$ (kg)					
Layer thickness (m)	0.6		Layer thickness (m)					

Van Gent - Very Shallow Water $h/H_{s,toe}$ =1.5,2

Armour Layer	Nominal	Range	Filter Layer	Nominal	Range	Core Layer	Nominal	Range
D_{n50} (m)	0.32	(.28 - .35)	D_{n50F} (m)			D_{n50C} (m)		
$D_{n50,max}$ (m)	0.56	(.5 - .62)	$D_{n50F,max}$ (m)			M_{50C} (kg)		
M_{50} (kg)	79	(56 - 109)	M_{50F} (kg)					
$M_{50,max}$ (kg)	435	(306 - 597)	$M_{50F,max}$ (kg)					
Layer thickness (m)	0.6							

DRAFT

Fill material shall be unwashed granular material. Material for filling shall be clean, non-combustible, and free of deleterious or organic material. Fill material should generally be placed in layers and uniformly compacted to the elevation and slope requirements as stipulated by the design team. Each layer of material must meet the required compaction before it is covered with the next layer. Material testing is expected during the compaction process to ensure that each layer is compacted properly.

A rough order of magnitude costing has been done for the proposed option. This costing assumes that fill and boulders will be locally sourced from available stockpiles. No allocation has been made for the importation of material in this costing. The costing also assumes that a percentage of the excavated volume is reused as dune sand material.

Table 22.0 Cost estimate for dune and filling works on the Romanza property.

Romanza Property
Engineers Estimate for Option 3
Date: June 07, 2024
Issued for: Oswald Williams

No.	Description	Lower Limit	Upper Limit
1.0	Bill No. 1 - General Items		
1.01	Mobilization and Demobilization of Plant and Labour	$4,000.00	$6,000.00
1.02	Communications, Transportation, Employee Welfare and Safety	$17,000.00	$24,000.00
1.03	Surveying	$11,000.00	$16,000.00
1.04	Insurance	$5,000.00	$8,000.00
	Sub Total	**$39,000.00**	**$53,000.00**
2.0	Bill No. 2 - Buried Revetment		
2.01	Excavation	$13,000.00	$19,000.00
2.02	Supply of Local Boulders	$31,000.00	$43,000.00
2.03	Place and Shape Local Boulders	$22,000.00	$30,000.00
	Sub Total	**$67,000.00**	**$90,000.00**
3.0	Bill No. 3 - Dune		
3.01	Place Sand	$49,000.00	$66,000.00
	Sub Total	**$49,000.00**	**$66,000.00**
4.0	Bill No. 4 - Raising Land		
4.01	Purchase and Deliver Marl	$319,000.00	$426,000.00
4.02	Place and Compact Marl	$97,000.00	$130,000.00
	Sub Total	**$416,000.00**	**$556,000.00**
	Total	**$571,000.00**	**$765,000.00**

DRAFT

Impact Assessment

Under the guidelines of the Terms of Reference for the EIA submission, impact modelling results within a 5km radius of the site should be presented. Table 23.0 summarizes the events tested and the impacts with the proposed concept in place. Given that the concept does not interact with the nearshore of the property there are few to no impacts under most wave events after the concept has been implemented.

Table 23.0: Wave event impacts after the concept implementation

Wave Event	Area of Impact	Impact
Daily Wave	5km radius of site	Negligible
Tidal Currents	5km radius of site	Negligible
Swell Event Currents	5km radius of site	Negligible
Swell Event Waves	5km radius of site	Negligible
Hurricane Event Surges	5km radius of site	Negligible
Hurricane Event Inundation	Property Boundary	Positive
Hurricane Event Waves	5km radius of site	Negligible

2-Dimensional plots are presented in the following figures that show various modelling scenarios for existing and proposed conditions. These results are shown for daily waves (Figure 45.0), 99th percentile waves (Figure 46.0), average wave generated currents (Figure Error***! No text of specified style in document.-2***), and 99th percentile wave-generated currents (Figure 47.0). The results show that there is no appreciable wave climate change in conditions from before to after the concept is put in place.

DRAFT

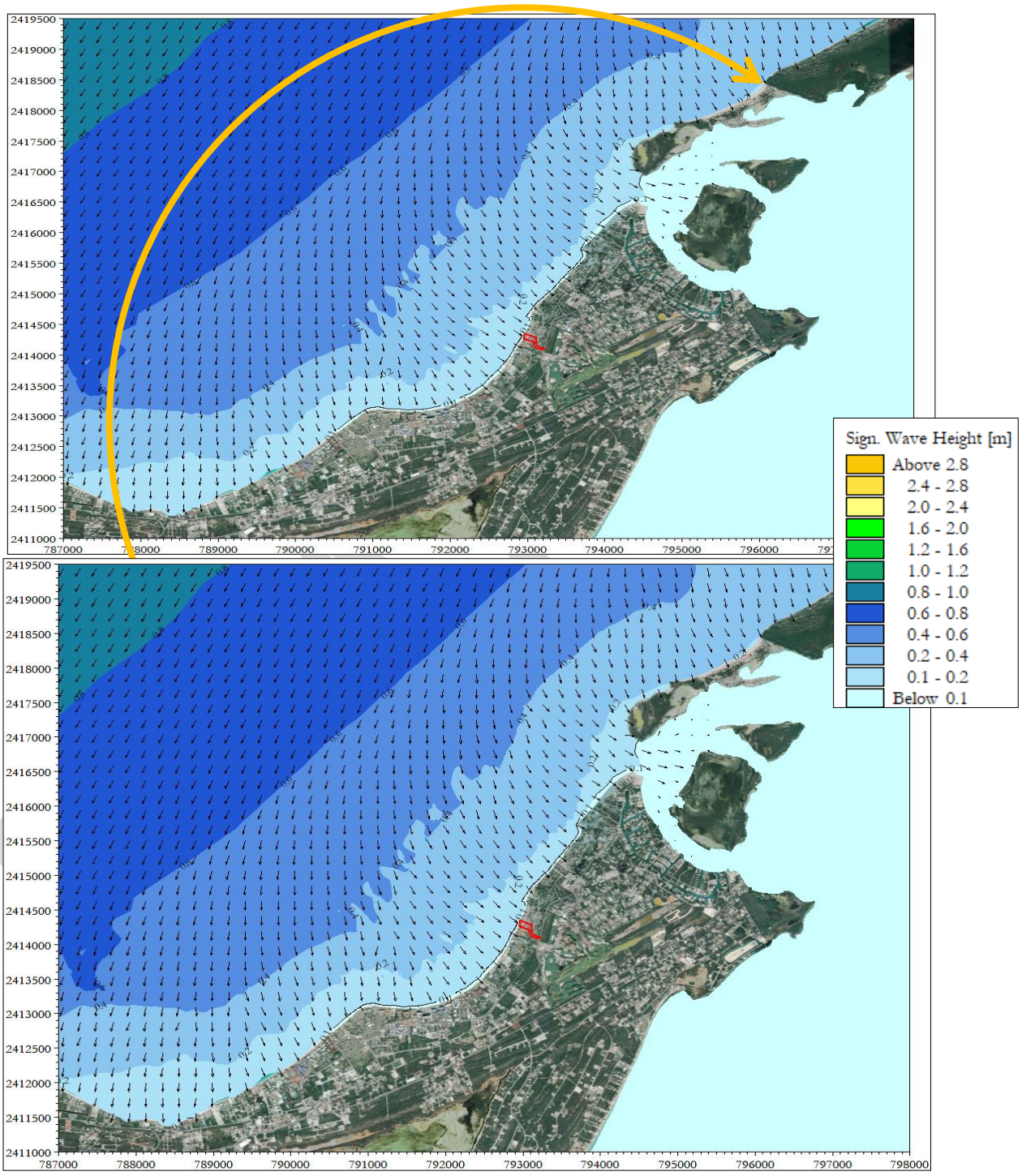


Figure Error! No text of specified style in document.6.0: Daily waves modelling of existing (baseline) and proposed conditions within a 5km radius.

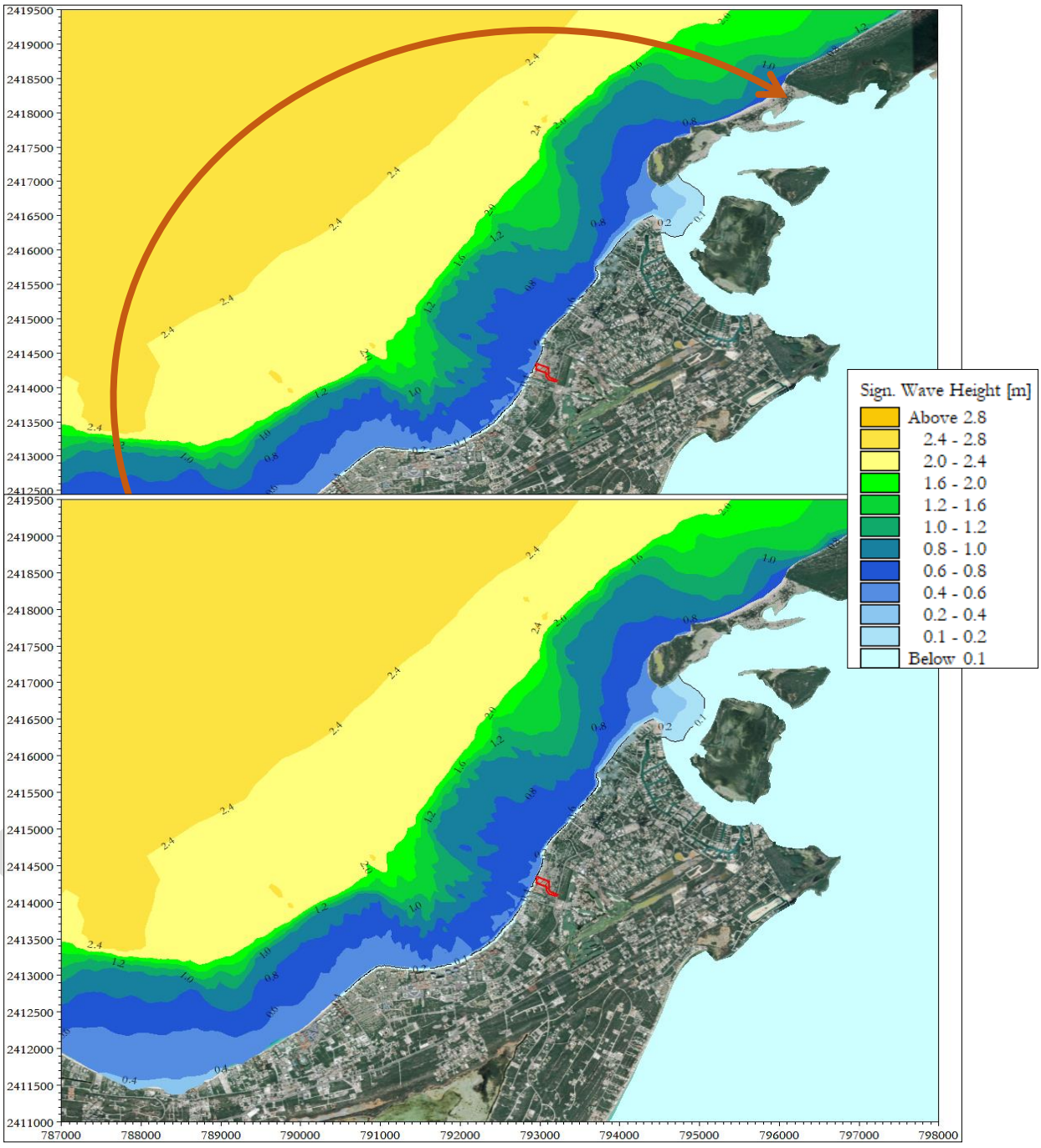


Figure Error! No text of specified style in document.7.0 99th percentile waves under existing (baseline) and proposed conditions within a 5km radius.

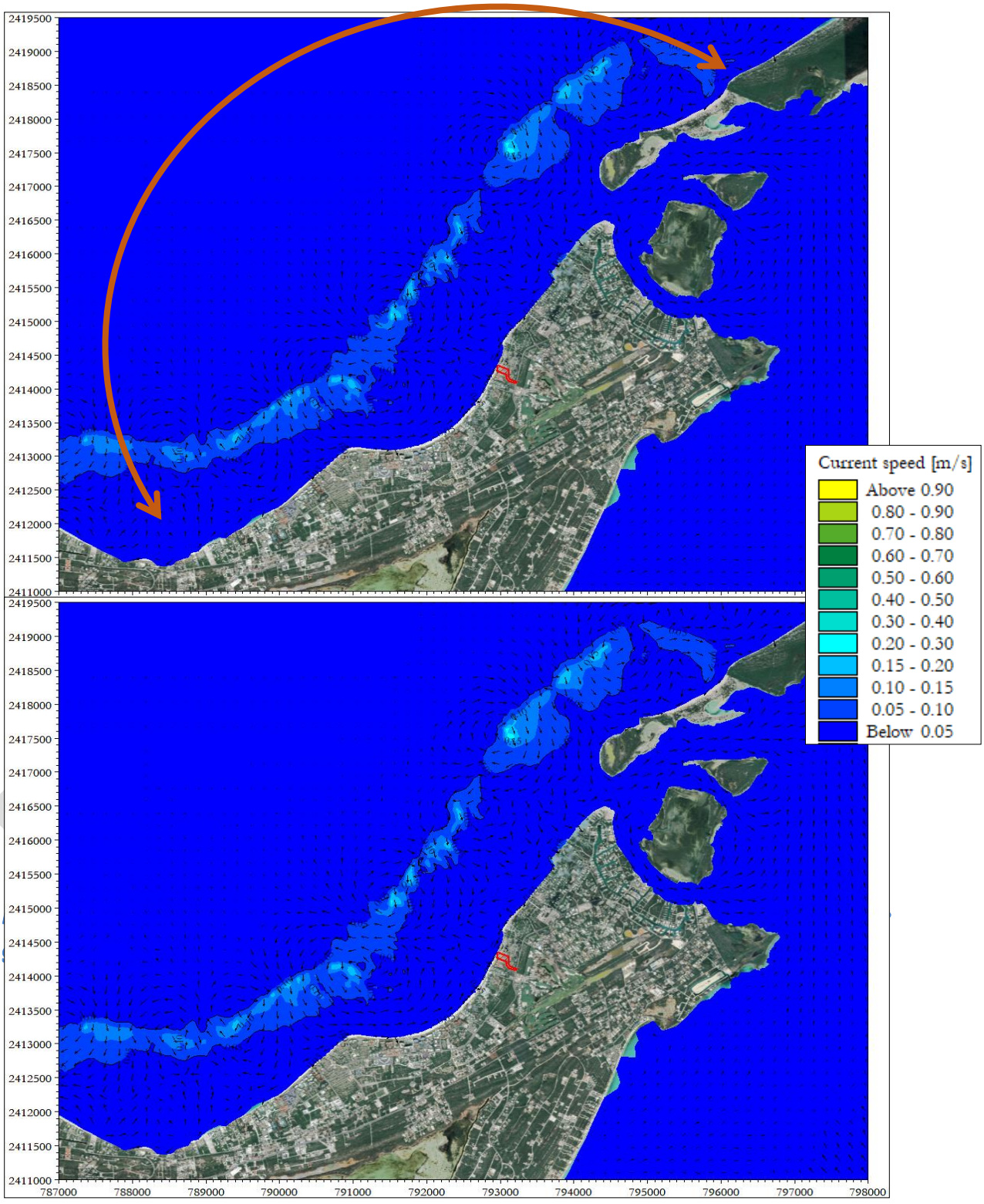

Current speed [m/s]
Above 0.90
0.80 - 0.90
0.70 - 0.80
0.60 - 0.70
0.50 - 0.60
0.40 - 0.50
0.30 - 0.40
0.20 - 0.30
0.15 - 0.20
0.10 - 0.15
0.05 - 0.10
Below 0.05
2419500
2419000
2418500
2418000
2417500
2417000
2416500
2416000
2415500
2415000
2414500
2414000
2413500
2413000
2412500
2412000
2411500
2411000
787000
788000
789000
790000
791000
792000
793000
794000
795000
796000
797000
798000

Figure 48.0: proposed conditions within a 5km radius.

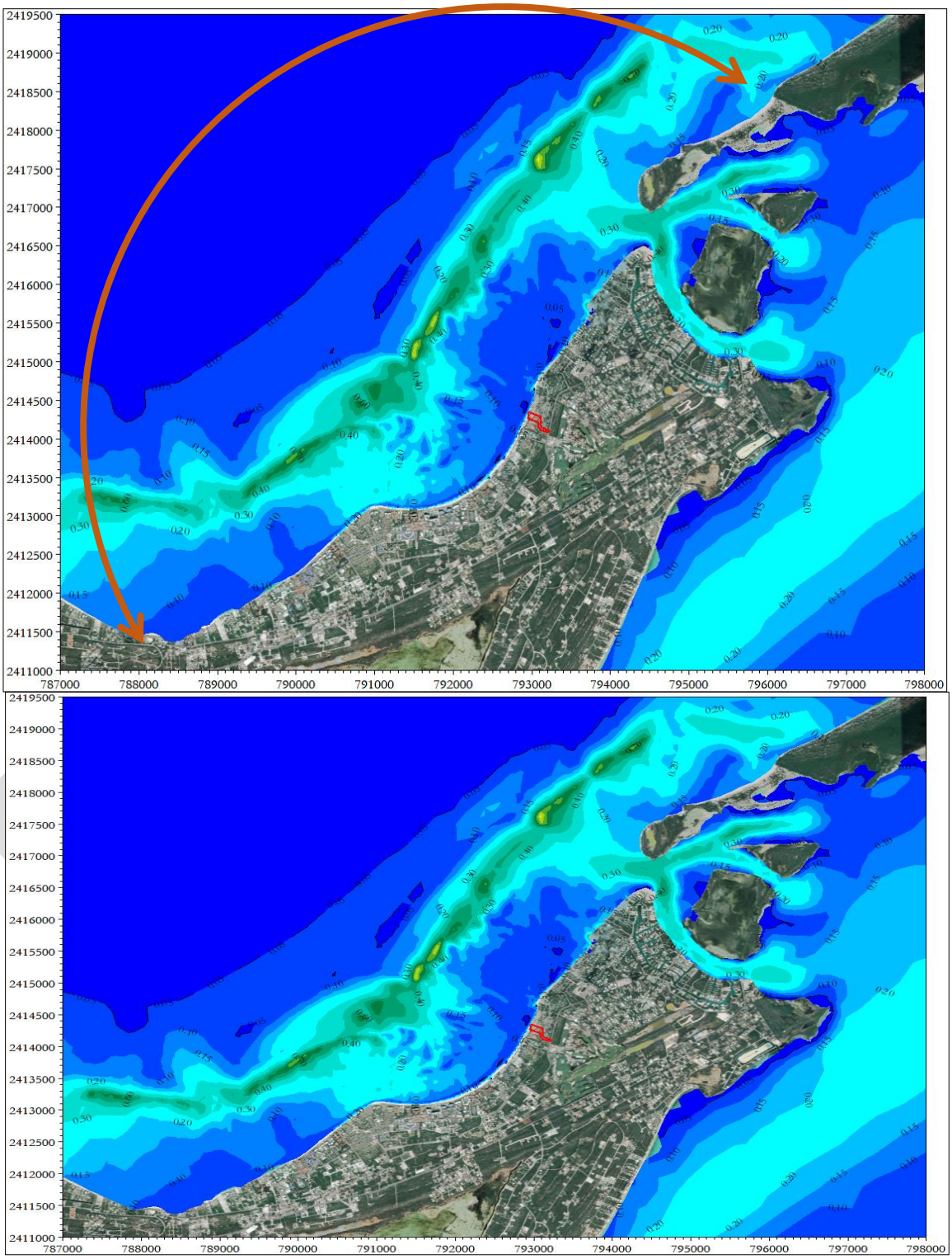


Figure Error! No text of specified style in document.9.0: 99th percentile wave-generated currents under baseline and proposed conditions within a 5km radius.

4.5 Solid waste management during construction and operation

Solid waste management means the collection, treatment and disposal of solid materials that are discarded because it has served its purpose and is no longer useful. Improper disposal of solid waste can create unsanitary conditions, and these conditions in turn can lead to pollution of the environment and to outbreaks of vector borne disease – that is diseases spread by rodents and insects.

The Environmental Health Department regulates the collection, treatment and disposal of solid waste and sewage in the Turks and Caicos Islands. It does so, within the framework of the Public Health Ordinance and Regulations (2014).

4.5.1 Solid waste management construction phase

During the construction of the Romanz on Grace Bay townhouses and condo development solid waste would be collected on a daily basis and stored in garbage disposal containers and carried to the public waste disposal site.

4.5.2 Solid waste management operational; phase

During the operational phase of the townhouse and condo facility garbage bins will be placed at strategic locations throughout the site for the collection and disposal of sold waste. Solid waste from the various waste generated entities on the property would be collected and sorted for recyclying, those waste items that are not recyclable would be stored and transported to the public solid waste disposal site by a private solid waste disposal company.

The existing solid waste dump on Providenciales has presented environmental management challenges to government during the past decade, particularly the outbreakes uncontrable fires that have caused public health concerns to residents in the area. Whilst there are studies underway to develop proper and safe options to the present open landfill arangements. The proposed Romanza on Grace Bay townhouses and condo facility will increase the volume of solid

waste going to the public dump, thereby constributing to the island-wide solid waste management problems.

What is urgently needed to properly, efficently and safely addressed the present solid waste management challenges on Provideciales is a proper solid waste management policy that makes provision for proper sanitary landfill. The goal of the sanitary landfill should be to prevent environmental contamination and to protect public health. Government is has engaged the Caribbean Development Bank to assist with the modernization of the Providenciales solid waste dump site. Studies are ongoing to develop workable solutions to the island's solid waste management challenges.

Recovery and recycling

Recycling is the process of converting waste products into new products to reduce energy usage and consumption of fresh raw materials. Recycling is the third component of Reduce, Reuse and Recycle waste hierarchy. The idea behind recycling is to reduce energy usage, reduce volume of soild waste that goes to the landfill, reduce air and water pollution, reduce greenhouse gas emissions and preserve natural resources for future use. Recycling is widely used around the world, with plastic, paper and metal leading the list of the most recyclable items.

The volume of waste going to the landfill from the Romanza on Grace Bay townhouse and condo facility during the operational phase could be substantially reduced if waste management recycling programs like the separation of cans, bottles and paper is done and send to a recycling plant.

The Romanza on Grace Bay townhouses and condo facility's management goal is to maintain and preserve the natural beauty of the TCI, by reducing the volume of waste that goes into the landfill. It will join the many hotel resorts on Providenciales that utilize existing solid waste management services and facilities on the islands.

4.6 Surface-water run-off management/Stormwater run-off and treatment

The, take water away from the property and protect human health. TCI Physical Planning Ordinance (2014) requires that a "storm water" drainage plan be

submitted along with applications for infrastructure development permission. A good storm water drainage plan makes it possible to collect and manage storm water runoff (rain) to minimize flooding

The Romanza on Grace Bay project's site drainage plan is designed to provide sufficient storm water drainage system for the conveyance of storm water runoff from the subject property, with due allowance to avoid runoff to adjacent properties. Figure 55.0 is a stormwater the plan for drainage site.

4.7 Traffic flow and safety (marine and coastal)

The safety and security of patrons, snorkelers, swimmers, sun-bathers, and boat operators is of paramount importance to the facility management. To ensure a safe environment for marine activities within the near shore coastal area it is important that the various recreational activities within the coastal marine environment be properly planned and layout by zones. For example, designating areas as swim only zones and providing boat access lanes where appropriate. Demarking this area with buoys is the most common way of dealing with the conflict between swimmers and motorized boats.

To provide a safe swim-zone for the Romanza on Grace Bay townhouses and condo guests, the marine area immediately in front of the hotel property will be zoned for recreational activities. A swim zone and boat access lane will be marked off by demarcation of buoys. Motorized boats will be prohibited from entering the swim zone. The existing swim zone in front of the property will be removed and replaced with a better demarcated one.

4.8 Water and electrical demand and sources

An international day to celebrate freshwater was recommended at the 1992 United Nations Conference on Environment and Development (UNCED), and since then World Water Day has been held annually on 22nd March of each year. The day aims to focus attention on the importance of freshwater and advocate for the sustainable management of freshwater resources. Water scarcity is a globally recognized problem, with demand for water projected to exceed supply by 40% by 2030. By the same year, half the world's population will be living in areas of high-water stress.

DRAFT

Hotel companies have both a strong commercial and moral imperative for addressing water use. Cost is a clear factor. Water accounts make up approximately 10% of utility bills in many hotels. According to the UK's Environment Agency, depending on their water efficiency, hotels can reduce the amount of water consumed per guest per night by up to 50%, compared with establishments with poor performance in water consumption. The moral reasons are equally compelling – water is a scare resource in many resorts around the world, so hotels have a responsibility not to use more than necessary.

Historically, potable water supply in the TCI was provided by the collection and storage of rainwater in water cisterns. On Providenciales, and to some extent the Caicos Islands, potable water was provided by wells. But due to limited rainfall in most of the islands, the government invested substantial sums of money in the development and installation of Reverse Osmosis Plants (ROP) on Grand Turk, Salt Cay, and South Caicos.

On Providenciales, the supply of potable water has been privatized, where potable water supply is provided by Provo Water Company (PWC). Approximately, 1.5 million U.S. gallons of water per day is processed by PWC and distributed to its customers via a network of pipes or by water trucks to customers not presently on the network (PWC).

4.8.1 Water and electrical demand and sources – Construction

During the construction and operational phases of the proposed Romanza on Grace Bay townhouses and condo project a reliable and sustainable sources of water supply and electricity would be needed, which would place additional demands on the service providers, namely Provo Water Company and Fortis TCI Limited respectively.

Water will be needed for construction works, to flush temporary toilets and to wet-down the construction site to reduce the level of dust. Temporary electricity supply would for needed to service the construction activities, to provide security lighting and for general purposes.

4.8.2 Water and electrical demand and sources – Operational

Water

On Providenciales, the supply of potable water has been privatized, where potable water supply is provided by Provo Water Company (PWC). Approximately, 1.5 million U.S. gallons of water per day is processed by PWC and distributed to its customers via a network of pipes or by water trucks to customers not presently on the network (PWC 2020). The Romanza on Grace Bay townhouses and condo facility would source its water from Provo Water Company.

Total Potable water requirements during the operational phase of the Romanza on Grace Bay townhouses and condo facility is estimated at approximately 15,900 gallons per day, calculated from the suggested minimum daily potable water consumption rate of 150 gallons/day/room from Section 702.1, TCI Building Code (Based on the 106 rooms hotel facility) Table 24.0 and Table 25.0.

Table 24.0 Minimum daily water consumption rates

No.	Building Type	Water Rates
1	Dwelling House	40 gallons/person/day
2	Hotels	150 gallons/room/day
3	Offices	15 gallons/employee/day
4	Condominium/Apartments	100 gallons/bedroom/day
5	Schools	15 gallons/student/day
6	Airports	5 gallons/passenger/day

Source: Turks and Caicos Building Code

Table 25.0 The Romanza on Grace Bay townhouses and condo project's estimated daily water consumption rates

No	Building Type	Total Rooms/Beds	Water Rates	Totals
1	Hotel Rooms – 106 rooms	106	150 g/d	15,900
2	Restaurant/Bar	•	5,800 g/d	5,800
3	Swimming Pool	135,000 gals	13,500 p/d	13,500 g/d
4	Recreational Facilities			
5	Landscaping	12 g/sq/foot	130,000 p/d	130,000g/d

Rainwater will be harvested, treated, and stored in specially constructed water storage cisterns. This water source will also be available in the event of a fire emergency. Additionally, irrigation water storage cisterns will be constructed on the property. The irrigation grey water will be used for landscaping purposes.

During the operational phase of the development, hotel management will utilize water preservation, conservation, and Best Management Practices to reduce water consumption rates on the property. These Best Management Practices will include, but are not limited to:

- Installation of water conservation devices in general water use areas, including bathrooms, laundry facilities, lawns, kitchen, and housekeeping.
- Water efficient systems – grey water systems enable up to 50% water to return to the hotel after treatment for landscaping purposes.
- Low-flow technology will be installed and will save large volumes of water across bathrooms and kitchens, with minimal effects on the guests experienced.
- Water meters will be installed in various sections of the property, which will help management identify areas of greatest use.
- Invest in new water conservation technology or water reduction schemes, and,
- Educate employees and guests on management commitment, objectives, and goal of water reduction.

Electricity

Energy usage in developing countries has risen more than fourfold over the past three decades and is expected to continue increasing in the future. Electricity is one of the most important ingredients for economic, infrastructural, and social development. Electricity in the TCI is generated, retailed, and distributed by Fortis TCI Limited. The Company serves almost 14,000 electricity customers in

DRAFT

the Turks and Caicos Islands – mainly Grand Turk, Providenciales, Salt Cay, North, Middle and South Caicos (Fortis).

Fortis has a combined diesel-fired generating capacity of 82 megawatts and meets a combined peak demand of 37.6 MW in 2015 (Fortis). According to the Company's promotion materials, Fortis TCI has a strong commitment to the environment and continues to take measures by investing in infrastructure, as well as policy and procedures that are consistent with international standards. Power for the proposed SEFAMM Grace Bay hotel facility will be provided by Fortis. Electricity projection usage for the hotel facility at full capacity is estimated at 480 volts 3 phase power at 4,200 KVA.

The designers of the proposed Romanza on Grace Bay townhouses and condo development took every effort to reduce the total energy utilization load of the development. The measures taken to reduce the total energy load and to e4nsure sustainability are included:

- Layout of all aspects of internal spaces. Natural and cross ventilation is used where possible.
- Use of energy and water efficient fixtures and appliances.
- Explore solar panel power and renewable energy options,
- Use of high-level U-values on external skin to achieve the highest performance standards.
- Orientation – All ultra-exclusive residences wrapped with spacious balconies, or aleros providing necessary shading.
- Use of full height sliding windows blurs the lines between outdoors and indoors, mainly north-facing units also help to optimize the natural daylight and reduce loads on cooling.
- Aground level, common areas are without an external where possible to reduce mechanically ventilated areas.
- There will be electrical charging points within the development to

DRAFT

encourage electrical car use. Cycle parking spaces would be provided to encourage the use of bicycles by guests.

- A car sharing scheme would also be introduced to optimize the use of cars.

Backup electrical generating equipment

The National Electrical Code (NEC) makes a clear distinction between emergency power and standby power systems. The equipment involved in both is similar; the use is different. Emergency systems provide power and illumination essential for safety to life and property, where such systems are legally required. Thus, most Building Codes require emergency power for exits lighting and egress lighting in places of assembly, plus power for equipment necessary for safety such as elevators, fire alarm systems, fire pumps and so on, and extensive systems in health-care facilities.

Stand-by systems provide power of selected loads in the event of failure of normal source. These systems are primarily intended to protect against property damage or financial loss and are not involved with safety considerations. For this reason, the few authorities which legally require their installation do so only for water and sewage treatment plants. Private owners on the other hand do install standby systems when power interruption would cause inconveniences to guests. The T&C Building Code, which this project must conform to, makes mandatory requirements for emergencies, and stand-by power.

The Romanza on Grace Bay townhouses and condo facility will be provided with an emergency generator set, located at the maintenance building. In the event of an interruption of the public power supply, the generator will provide power for the following systems - Emergency lighting, both interior and exterior; fire alarm equipment; fire pump; Standby potable water pumps; sewage lifts stations; wastewater treatment plant; telephone exchange equipment, and office, meeting areas and the casino.

Fire safety and equipment

High-rise buildings present several unique challenges not found in traditional low-rise buildings; longer egress times and distance, evacuation strategies, fire

DRAFT

department accessibility and fire control. High-rise buildings are not inherently dangerous structures, but they do require additional systems and features than low-rise buildings. Components of hotel fire system can include the following - Fire sprinkler system; smoke and fire detectors; duck smoke detectors; automatic alarm systems; manual alarm systems (the pull-boxes used near stairway doors and elevators); fire Department standpipes; emergency lights, the emergency egress system; exits & exit signs, smoke control systems; portable fire extinguishers, staff and guests' emergency response plan, staff training; gas Supply Shut-off Devices, and fire alarm system.

The Romanza on Grace Bay townhouses and condo project is designed in accordance with the National Fire Association standards and Turks and Caicos Building Code.

4.9 Landscaping (Initial phase and maintenance/operations)

Landscape planning is defined as an activity concerned with reconciling competing land uses, while protecting natural processes and significant cultural and natural resources. Landscape design architecture for resorts is a unique art form that combines beautiful public spaces with the feeling of luxurious private escapes. Landscaping is a critical element of resort planning worldwide,

4.9.1 Landscaping initial phase

The landscape design plan for the Romanza on Grace Bay townhouses/condo project makes maximum utilization of existing native vegetation and incorporates a few foreign plant species to enhance the overall integrity of the landscape. The design embraces the open spaces between the townhouse buildings and the condominium building. Transforming the townhouse open spaces into garden living spaces. The lush landscape pattern separates the townhouse spaces from the condominium spaces. The unique shaped entrance peninsula track of land will be landscaped to offer a bold entrance to the property. A central boardwalk would be strategically located to allow uninterrupted beach access over the fragile sand dune system.

4.9.2 Landscaping maintenance and operation

Maximum utilization of native plants in landscape design can have important benefits on the environment by fostering healthy ecosystems and enhancing biodiversity. The Romanza om Grace Bay townhouses and condominium project will be landscaped with natural local vegetation and palm trees, that are resistant to local diseases and require minimum maintenance.

Landscaping and hardscaping like sidewalls, walkways and car parking are important components of a cohesive landscape design and would help shape the Romanza on Grace Bay townhouses and condo project's landscape design features.

By utilizing predominantly native vegetation and incorporating disease resistant species in its landscape design, the Romanza on Grace Bay townhouses and condo project landscape maintenance will be cost effective because native plants adapt to local climatic conditions, prevent soil erosion, and more effectively filter storm water. No fertilizers are required because of the use of predominantly native vegetation in landscaping the site.

4.10 Construction phase activities

Coastal activities will be focused on raising the land to be able to protect against hurricane surges. This component of the project will need to be integrated into the overall project timeline by the construction project manager during that stage. Information presented in the section provides an idea of the sequencing activities and should be combined with the other major building components.

4.10.1 Construction Phase Activities

It is anticipated that the filling and grading of the land will be done in the initial stages of the project when substructures are being constructed. Further, the building of superstructures will likely commence when filling work is almost complete. The construction methodology is as follows:

- Material checks and sourcing
    - Requisite testing will be done at the sand supply site to ensure that the sediment size is appropriate for the dune extension. Checks will also be done to determine if the required amount of sand can be attained from the sand supply site chosen.

DRAFT

- Requisite testing will be done at the marl quarry or holding site to ensure that the fill material is suitable for the land.
- Boulders will be sourced from a local supplier and density tests done to ensure that they fall within the specifications for boulder sizing

- Site preparation will begin with a surveyor setting out controls for the works.
- Equipment will be mobilised.
- Fill material will be brought to the site and stockpiled.
- Fill material will be spread by a front-end loader and compacted with a roller compactor in layers until the fill is at the design grade.
- An excavator will be used to excavate for the placement of the buried revetment.
- The buried revetment will be placed to grade.
- An excavator and truck will be used to load and transport the sand.
- The sand will be transported to the site and stockpiled.
- Once the requisite volume has been stockpiled, a front-end loader or bobcat will be used to spread the stockpiled sand to the design grade.
- Closing works
  - A surveyor will then survey the works to ensure that the construction was done to recommended crest height and side slopes.
  - All debris will be collected, removed and disposed of offsite at a suitable dump/landfill; and
  - Equipment will be demobilised.

4.10.2 Site security and hoarding

Proper signage will be used during the construction to warn patrons from both the road entrance and along the beach area. Hoarding will be installed around the perimeter of the property to prevent unauthorised access.

DRAFT

4.10.3 Storage of materials and equipment

Materials will be stored on site in designated stockpile areas as shown below in Figure 49.0.

Materials will be stored on site in designated stockpile areas as shown below in Figure 49.0.



Figure 50.0 Stockpile and signage locations.

4.10.4 Beach traffic impact and safety

Physical works will not occur on the beach and beachgoers will be able to move around the nearby beach area without interruption. There will be an impact to

patrons with possible noise and dust. Signs will be placed that inform patrons of works being done and the times of work.

4.10.5 Temporary sanitary facilities

Adequate temporary facilities are an essential part of construction sites to ensure the health and safety of construction workers. Such facilities are not just a legal requirement, but they also serve as critical control measures to mitigate risk associated with hazardous substances and fatigue related accidents.

According to international health and safety requirements the minimum temporary sanitary facilities that are required on a construction site include, Toilets, wash hand facilities, drinking water, and eating facilities. To satisfy the needs of its construction workers the Romanza on Grace Bay townhouses and condos construction site will have portable toilet facilities, wash hand facilities, drinking water fountains and eating area.

4.10.6 Access and staging

Property access will be mainly from Grace Bay Road for coastal works. Figure shows the staging areas on site for the coastal construction components. These will likely move after the works are finished to better accommodate the building construction.

4.10.7 Solid waste Management – generated during construction

Proper waste disposal bins will be set up close to the site office and carted away weekly.

4.10.8 Liquid waste Management – generated during construction

It is not anticipated that the volumes of water used during filling would generate significant runoff on or off site.

4.10.8.1 Waste Management Plan

The waste management plan clearly defines the controls that will be used to manage all waste generated on the Romanza Grace Bay Townhouse Development. Implementing this plan will help ensure protection for human and environmental health and protect the adjacent national park by reducing the amount of municipal waste entering the marine environment.

Site Preparation

DRAFT

During the site's initial stages before construction, designated locations for storage of materials should be laid out. If possible, all material should be stored in an area free from obstruction and with means to cover it with the elements and reduce any potential runoff pollution.

Types of Waste

The construction phase will create a wide range of waste, some more harmful to the environment than others. All subcontractors must be aware of the different types of waste and disposal methods on site. Some examples of the waste generated due to construction are:

- Non-hazardous waste – Wood, Glass, Plastic, Paper, Food, etc.
- Hazardous Waste – Adhesive, Aerosol Cans, Paint and Paint Thinners, Solvents, Concrete, Lightbulbs, Batteries, etc.

Storage Collection and Disposal

Waste bins should be strategically positioned around the site and designated for different waste generated. This will ensure that waste material that can be recycled remains clean and will reduce the need for sorting. Each bin should be numbered to help identify each bin's purpose and monitored to ensure compliance from subcontractors.

Contractors and subcontractors should be made aware of the disposal policies and procedures on-site and the location of bins for appropriate waste material. Once containers are full, they should be handled based on their contents, promptly transported to the pre-approved waste facility to prevent overfilling and returned to the location. Bins should be checked for any leaks or damage before being utilized again.

The following practices and procedures will be applied:

- Ensure that an adequate number of appropriate waste containers are available on site.
- All spill clean-up material (i.e., used sorbent pads) will be stored in lined containment drums and disposed of at an approved facility.
- Designate a safe area for temporary waste storage with adequate

containment that is secure and protected from weather until waste bin removal and disposal can be arranged.

- Remove all waste materials from the site as soon as possible.
- Any portable toilet(s) on-site should be secured to avoid being knocked over by heavy winds and vandalism. They must also be adequately maintained on a regular basis by a licensed contractor. Toilets must be located more than 150 feet from the edge of the open water.

During the operational phase (post-construction), an adequate number of waste bins should be on the site, including the beach area, to provide a location for waste to be discarded. Waste bins on the beach should be lidded and tied down to prevent them from being knocked over during weather events. Waste bins should be emptied regularly to prevent overfilling or prevent the wind from transporting waste into the marine environment.

Hazardous Waste

All work must be completed in a manner that ensures water quality standards are maintained. Hazardous materials such as concrete, paint, solvents, and other chemicals may be high in pH and harmful; therefore, there shall be no contact with open water through spillage, hosing off surfaces, rain, cleaning of tools, or concrete washout. Hazardous materials will be kept in a covered storage location to prevent the potential for mixing with water and substances from being released into the environment. A concrete and equipment washing site will be bound and lined up to contain any concrete and chemicals. All accepted washing locations must be cleaned up before demobilization. Any excess material shall be removed upon project completion and disposed of at the landfill.

Any hazardous waste should be collected immediately after being generated or stored safely in a designated area until removal and disposal are arranged. That area should be free from obstruction and structural defects and only used to store hazardous waste. Appropriate signage should also depict hazards in the area, including a no-smoking sign. All hazardous waste should be stored in containers and stored on spill containment pallets. This area should be

DRAFT

monitored, and access limited.

For all waste referenced as e-waste, such as electronic devices, careful consideration will be given to prevent any potentially toxic materials from being released into nearby bodies of water, soil, and air. E-waste is hazardous and should be stored in the hazardous waste area until disposal methods are arranged.

Site Inspections

The contractor should conduct weekly routine inspections to assist with the management of waste on-site. It's important to track and plan, if possible, for the creation of construction debris. This can help mitigate potential fire hazards or environmental risks on the site. Monitoring the bins and the hazardous waste disposal area should be given special attention.

4.10.9 Control of air, dust, water and noise pollution generated by project/heavy Equipment

Construction will be confined to the working hours of 8am to 5pm to reduce the disturbance to nearby properties. Equipment will be well maintained and checked daily for leaks or excessive exhaust. If a piece of equipment is malfunctioning, works with that equipment will be stopped and the equipment repaired.

4.10.10 Control/storage of fuels and other dangerous substances

Fuels/fluids and small tools will be stored in a lock equipment container to prevent tampering with or unauthorised access.

4.10.11 Emergency Mitigation Plan

After completion of construction, the contractor and site manager will ensure that the site is fully clear of construction activities. These activities include:

- All chemicals, waste stored on site, and concrete washout areas will be removed.

- A licensed contractor will properly dispose of oils, lubricants, or fuels.
- The contractor will clean, dismantle, and remove all equipment.
- All temporary buildings, trailers, and excess materials will be removed from the site.
- The site will be returned to its natural state. The exception is the beaches, which have permanent structures.

Two basic hydrogeological mitigation strategies will be employed for this project:

A. Avoidance of Risk – identify potential risk (injection /disposal well failure), plan for risk (design deep injection / disposal well) and initiate mitigation steps to avoid the risk (injection / disposal well testing prior to construction)

B. Watch and Monitor – use of pressure gauges at the head works of the injection / disposal well(s) to act as early warning mechanism to alert to potential well failure. Daily monitoring schedule will provide input for routine evaluation.

Additionally, the implementation of a stormwater and site drainage network comprised of strategically place drainage wells will act to intercept potential flood episodes and reduce site flood potential.

4.10.11.1 Health and Safety Plan

The Project Manager or Owner/Developer shall appoint a designated Health and Safety Officer [who will be responsible for overseeing and ensuring the implementation of all health and safety protocols for the project].

The Health and Safety Manager is responsible for implementing the health and safety protocols and promoting an effective safety culture on site. They are responsible for responding to all emergencies. The general responsibilities of the HSO are as follows:

- The HSO will report to The Project Manager.

- With the assistance of The Project Manager and the Site Supervisors, the Safety Manager is responsible for overseeing the implementation and enforcement of all applicable safety and health rules/regulations. The manager has the responsibility and authority to take prompt corrective measures and implement additional safety procedures as necessary to eliminate working conditions that are unsanitary, hazardous, or dangerous to employees.
- Identification of the hazards and risks relevant to the construction project through regular coordinated site inspections.
- Reports identified safety hazards to the Project Manager, Site Supervisors, and affected Subcontractor(s) and provides written verification and documentation to The Project owner when so required.
- Facilitate site health and safety meetings, Site Inductions, and Toolbox Talks.
- Compiling project-specific emergency response and preparedness plans.
- Testing the effectiveness of the emergency response plans.
- Investigate and report project-related incidents.
- Maintenance of all records.
- Participation in management reviews of the health and safety systems.

The HSO is required to have basic first-aid training. There should always be a fully equipped first aid box at all work sites and a list of local emergency telephone numbers in case of an accident. Minor and major accidents shall be reported to the HSO, where they are recorded in an accident logbook. **ALL** accidents, including `near misses' / dangerous occurrences, regardless of severity, must be reported immediately to the HSO. After every incident, the HSO should carry out measures to determine the cause of the accident and to develop changes or corrections that may be needed to prevent the recurrence of the same or similar type of accident.

DRAFT

The HSO shall ensure that all staff, including subcontractors, undergo safety training and inductions. These training events will educate workers on the best practices for working (to include but not limited to):

- With hazardous materials.
- In confined spaces.
- With heavy equipment.
- Over and/or near water.
- With hot works.
- At heights.

Toolbox Talks

At the HSO's discretion, regular "Toolbox Talks" will be conducted after the initial Site Induction. The Toolbox Talks will include information on some or all the topics listed above depending upon the site-specific conditions: -

A Toolbox Talks form / Site Induction register form shall be completed for each talk and shall contain the following information: -

- Supervisors Printed Name & Signature.
- Date.
- Site/Project Name.
- Talk topics.
- Printed name and signature of each operative attending.

Site Rules

All construction personnel involved in the work will observe the following basic working rules, amongst others:

- Relevant Personnel Protective Equipment (PPE) will be issued and used before the commencement of the work.
- PPE shall be always worn on-site, except the dedicated safe area(s) and welfare facilities.

DRAFT

- Proper training and induction in the various roles for the type of activity will be performed.
- Experienced and active supervision will be in place at all work times.

Site-specific rules will be posted in the canteen/office, and copies will be given to all personnel working on the site. They will contain details of No-Smoking requirements, dress code, PPE requirements, emergency arrangements, etc.

Use of Personal Protective Equipment (PPE)

Personal Protective Equipment (PPE), including protective suits, gloves, hard hats, life vests, safety vests, and goggles, shall be worn in areas designated for their use. At all times, work sites shall be maintained in an orderly, safe, and tidy state. Precautions against fire accidents shall be taken, and appropriate fire safety equipment shall be supplied and clearly indicated at work sites.

Life Jackets must be worn when working near open water where no sufficient handrail or edge protection is present or when accessing/egressing a vessel using life jackets, lifelines/rings, and a safety boat. Work sites shall be maintained in an orderly, safe, and tidy state always.

Site Inspections

The HSO will inspect sites for compliance with approved working methods and contractual requirements. The emergency assembly site should be identified before work begins and relayed to on-site workers during induction and Toolbox Talks. In any emergency, the staff will meet in this area, away from the building and near the exit site, for easy evacuation.

The national labor laws and occupational health and safety policies for Providenciales will be always applied.

Construction activities can become dangerous if managers and operators are not careful. All efforts must be made to avoid dangerous or reckless practices on the construction site. The following are recommended practices to prevent emergencies and what should be done in the unfortunate case of a site accident.

Neighbourhood Mindfulness

DRAFT

Construction will be inconvenient for the surrounding residents and beachgoers. To mitigate any accidents from lack of information, it is imperative that clear communication occur. Neighbours should be informed of construction and the possible hours of construction/disturbance. Neighbours should also be informed of the positive impacts of the works such as reducing site inundation in hurricanes.

Muster Points and Evacuation Routes

Muster points and evacuation routes must be designated before the start of the construction and operational phases. Muster points are relatively safe locations where people can gather when an emergency occurs. At this location designated team leaders would verify that everyone is accounted for and provide further instructions. Evacuation routes will be used to move from the construction site to the appropriate muster point in each case. Muster points and evacuation routes must be clearly marked and kept unobstructed throughout the construction and operational phases.

Public Access and Recreational Use

During active construction hours (strictly 8am-5pm) there will be no public access or recreational use along the section of dune being worked on. After construction hours patrons should be warned with signs if they choose to enter the area.

Health and Safety

All workers will be given an orientation of the challenges associated with working in a marine environment. For each work activity, potential risks will be explained and proportionately addressed with risk-mitigation strategies. Appropriate protective gear will be used by all workers. Gear will include ear plugs, steel-toed boots, hard hats, wetsuits, high visibility vests and gloves. Neighbours and locals will be notified of the works and caution tape will be placed along the beach, stockpile area and access path for equipment.

Emergency Response

DRAFT

In the unfortunate event of a worker being injured on site, work along his or her section will be stopped, and emergency response teams called to quickly aid the worker. The cause of the incident will be investigated to prevent further injury on site and safety procedures will be reiterated.

On-Site Resources

In addition to best practices, equipment and materials must be provided on site to respond to emergencies. These will include:

- Buildings or open areas designated as muster points with resources listed below:
  - A siren system to warn staff and nearby residents when an emergency arises.
  - Fire extinguishers on site.
  - Adequately stocked first aid kits.
  - Drinking water.

4.11 Socio-economic

The construction sector has contributed significantly to economic of the Turks and Caicos during the past two decades, providing revenues to government and construction related employment for the labour force.

4.11.1 Demographic

The population of the islands is relatively young, with the age group of 0-14 years old accounting for 20.97% of the population and 15 years and making up approximately 74.84% of the population, while 65 years old and over representing just 4.87% of the population. The Male-Female Ratio of the 2012 population of the TCI stood at 99.1%. However, the present working age population cannot sufficiently service the booming construction industry, resulting in a heavy dependence on foreign construction workers.

4.11.2 Employment – Labor & skills demand at construction and operation

The Romanza on Grace Bay townhouses and Condominium development is likely to place an additional burden on the already stained labour force during both the construction and operational phases of the development.

The construction phase of the development is expected to generate approximately 100 jobs, ranging from labour, skilled and unskilled workers and technical and managerial workers. The operational phase of the facility will likely create approximately 110 permanent jobs, to facilitate the proper management of the facility, including top and middle level managers, services providers, operators, bar maids and cleaners.

4.11.3 Safety/security concerns within the community (Construction and Operation)

4.11.3.1 Construction

Providing and maintaining appropriate levels of site security during the construction of the Romanza on Grace Bay townhouses and condo development is one of the main objectives of the contractor and owners of the proposed development, as it will protect the site, reduce the potential for theft and restrict entry to only authorized personnel.

Some security measures to be taken during the construction phase of the development include the development of a security plan by the contractor prior to the commencement of construction work, securing the perimeter boundaries of site to restrict access, install security lights, have limited access to the site and install surveillance security systems.

4.11.3.2 Operations

The increasing criminal activity in the Turks and Caicos Islands, particularly, Providenciales has placed tremendous challenges on hotel owners and management to ensure the safety and security of hotel guests, workers, and patrons. Hotel security is all about the management of all aspects of a hotel operation, its property, grounds, equipment, personnel and more. Hotel security involves the establishment of effective procedures, systems, and personnel to ensure the safety and security of all guests, their belongings, and the staff.

The Romanza on Grace Bay residential facility management will develop security measures to ensure that any physical, financial or information threats to property and guests are reduced. This will be accomplished by providing surveillance monitoring systems throughout the property, equipping employees with safety devices, ensure that all employers are trained in safety and security measures and develop a security plan for the facility operation prior to the opening.

The facility management will also work with the Royal Turks and Caicos Police Force to develop a neighbourhood policing program.

4.11.4 Issues raised in the public consultation (written and verbal concerns)

Public involvement is a fundamental principle of the EIA process. The inclusion of the views of the affected and interested public help to ensure the decision-making process is equitable and fair and leads to more informed choice and better environmental outcomes.

Some of the issues raised at local agencies consultation level include the potential for coastal erosion, solid waste disposal methods to be employed, the use of renewable sources and sustainable and resilience construction methods and construction materials to be use in the construction of the hotel facility. Beach carry capacity is another issue raised, particularly as it relates to the use and placement of beach furniture. Safety and security of guests and visitors in swimming and snorkelling zones in the marine area in the front of the property. Swimming zones and boat access lane will be established to separate the two users.

4.11.5 Others

Other concerns raised included the use of natural plant species vs foreign species was identified as a critical option for consideration during the preparation of the landscape plan. The use of natural plant species as the preferred option. The use of pesticides and fertilizers were discouraged by local environmental authorities

4.12 Impact on the terrain including method of clearing of the site

It is anticipated that the filling and grading of the land will be done in the initial stages of the project when substructures are being constructed. Further, the building of superstructures will likely commence when filling work is almost complete. More detailed discussion on the impact on the site terrain can be found in section 4.4.

4.13 Marine Traffic Flow and Safety

Grace Bay Beach is a prime tourist attraction with many beachgoers and water sports charters. Boating traffic is extremely high in the area due to many charters utilizing the area for tours, dive trips, parasailing activities, etc. Due to development happening adjacent to Grace Bay Beach, the safety of boaters is important.

The creation of a swim zone should have a minimal impact on boaters. Due to the numerous hotels, Airbnb, and businesses in the area, numerous swim zones have already been established along Grace Bay's Beach with the closest swim zone being that of the property adjacent to the proposed development. Also due to the marine environment being with the PANP, boaters should abide by regulations set out within the National Park Ordinance regarding speed restrictions. To ensure the safety of boaters, the following practices should be implemented before the creation of the swim:

- Nearby businesses and residents should be notified of the commencement of construction activities.
- All relative government departments should be notified of the swimming zone (Department of Coastal Resources
- Public notices should be distributed via various media channels to ensure that boat operators are cautious in the area and are aware of the swimming zone.

4.14 Beach traffic impact and safety

The Project is located on the northern coastline of Providenciales and is bounded by Princess Alexander National Park and Grace Bay Beach on the Northern side of the Property.

Grace Bay Beach is a public beach approximately three miles (3 mi or 4.8km) long and is home to many resorts, Airbnb, and businesses on Providenciales. Due to its clear waters, free beach access, prime location, and shallow depth, Grace Bay Beach is a prime tourist attraction with many beachgoers and water sports traffic. Due to development happening adjacent to Grace Bay Beach, the safety of beachgoers is important.

The Project's scope of works is limited to upland works, with no major development being scheduled for the existing marine environment. The scope of work for the beach would be limited to the beach installation of beach equipment such as lounge chairs and beach umbrellas and the creation of a swim zone.

Activities should not endanger beachgoers but will affect the use of a section of beach adjacent to the property temporarily. Portions of the beach may have to be sectioned off/closed for the anchorage of the buoys for the swimming area. To ensure the safety of beachgoers in the area, the following practices should be implemented:

- Nearby businesses and residents should be notified of the commencement of construction activities. This is especially important for resorts and Airbnb in the area to warn guests to be vigilant.
- Proper signage indicates active construction in the area. These can include but are not limited to signs saying, "Men at Work," "Caution," "Active Construction Site," and "No Entry."
- The site boundaries should be clearly marked. Silt fencing should be installed around the site to prevent unauthorized entry and prevent construction material from polluting the beach.

The "No Action" alternative would be to let The Project area remain in its present condition. This alternative will preserve the natural state of the existing ecosystem and the surrounding areas. However, the positive economic impact on the country's economy and surrounding community would not be realized.

4.15 Potential Alternatives

Protection options for the Romanza property were explored and evaluated to produce a more complete analysis of the solution. In total, two filling alternatives were developed and tested during a 100-year design storm. One option alternative had a lower dune while the other had a higher dune and lower land fill. The heights of the berm were selected based on the results of the storm surge analysis which is shown in Section **Error! Reference source not found.**.

Alternative 1 had two levels of fill with a vegetated sand dune and buried revetment. The lower berm would increase the dune height by 0.8m to +4m above mean sea level. The dune would require 610m^3 of sand and be 1m thick above the crest of the revetment. The revetment would require 80m^3 of boulders and have a crest elevation of +3m above MSL. The filling of the land would require 33,200m^3 of fill material to get to the recommended level of +4.5m above MSL. Figure 50.0 shows a typical cross section and plan of Alternative 1.

Alternative 2 (Figure 51.0) was configured to replicate typical sand dune topographies. Alternative 2 had a high berm up to +4.5m above MSL which would be an increase of 1.3m above the existing land height. The seaward section of the berm would be a vegetated dune and would have a buried revetment that acts as a last line of defence during the storm events. The buried revetment would require 75m^3 of boulders and be covered by 1,000m^3 of sand. The rest of the buffer zone area would also be filled to +4.5m to help with reducing storm waves and overtopping on the property. The buffer zone would offer most of the protection for the townhouses. The rest of the property would have a lower elevation of +4m which was done to reduce the volume of fill required and to reduce overall costs. The volume of fill was calculated to be 29,000m^3.

DRAFT


DUNE
BUFFER ZONE
30.0m
FILL
+4.0m
FILL
+4.5m
LAND SLOPING @ 1:40

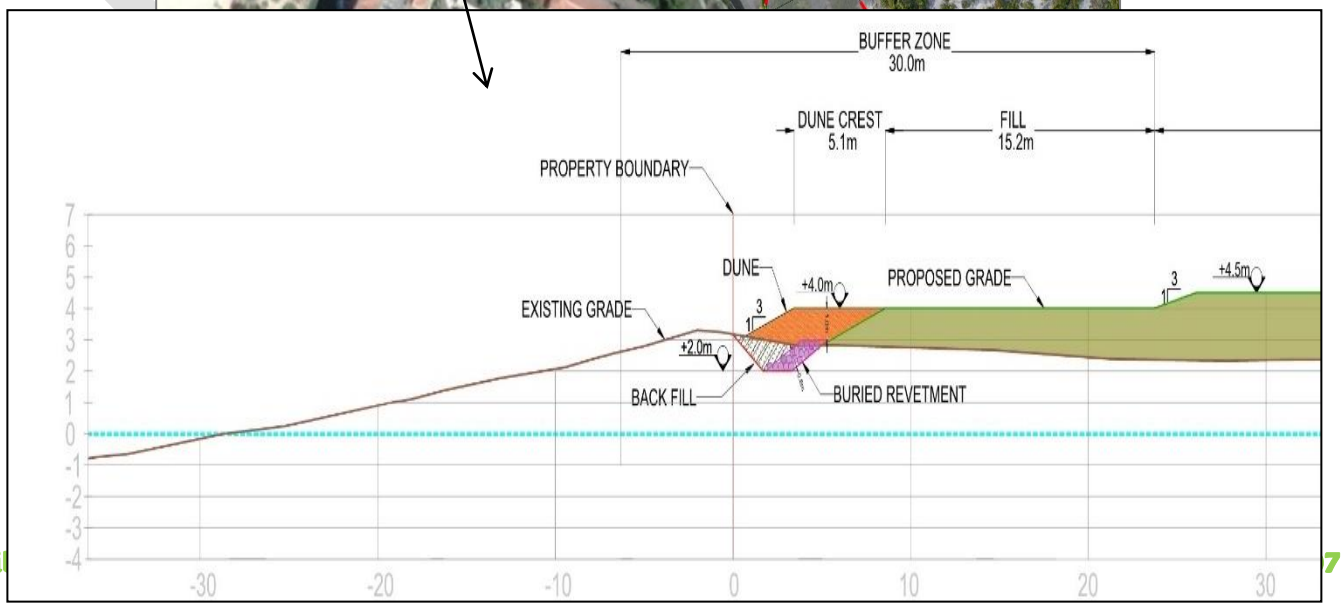

BUFFER ZONE
30.0m
DUNE CREST
5.1m
FILL
15.2m
PROPERTY BOUNDARY
DUNE
+4.0m
PROPOSED GRADE
+4.5m
EXISTING GRADE
+2.0m
BACK FILL
BURIED REVETMENT

Figure 51.0: Alternative 1 plan and typical cross section for the Romanza property.

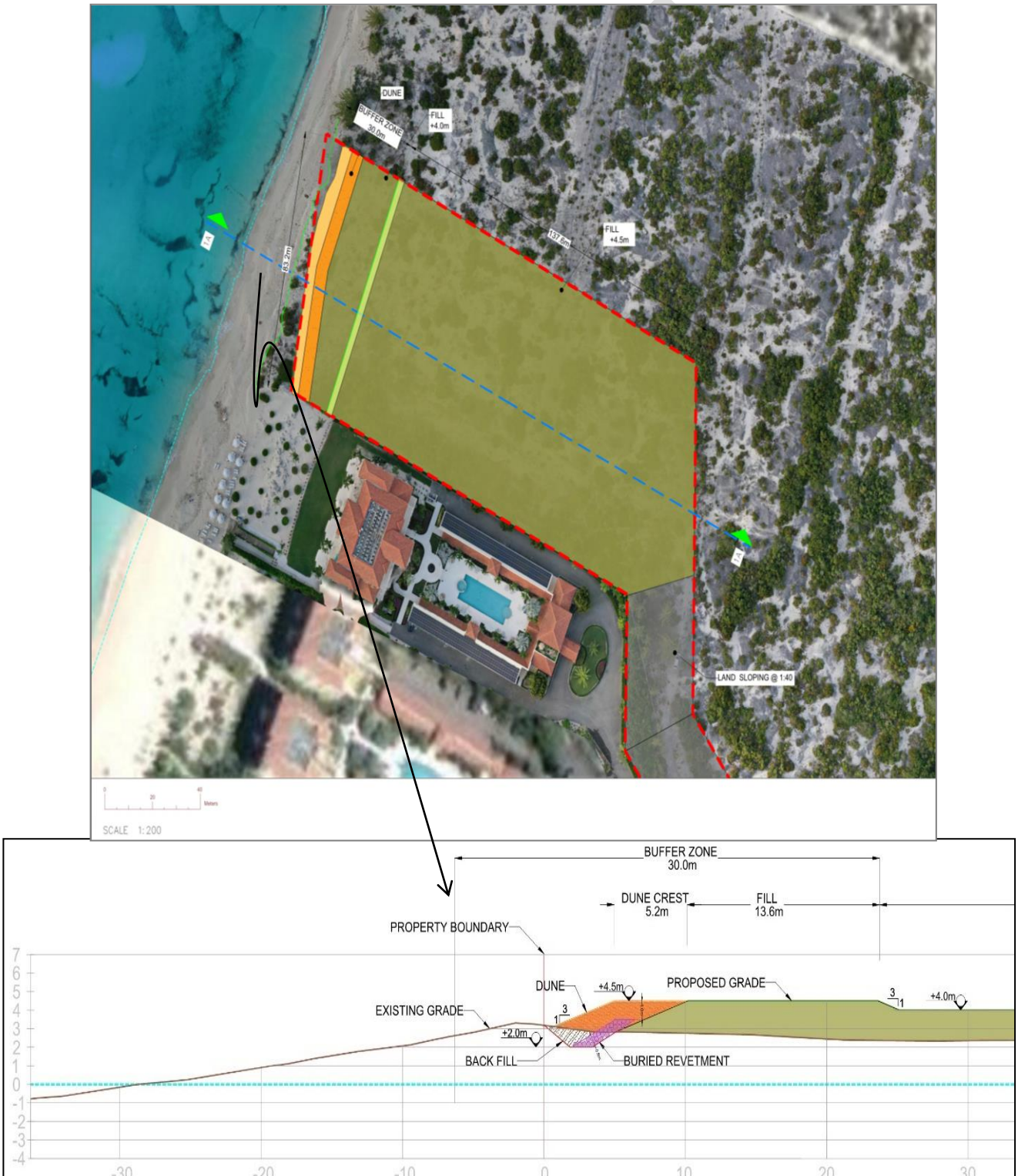


Figure 52.0: Alternative 2 plan and typical cross section for the Romanza on Grace Bay property.

Cost estimates associated with both alternatives are presented in the following table (Table 26.0). The alternatives are about 25% higher in total cost than the proposed option.

Table 26.0: Cost estimate for surge protection alternatives.

Cost Component	Alternative 1	Alternative 2
General Items	55,000 - 74,000	53,000 - 72,000
Buried Revetment	26,000 - 36,000	25,000 - 34,000
Dune	182,000 - 244,00	295,000 - 395,000
Raising Land	440,000 - 588,000	379,000 - 507,000
Total	**689,000 - 924,000**	**740,000 - 992,000**

The final alternative is the "Do-Nothing" alternative which would have no development and further, no coastal surge protection implemented. This option is the cheapest option in the short term as there would be no expenditure used for raising the land. Additionally, the property is well protected against typical swells and has a stable beach width as was shown in prior analyses.

Unfortunately, the "Do-Nothing" alternative does not provided protection against inundation in storm events. Model simulations with climate change have shown that the property and critical roadway, Grace Bay Road, could be affected by storm surge under the 100-year storm. In the medium to long-term this alternative would be more costly as the property and roadway become increasingly vulnerable to rising seas and hurricane surges.

Considering government's policy to promote tourism development as an engine of economic growth to generate increased revenues, employment opportunities

and improved the socio-economic wellbeing of the people the "No-Go" as an alternative was not given much serious consideration.

SECTION V

5.0 Impact Assessment

With any new development there will be impacts to the social and physical environments. The impacts may be positive or negative. The impacts will also have varying durations such as temporary or long lasting. This section highlights the possible impacts associated with the coastal works proposed. As previously stated, it is understood that impacts of the building construction and supporting facilities have been assessed in other report sections.

Long-term negative impacts on the marine resources in the area are not expected to occur due to the proposed construction work. Construction will be closely monitored to prevent contamination of the adjacent marine habitats. Generally, the potential environmental marine impacts associated with The Project include the following:

- Water Quality Impacts
- Light Impacts
- Solid Waste Impacts

5.1 Impact Identification

Possible impacts over the project life are categorised as occurring during the construction phase or the operational phase. The impacts are further classified as direct or indirect based on the area of impact. For this project there are three areas of impact: (1) the option footprint; (2) a 500m radius from the site and (3) a 5km radius from the site.

The impacts to the coastal environment have been quantified by assessing modelling results before and after the concept is put in place. There were few changes observed on the wider impact areas since there is no permanent interaction with the nearshore area.

Impacts were identified and assessed based on their significance. Significance is a measure of the impact's magnitude and its likelihood (Table 27.0).

- Magnitude – magnitude was determined by combining The Project activity's duration and intensity.
    - Duration – The timeframe The Project activity will influence The Project area. The impact duration measures the time it takes for the impact environment to return to baseline conditions or undetectable levels. Duration can range from:
        - *Temporary (T)*– impacts persist for a short duration and occur occasionally and/or intermittently.
        - *Short Term (ST)* – impacts are expected to persist for the duration of The Project activities related to the construction phase of The Project.
        - *Long Term (LT)* – impacts extend beyond the duration of the construction period and exist throughout the life of The Project.
        - *Permanent (P)* – impacts that persist far beyond The Project's life and are irreversible environmental changes due to Project activities.
    - Intensity – The degree to which an impact affects the environment. The intensity of an impact can be considered as:
        - *Negligible (N)* – Impacts that have no detectable change on the environment.
        - *Low (L)* – Impacts that do not alter the environment's natural flows and processes.

DRAFT

- *Moderate (M)* – Impacts that alter the natural flows and processes of the environment while allowing the flows and process to retain their natural functions.
- *High (H)* – Impacts that alter natural flows and processes to the extent where natural functions are inhibited temporarily or permanently.

- Likelihood–The potential for an impact to occur. This can be categorized as Unlikely, Likely under most conditions, or Highly Likely. Risk Scores will be used to measure the likelihood of the impact occurring and are measured on a scale of 1-10, with 1 being unlikely, 5 being likely, and 10 being highly likely to occur.

Table 27.0: Magnitude classification system used to identify and assess impact

Significance		
Magnitude		Likelihood
Duration	Intensity	
Temporary (T)	Negligible (N)	Unlikely (1)
Short Term (ST)	Low (L)	Likely (5)
Long Term (LT)	Moderate (M)	Highly likely (10)
Permanent (P)	High (H)	

The perceived potential hydrological impacts include:

1. Depletion of existing fresh groundwater
2. Degradation of groundwater quality
3. Odor – wastewater treatment system operations

5.2 Description of impacts

Since there are several categories that a singular impact could fall into; the impacts have been tabulated so that they can be quickly viewed against each other. The table is presented in subsection 5.2.

Freshwater Lens – the mixing of saltwater with the existing fresh groundwater that results in the contamination of the freshwater lens that renders the freshwater non-potable Degradation of

Water Quality – Nutrient loading derived from the use of fertilizers in the landscape plant and potential wastewater leakage into the subsurface that renders the freshwater non-potable.

Odour – the inadvertent emission of Sulphur gases into the air of the immediate and surrounding areas resulting in offensive Odours

5.2.1 Potential impact on the biotic environment

Landside Impacts

For most projects, overlaying the proposed development onto the results of landside and marine investigations reveals the extent to which a project would have direct impacts on landside vegetative communities, intertidal communities, and nearshore sub-tidal marine areas. However, in this case, implementing the proposed site plan will result in all but the water ward-most 100 ft being cleared. Therefore, from an ecological impacts' perspective, the remainder of this EIA assumes that, without regard to how high the residential structures will extend (i.e., the number of stories), the spatial extent of the impact will be approximately 85% of the property.

Table 28.0
Direct Impacts on Landside Vegetative Communities

Vegetative Community	Size Ac / Ha	Area proposed to be Impacted
Un-vegetated Sandy Beach	0.37 / 0.14	0.37 / 0.14

Sand Strand	0.18 / 0.07	0.01 / 0.01
Invasive-dominated Sand Strand	0.10 / 0.04	0.10 / 0.04
Invasive-Dominated Shrubland	1.11 / 0.45	1.11 / 0.45
Dry Broadleaf Evergreen Shrubland	3.90 / 1.60	3.40 / 1.40
Dry Broadleaf Evergreen Forest	0.16 / 0.06	0.16 / 0.06
Scarified Lands	0.18 / 0.07	0.18 / 0.07

Descriptions of the results of these direct impacts and secondary impacts on each community type follow.

Direct, Indirect, and Secondary Impacts on the Sandy, Unvegetated Beach
As no sand or infrastructure (e.g., groynes, jetties, docks, piers etc.) is proposed seaward of the top of the existing dune, direct impacts to this community are expected to be non-existent.

Secondary/indirect impacts to 100% of this community will occur, however, as the result of increased human use of the beach that will occur after the project's residences become occupied. This increased use will likely result in a reduction in available foraging for resident shorebirds birds (e.g., Wilson's plovers) and migratory shorebirds (e.g., sanderlings, ruddy turnstones, willets, semi-palmated plovers, etc.).

Additional secondary impacts could occur as the result of increased lighting and noise and for beach management purposes. Although "seaweed" (actually *Sargassum*, dead blades of seagrass and other flotsam and/or jetsam) had not accumulated in large quantities during or immediately prior to the March 2024 site investigation that was conducted for this EIA, seaweed piling up on beaches in the tropics has been an increasing problem in recent years, particularly when winds and/or ocean currents deposit these materials on beaches in large

quantities. While this may not be a problem on beaches adjacent to undeveloped tracts (and may be beneficial for natural recycling of nutrients and when amphipods, small crabs and other marine organisms provide prey for foraging shorebirds), it can be objectionable when it accumulates in large amounts on beaches that are used by property owners and vacationers.

Beach management techniques to address this problem vary based on the extent of the problem on a day-to-day, week-to-week, and/or seasonal basis. For minimal or relatively light build-ups, taking no action may be appropriate. When build-ups become objectionable, addressing them may be as simple as deploying an individual or two with a rake and hauling the material off-site for disposal (or composting). When build-up is heavy, a small army of laborers (rakers, baggers, hole diggers) and equipment (e.g., tractors fitted with rakes) may be necessary to deal with the problem. It is recommended (See Mitigation section) that a beach management plan be developed in advance of unit occupancy to be prepared when, sooner or later, the problem arises.

Direct, Indirect, and Secondary Impacts to the Sand Strand Community

Except for a single ~ 10-foot wide corridor that will allow hotel and townhouse occupants access to the beach, the proposed site plan has been designed to provide a minimum 100-foot setback from the seaward vegetation line to the most waterward infrastructure (the pool decks for each of the eight waterward-most residences), so direct impacts on the sand strand community are minimal (i.e., 0.01 Ac., < 0.01 Ha).

Indirect impacts to this community could occur as collateral damage during removing the *Casuarina* and *Scaevola taccada* from the invasive-dominated sand strand community and/or if native endemic species are salvaged and relocated into this community.

Additional impacts could occur due to habitat fragmentation, as the floral and faunal diversity and productivity within this community will likely be diminished when the vegetative communities on the waterward and landward sides of this

community are directly impacted by the development's construction and/or operation.

Secondary impacts are likely to occur in this area due to increased noise and lighting when the water-fronting residences become occupied.

Direct, Indirect, and Secondary Impacts on the Invasive-dominated Sand Strand Community

Except for a single ~ 10-foot-wide corridor that will allow hotel and townhouse occupants access to the beach, the proposed site plan has been designed to provide a minimum 100-foot setback from the seaward vegetation line to the most waterward infrastructure (the pool decks for each of the eight waterward-most residences).

However, because part of the existing vegetative community within the setback area contains *Casuarina* trees and invasive beach cabbage, replacing these undesirable species with site-appropriate dune vegetation (e.g., sea oats, bay tansy, dune sunflower, etc.) will result in direct impacts that are expected to occur on an estimated 100% of the invasive-dominated Sand Strand community.

In the long term, replacing the invasive non-native plants with species that are more appropriate for this community could result in a net increase in ecological values, particularly if native species that are endemic, good for wildlife, and/or resilient to storm surges and sea level rise are used.

Secondary impacts will likely occur in this area due to increased noise and lighting when the water-fronting residences become occupied.

Direct, Indirect, and Secondary Impacts on Invasive-Dominated Uplands

This 0.7-acre area is located along the southwestern part of the property, and the presence of these undesirable species appears to be linked to land clearing that took place when Tuscany was built several years ago. The proposed site

plan calls for this area to be cleared of vegetation. A landscape buffer will be planted in the waterward-most approximately 200 ft of the property. Setbacks along the remaining southwestern property boundary vary from a minimum of approximately 3 ft to a maximum of approximately 15 ft.

The removal of existing debris piles and the replacement of invasive pest plants with native and/or non-invasive ornamental species will help offset the project's adverse impacts in this area.

Due to the extremely poor existing environmental quality of this area, it did not appear to be valuable as a nesting habitat for birds, so faunal impacts are also not expected to be significant, although the removal of one Casuarina tree will destroy a nest of wasps. Salvage/relocation of minimally motile faunal species (e.g., *Cerion* and *Hemitrochus* snails) could also lessen the adverse impacts on these species.

Indirect and/or secondary impacts are not expected to be significant in this area, but they could include potential nutrient loading if fertilizers and/or other chemicals are needed to keep the new landscaping in an aesthetically appealing condition and potential hydrologic changes that may result from the addition of several feet of fill that will be necessary to meet building requirements.

Direct, Indirect, and Secondary Impacts on Dry Broadleaf Evergreen Shrubland

Impacts to the 3.90 acres (~ 1.60 Ha) of Dry Broadleaf Evergreen Shrubland pose the most significant ecological impact of the proposed project. Extrapolation of the results of the vegetation analysis plots suggests that, unless proactive mitigation steps are undertaken, the project could result in the destruction of thousands of native orchids, air plants, and other vegetative species that are designated on the TCIG's list of endemic and/or notable flora and fauna. Observations of fauna in this area, including curly-tailed and *Anolis* lizards, butterflies, and other insects, indicate that there is likely to be nearly total loss of these species when the land is cleared, and fill is deposited to bring the ground surface up to buildable standards.

Motile species (e.g., mourning doves, common ground doves, etc.) will need to either find another suitable habitat that is unoccupied or persist until after re-vegetation work is completed, at which time some foraging and nesting habitat may eventually be re-created. Based on observations in the field and publicly available data, it is likely that, in its present condition, the property likely provides habitat for small but sustainable populations of these species. Habitat that is potentially suitable for these species is available on properties to the north, east, and south.

Indirect and secondary impacts likely to result from the loss of this habitat include the reduction (or temporary loss) of habitat for insects and insectivores, including migratory birds that may use existing vegetation for foraging and/or roosting during their annual migrations.

Direct, Indirect, and Secondary Impacts on Dry Broadleaf Evergreen Forest

Similarly, although the spatial extent of this vegetative community is very small (i.e., 0.16 Acres (0.06 Ha)), construction of the proposed site plan will impact all this habitat. As described above in the impacts to the Dry Broadleaf Evergreen Shrubland, extrapolation of the results of the vegetation analysis plots suggests that, unless proactive mitigation steps are undertaken, the project could result in the additional destruction of orchids, air plants, and other vegetative species that are designated on the TCIG's list of endemic and/or notable flora and fauna.

Motile species (e.g. birds) that inhabit this area will also need to find other suitable unoccupied habitats or persist until re-vegetation work is completed. At that time, a limited amount of foraging and/or nesting habitat may be re-created for the species that can survive in urbanized areas. Habitat that is potentially suitable for some of these species, is available in limited quantities on north, east, and south properties.

Indirect and secondary impacts likely to result from the loss of this habitat include the reduction (or temporary loss) of habitat for insects and insectivores, including resident and migratory birds that may use existing vegetation for foraging, roosting, and/or nesting.

Direct, Indirect, and Secondary Impacts on Scarified Lands

Similarly, all 0.18 Ac (~ 0.07 Ha) of this vegetative community's spatial extent directly conflicts with areas where development is proposed. No notable floral or faunal species were encountered in this heavily impacted area, so although adverse impacts to this community are pervasive, the ecological ramifications are minimal.

Motile species (e.g., birds) that inhabit this area will also need to either find another unoccupied suitable habitat or persist until after re-vegetation work is completed. At that time, a limited amount of foraging and/or nesting habitat may be re-created for the species that can survive in urbanized areas. Habitat, suitable for some species, is available in limited quantities on north, east and south properties.

Indirect and secondary impacts likely to result from the loss of this habitat include the reduction (or temporary loss) of habitat for insects and insectivores, including resident and migratory birds that may use existing vegetation for foraging, roosting, and/or nesting.

5.2.2 Potential of added lighting

Light disturbances due to construction activities need to be managed to reduce the impact on the surrounding businesses, residents, and wildlife. Contractors should be aware of and identify any sources of light disturbances and train all on-site workers to be aware of noise or light issues and how to minimize disturbances where possible. The level of light from construction operations shall be periodically assessed by the Contractor and the Owner in relation to the significance of potential disturbance to reduce the impacts to the surrounding areas/community and wildlife (such as sea turtles that may nest on beaches). Sources of light disturbances should be identified and minimized where possible.

If construction is to occur during hours when enough daylight is not available, and lighting of the work area is required, the Contractor is expected to manage excess lighting and glare by:

- Strategic placement of lights away from residential areas and the beach,
- Tilting lights downwards, and
- Using shielding to restrict the glare of lights.

An Operational Management Plan should be implemented and the above techniques to reduce lights on the beach. Additional techniques that can be implemented include:

- Motion sensor light for areas near the beach,
- Tint windows that face the beach.
- Use opaque curtains or blinds after dark to reduce light visible from the beach.

5.2.3 Potential impact on the coastal environment and processes

Potential impacts to the coastal environment are generally split into two phases: construction phase and operational phase. During the construction phase, most impacts are associated with the use of heavy equipment and placement of material. Other possible impacts are discussed below.

Smothering

Smothering or trampling of terrestrial plants might occur during the construction period from the added sediment on land. Temporary smothering could also occur through the passage of heavy machinery over sensitive areas during the construction process.

Oil Pollution

There is also the potential for oil pollution stemming from fuel leaks or refuelling spills from equipment used for sand placement or grading.

Loss of habitat/ biodiversity

Terrestrial vegetation within the dune concept footprint will also be impacted during the construction works while sand is stockpiled and graded.

Debris

Any debris left on the property from the construction activities may diminish the aesthetic appeal of the area or become an obstruction on land.

DRAFT

Wide Scale Coastal Processes

Impacts to the coastal environment in the operations phase were assessed based on scenarios such as daily waves, tidal currents, hurricane waves and hurricane surges. The main long-term impact was positive in this case as the option reduced onsite inundation during the hurricane scenarios tested.

Light Impacts

Impacts caused by the increase in light can possibly occur during pre-construction, active construction, and post-construction activities.

Many marine faunae rely on the natural light cycles of the moon and stars to drive and regulate important physiological and behavioral processes, such as spawning (for corals), daily migration (for zooplanktons), or nesting (for sea turtle hatchlings). The increase in light due to urban development has the potential to negatively impact on the marine environment including species such as marine sea turtles. Increased artificial light on or near turtle nesting sites can cause disorientation in turtle hatchlings, affecting their ability to reach the safety of the ocean.

Impacts caused by the increase of artificial light are expected to be low during pre-construction, active construction, and post-construction, as there were no avian or turtle nesting activities observed on the beach. During pre-construction and active construction, works are scheduled to occur during daylight hours; therefore, the need for artificial light during construction may only extend toward the erection of tower lights to aid in securing the site. During post-construction increase, there will be an increase in artificial light sources from houses and other buildings. A proper light management plan should be established during the operational phase to reduce impacts.

5.2.4 Potential impact to any species identifies as endemic, near endemic, Rare, threatened, or endangered

The ecological assessment for this site revealed the presence of populations of ten species of plants that are notable for their inclusion on the TCIG's lists of Endemic Plants, Lucayan Archipelago Endemics and/or Native Plants of Special Conservation Concern (See Table 7.0). While it is recognized that individuals of several of these species may not transplantable due to their

DRAFT

unique biology, other species can be salvaged and/or relocated with a comparatively high level of success and confidence. Activities that should be considered to further reduce ecological impacts include:

1) Salvaging all individuals of all native orchids prior to undertaking any land clearing activities.

2) Salvaging all individuals of all native *Tillandsia* air plants prior to undertaking any land clearing activities.

3) Working with landscaping and native plant professionals to assess the individual biology of the other species identified in Table 3 to determine the extent to which they can be salvaged and/or transplanted with a high enough expectation of success that a plant salvage undertaking would be practical.

4) Developing and implementing a programmed to relocate all notable plants, including the identification of a location and procedure for temporary relocation of floral species that could be removed from the site prior to land clearing, and then moved back onto the site following the addition of fill.

5) Ensuring that additional ecological mapping of the location of notable plants be performed to prepare for relocation of individuals of notable plant species prior to construction.

6) Schedule the clearing of vegetation to avoid being performed during the bird nesting season, ensure that no active nests (i.e., nests with eggs or young incapable of sustained flight) will be damaged or destroyed.

5.2.5 Potential impact on the aesthetic and other built environment

Aesthetics is a branch of philosophy dealing with the nature of beauty, art, and taste and with creation and appreciation of beauty. The aesthetic value of an area is based on the visual character and quality of the natural and human-made features of the area.

DRAFT

The study area, for aesthetic purposes, is defined as the immediate areas within the vicinity of the proposed development – i.e., the Seven Stars development to the east, The Regents to the west, the beach to the north and the area to the immediate south of Grace Bay Road. The aesthetic quality of the Grace Bay area is affected by a mixture of imported Caribbean and North American and European architecture characters, nonunique to Providenciales or the Turks and Caicos Islands. The most dominant aesthetic character on Grace Bay is the 12 – story Ritz Carlton Hotel.

5.2.6 Water quality and noise (Construction and Operation)

Groundwater quality will be susceptible to point source pollution during the construction and operation phases:

i. Operation of bulk fuel storage (Standby power generators)
ii. Operation of sewerage disposal facility (Mechanical Systems)
iii. Landscape plans – nutrient loading from use of fertilizers

Noise pollution will be a factor during the construction phase of development:

i. Use of heavy plants and equipment
ii. Loud talking – construction workers

Mitigating any potentially harmful effects on marine water quality is extremely important. There is a potential impact of turbidity during the swim zone's creation due to the buoys' anchorage. Control measures and monitoring to reduce turbidity in the marine environment are extremely important as suspended sediments that cause turbidity can block light to aquatic plants, such as seagrass, smother aquatic organisms, and carry contaminants, pollutants, and pathogens, such as lead and bacteria. Proper monitoring efforts should be implemented to ensure sedimentation impacts do not exceed the threshold (fifteen (15) NTU).

Water quality impacts can possibly occur during and after active construction activities. However, impacts are expected to be low and short-term in nature.

5.2.7 Ecosystem and Economic Analysis

Potential the integrity of the existing groundwater configuration are unavoidable, negative impacts derived from the proposed development. The natural landscape will effectively reduce the reliance on processed water and assist in lowering operating costs.

5.2.7.1 Ecosystem analysis

Romanza on Grace Bay Townhouse and Condominium development is located on the northern coastline of Providenciales along Grace Bay Beach. Grace Bay Beach is a protected area within Princess Alexander National Park and is Protected under Government Law. The marine ecosystem is not expected to be disturbed as there is no direct development occurring in the marine or coastal environments.

The creation of the swim zones has the risk of causing sedimentation if not properly monitored. Impact on the marine ecosystem is expected to be minimal as bare sand, void of marine flora and epifauna, was observed around the proposed activities

5.2.7.2 Economic analysis

The development seeks to construct fifty-four (54) townhouses and condominium units on the property along with amenities such as swimming pools, a poolside bar, a restaurant building, a reception/gym building, a staff building, a tennis and sports court, a garage enclosure, a boardwalk, and gatehouse. The development is along a strip with numerous luxury resorts and townhouses like the proposed development. The Project Seeks to contribute to tourism (ecotourism specifically) by attracting and providing accommodation for guests visiting the island of Providenciales. The property will have direct access to Princess Alexander National Park, a protected area with a marine environment teeming with diversity that will attract ecotourists looking to explore the coral reefs or take part in the many water sports activities offered, such as kayaking or paddleboarding.

5.2.8 Socio-economic

This section briefly addresses the potential socio-economic impact of the proposed development on the already stressed metropolitan population including

the economy, social cultural, and heritage environments. This impact may be positive or negative; direct or indirect.

The proposed Romanza on Grace Bay townhouses and condo development will occur in an economy of explosive growth and development on Providenciales, particularly in the tourism sector.

The National Physical Development Plan (2020) for the TCI described Grace Bay as the tourism center of the country that drives the economy and is largely responsible for the socio-economic development during the past four decades. The world renounced Grace Bay Beach is the major attraction that draws visitors to the area. This area is the economic hub of Providenciales where the major hotels, tourist shops, restaurants and nightlife are found.

Tourism drives the socio-economic growth and development of the TCI, contributing significantly to the Gross Domestic Product and the source of capital for the advancement of socio-economic growth.

The proposed Romanza on Grace Bay Townhouses and Condominium is expected to make significant contribution to the socio-economic development of the islands by providing employment opportunities, new revenues for government and adding additional social facilities for the enjoyment of the local and tourist population.

5.2.8.1 Labor

Tourism generates income for a variety of businesses and creates a wide range of employment opportunities for the local labour force. The Romanza on Grace Bay townhouse and condo project will have direct and indirect impact of the growing labour market of the Turks and Caicos Islands. During the construction phase the project will create approximately 100 new construction jobs, ranging from labours, skilled works, middle and lower-level construction management jobs. Approximately 110 fulltime workers will be needed to successfully operate these new facilities. These employment opportunities include house keepers, gardeners, receptionists, clerical workers, booker keepers, bar maids, security workers and middle and top-level managers.

5.2.8.2 Tourism

According to the Department of Economic Planning and Statistics (DEPS) August 2016 Departing Visitors Survey "the average length of stay in the TCI was about 8 nights". This represents an increase in the average length of stay from the previous 7 nights average. Taking the 2016 land-based arrival figure of 453,612 and the average length of stay per guest (453,612 x 8) equates to approximately 3.6 million visitor nights in the TCI or approximately 9,950 temporary residents on daily basis. When including the local population, the overall population in the TCI was approximately 47,852 in 2016.

5.2.8.3 Public infrastructure

Tourism is one of the fastest growing industries in the 21st. century and it has tremendous impact on the development of a country physical infrastructure like roads, airports, water, and sewage facilities. Infrastructural development in the TCI during the past two decades or so has not kept pace with rapid development, resulting existing infrastructures that cannot adequately meet the needs of a growing population and increased tourist arrivals. For example, the road system is overcrowded, and traffic congestion is a way of life. The Howard Hamilton International Airport cannot comfortably handle the daily number of passengers.

Therefore, any increase in the numbers of tourists visiting the destination would have further impact on the limited infrastructure.

Significant improvements need to be made to public infrastructure like public roads, airports, and seaport, healthcare facilities, water management and distribution facilities, waste management facilities and recreational facilities. The Providenciales (Howard Hamilton) International Airport at its present size and standard cannot comfortably accommodate the number of passengers travelling through it. Government has plans for major infrastructural upgrades, including the redevelopment of the Leeward Highway in a 6-lane highway and adding parallel shoulder feeder roads; modernization of the Howard Hamilton's International Airport funded through a public/private collaboration.

Similarly, Water and sewage distribution facilities would also be stretched to their limits with the increased annual number visitors.

The increased annual tourists' arrivals will encourage government to increase investment in infrastructure development like public roads, airports, and seaports. Increase revenues from tourists can be used for this purpose.

DRAFT

Tourism can help protect and finance the preservation of historic and cultural sites. Historical site like the "Cheshire Hall Ruins" can benefits from tourists visiting the site and entrance fees collected can be used to restore the site.

5.2.8.4 Crime

The Government of the TCI has developed a comprehensive National Security strategy to effectively confront crime throughout the country. This multi-pronged approach will identify immediate national security threats; efficiently manage the resources currently available; procure additional tools and resources for internal and external security agencies; strengthen partnerships internally and regionally and internationally collaborating on security initiatives and will engage the Turks and Caicos community in the fight against crime.

5.2.8.5 Public beach access

Beach access is a universal right and necessary for the public's enjoyment of the beach. Beaches and coastal area in the Turks and Caicos are a unique resource. They provide ecological, recreational, economic and aesthetic opportunities that are found nowhere else. To use and enjoy this resource, people must be able to get to it. Beaches in the Turks and Caicos are public. Private property ends at the edge of vegetation. The proposed development does not eliminate any existing beach access.

5.2.8.6 Potential impact to neighbouring developments, businesses and Residences

Urban design is an art form of designing buildings and spaces for people and is one of the important elements in urban planning, especially for dense and dynamic coastal areas like Grace Bay beach, Providenciales. It concerns the total visual effect of building masses, connections with people and places and creation of spaces for movement, urban amenities, and public realm.

The collection of low and high-rise resort and commercial buildings along the Grace Bay beach have various architectural styles and character non is indigenous to Providenciales. The proposed Romanza Grace Bay townhouses and condominium development will add the bold foreign form architecture

character that lines the Grace Bay beach skyline. The architectural style of the proposed hotel facility seeks to blend with the neighbouring developments.

The proposed Romanza on Grace Bay townhouses and 7-story Condo tower development will have similar building heights, densities and building line setback as existing developments in the area, therefore, will not negatively impact neighbouring development in the area.

The proposed development is located adjacent to Tuscany and the Venetian on Grace Bay resorts and would complement the existing buildings. The land area to the immediate east of the proposed development site is undeveloped. Neighbouring businesses in the vicinity of the proposed development include the Royal Turks and Caicos Golf Club. The adjacent golf club would offer an attractive amenity to the residents and guests at the new Romanza on Grace Bay residences

5.2.8.7 Potential Climate Change Impacts

Many factors contribute to climate change and associated sea level rise. The Intergovernmental Panel on Climate Change (IPCC) determined that the current trend of sea level rise is 3.4 mm/yr. The IPCC has also predicted that sea levels may rise anywhere from 8.9 cm to 23.8cm by the year 2050 and 18 cm to 59 cm by the year 2100. Some reports have called the IPCC conservative in their assessments and feel that they do not accurately account for the response of continental ice to greenhouse warming. These other reports have estimates of as much as 60 cm (the low range) and 215 cm (the high range) by 2100.

Whilst small island states, like the Turks and Caicos contribute very little to climate change they face significant potential impacts from this philomel including rising sea levels leading to flooding and land loss, increased frequency and intensity of extreme weather events like tropical storms and hurricanes, damage to coral reefs, disruption of freshwater resources, potential displacement of populations due to shrinking landmass and disrupts to economies and livelihoods of peoples.

DRAFT

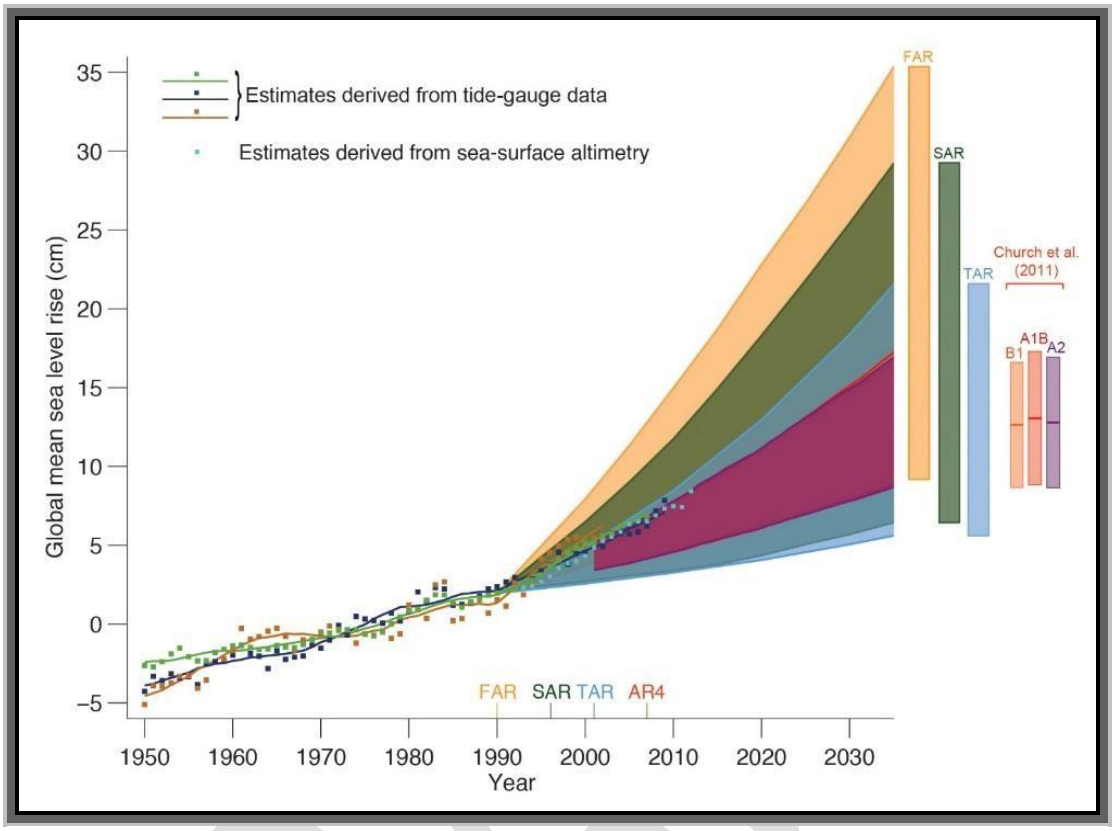


Figure 53.0: Predicted Global Mean Sea Level Rise over Time

In addition, it is notable that these projections in sea level rise are associated with global (eustatic) levels and do not account for localized changes in sea level associated with tectonic equilibration.

5.2.8.8 Solid Waste Impacts

The Project should seek to reduce waste production and recycle material as much as possible. This will help reduce and/or eliminate solid waste from entering the marine environment. Solid waste, in particular materials that take a long time to degrade, can have numerous negative impacts on wildlife and the ecosystem and are usually caused by improper waste management. Negative impacts to the marine ecosystem include:

- Animals become entangled in debris. This is most notable in animals required to resurface to breathe air, such as whales, turtles, and dolphins.

- Marine wildlife such as seabirds, whales, fish, and turtles mistake solid waste for prey and ingest it, which can cause them to starve.
- Some debris can also carry bacteria and viruses into the marine environment, causing diseases in marine species.
-

Solid waste impacts marine wildlife and tourism. Large amounts of solid waste on beaches and in shallow water environments can reduce the aesthetic value of the beach and the number of tourists visiting the island of Providenciales. This can long-term impact on the country's GDP and economy, as tourism is the number one industry.

Hazardous waste impacts are potential during the construction and operational phases. The introduction of hazardous chemicals and waste can decrease water quality by increasing parameters such as pH, harm wildlife in the area, and degrade sensitive habitats such as seagrass, corals, and mangroves.

Proper waste management should be implemented on-site to help prevent solid waste impacts. Solid waste impacts are expected to be short-term and moderate on the environment.

5.3 Impact Assessment

These potential impacts will directly relate to activities taking place during the construction and post-construction phases of the proposed development. Each impact can range from low to high, short-term and reversible using appropriate mitigation measures, Table 1. The areas subjected to groundwater quality impacts are:

a. Immediate and surrounding

DRAFT

Table 29.0: Impact Assessment

Project Phase	Impact	Area of Impact	Impact Rating	Mitigation Measure
Pre-Construction	Groundwater	N/A	N/A	N/A
Construction		Immediate and surrounding	L/ST/R	EMP
Post Construction		Immediate and surrounding	L/LT/R/	EMP

These impacts can be effectively mitigated by ensuring that abstraction is minimized and exploited in small volumes over extended time periods. Fresh groundwater should be extracted and stored in a cistern where abstraction for general use occur. General quality monitoring will form part of the Environmental Management Plan.

A summary of potential impacts to the coastal regime and terrestrial environment is presented in Table 30.0. The table is split into phases to show the impacts that apply during the construction phase and then the impacts that apply during the operational phase. Three areas of concern are highlighted based on the recommendations in the issued Terms of Reference. The area within the concept footprint had the highest number and degree of impacts while the 500m and 5km radius areas had negligible impacts.

During the operational phase, there are potential impacts related to more people being on the beach. These may include additional debris and more human interaction with benthic resources. These impacts are assumed to have been addressed in detail by social scientists in other sections of this report.

DRAFT

Table 30.0: Potential impacts to the coastal environment.

Phase	Potential Impact	Area of Impact			Duration	
		Option Footprint	500m Radius	5km Radius	Short	Long
Construction	Impacts on average waves in the area					
	Impact on average tidal currents in the area					
	Impacts on erosion or accretion processes					
	Impacts on storm waves in the area				x	
	Impacts of storm inundation in the area				x	
	Impacts on terrestrial flora and fauna				x	
	Impacts on burrowing organisms					
	Impacts on marine benthos				x	
	Noise and dust from construction				x	
	Increased turbidity in marine water					
	Potential oil spills related to machinery				x	
	Impacts on beach access				x	
	Impacts on roadway traffic				x	
	Key	*Negligible*	*Increased*	*Reduced*		

Phase	Potential Impact	Area of Impact			Duration	
		Option Footprint	*500m Radius*	*5km Radius*	*Short*	*Long*
Operational	Impacts on average waves in the area					
	Impact on average tidal currents in the area					
	Impacts on erosion or accretion processes					
	Impacts on storm waves in the area					x
	Impacts of storm inundation in the area					x
	Impacts on terrestrial flora and fauna					x
	Impacts on beach access					
	More patrons on the beach					x
	More debris on beach area and seafloor					x
	Key	*Negligible*	*Increased*	*Reduced*		

5.4 Derivation of Significance

The potential for any derivation of significance is low. The fresh groundwater lens is not used as a source for potable water.

Added to the magnitude and duration of an impact, it is also important to look at the likelihood of an impact occurring. When these three concepts are combined, the significance of each impact is derived.

In the construction phase, the activities are generally well understood and would be undertaken by experts in the field. Construction process impacts, such as the impacts to the vegetation, have a high likelihood of occurring since the existing environment will need to be disturbed not only to construct the option but to also construct the townhouses.

There is also a certain likelihood that road traffic will be disturbed, however, this will not be during high traffic hours. Therefore, the increase traffic associated with construction has a medium likelihood. Beach traffic may also be impacted during construction, however, with the availability of other beach areas, patrons will more than likely relocate to quiet beach sections. Outside of the 500m radius this impact would have a low significance.

The site offices, machinery and stockpiles will be stored within the property to reduce the impact on aesthetics in the area. If there is a buildup of unsightly garbage on site, this would first impact workers on the site which would prompt a cleanup exercise. Once the debris is contained within the property and disposed of on schedule this impact will have a medium significance.

With best practices employed, it is less likely that oil spills or other chemical spills will occur. Therefore, the potential negative impact of oil spills has a low likelihood and low significance.

In the operational phase the main impact is the reduced inundation from hurricanes. Hurricanes may be regarded as infrequent events since they may hit every year or two. When one considers climate change there is a possibility that hurricanes may become more frequent. With the varying strengths and frequency of a hurricane, it may be considered that there is a medium likelihood of a major hurricane passing over the project life. However, when future cost savings and habitat rehabilitation (that arise from implementing the concept) are considered the impact was ranked with a high significance.

DRAFT

5.5 Register of Significant Aspects and Impacts

Environmental impacts of The Project are impacts to the natural communities and wildlife in the area that can be reasonably inferred, considering the footprint of impacts and known habitats on-site. Other expected impacts are those related to normal construction and operation, such as waste generation and disposal, fueling, and use of potentially hazardous materials, as well as other accidents or malfunctions, which may entail an environmental component. The Register of Significant Aspects and Impacts considers potential impacts due to construction activities. The Register will be used to develop method statements to manage and mitigate potential impacts of The Project proactively.

The Register of Significant Aspects and Impacts evaluates the potential impacts identified in the Environmental Impact Assessment and assigns a significant Impact rating. Risk Scores measure the likelihood of the impact occurring and are measured on a scale of 1-10, with 1 being unlikely to occur and 10 being highly likely to occur. Magnitude scores measure the scale of the impact if it occurs. Duration ranges from Temporary (T), Short-term (ST), Long-term (LT), and Permanent (P). Intensity parameters are Low (L), Moderate (M), and High (H). Low Impact refers to impact reversible in 1 year. Moderate Impact refers to impacts reversible in 5 years. High Impact refers to impacts that are not reversible within 5 to 10 years or are irreversible.

DRAFT

Table 31.0: Register of Significant Aspects and Impacts

Significant Aspect and Impact	Activity	Potential Impact	Significant Impact Ratting			Mitigation Strategy
			Magnitude		Risk Score	
			Duration	Intensity		
CONSTRUCTION PHASE						
Pre-Construction						
Solid Waste	Mobilization	Increase in marine debris. This may cause entanglement of marine life (specifically marine mammals and sea turtles), introduction in diseases, increase of marine life ingesting debris and smothering of marine habitats,	ST	M	3	• A proper waste management system should be created. • Any material or equipment that is blown into the water should be retrieve at the earliest convenience, in a safe manner. • Sufficient waste bin should be provided on site. Waste bins should have lids to ensure domestic waste does not enter open water.

DRAFT

						• Waste should be recycled before entering pre-approved landfill. • Construction waste should be reused on site where feasible.
Lighting	Mobilization/securing site	Disrupt natural process and disturb/harm marine life (such as turtle hatchlings)	ST	L	3	• A proper light management plan should be established. • Tilt light away from sensitive areas. • Use shades where necessary.
During Construction						
Water Quality	Bouy anchoring	Increase in Turbidity	ST	L	5	• Installation of Turbidity Curtains. • Turbidity Monitoring will be done during anchoring of swim zone buoys.

DRAFT

						Works will be halted if readings exceed fifteen (15) NTU.
Marine Biodiversity	Bouy anchoring	Marine Life	ST	L	1	• Prior to buoy anchoring, the area will be assessed to ensure that there are no motile epifauna (such as Long-Spined Sea Urchins or Queen Conch) present within the footprint of works. • Any identified epifauna will be removed from the area and relocated to a similar habitat.
Marine Biodiversity	Bouy anchoring	Habitat degradation	ST	L	2	• Works should be restricted to only the footprint of works. • Turbidity

DRAFT

						monitoring will be conducted to ensure protection of remaining benthic habitat. • Anchoring should only occur in the bare sand benthic habitat.
Solid Waste	Creation of swim zone	Increase in marine debris. This may cause entanglement of marine life (specifically marine mammals and sea turtles), introduction in diseases, increase of marine life ingesting debris and smothering of marine habitats,	ST	M	5	• A proper waste management system should be created. • Any material or equipment that fall into the water should be retrieve at the earliest convenience. • Sufficient waste bins should be provided on site. Waste bins should have lids to ensure domestic waste does not enter

DRAFT

						open water. • Waste should be recycled before entering a preapprove landfill facility. Waste should be reused on site where feasible.
Lighting	Securing site	Disrupt natural process and disturb/harm marine life (such as turtle hatchlings)	ST	L	3	• A proper light management plan should be established. • Tilt light away from sensitive areas • Use shades where necessary
Post -Construction						
Water Quality	Recreational Activities (swimming)	Turbidity	T	N	1	• Swimming and beach activities should be limited the swim zone where there will be limited impacts to the marine benthic communit

DRAFT

						y.
Lighting	Increase in artificial light	Disrupt natural process and disturb/harm marine life (such as turtle hatchlings)	LT	L	3	• Monitoring for nesting turtles and avian species. • Tilt light away from sensitive areas. • Use shades to block glare where necessary. • Strategically place light away from areas with high biodiversity (avian, turtles)
Solid Waste	Operation Activities	Pollution of the marine environment	ST	M	5	• Implement an operations solid waste management plan. • Implement an operations hazardous waste management plan.

DRAFT

SECTION VI

6.0 Mitigation and Monitoring

Impacts can be addressed by using mitigation measures. These measures seek to reduce the potential scale of impacts through preventative action. Mitigation measures go hand in hand with monitoring exercises, which are undertaken to ensure that the baseline conditions have not been negatively impacted by the works.

6.1 Proposed actions and schedule to mitigate against any environmental impacts.

The mitigation measures proposed are listed below based on the construction impact being addressed as listed in section 6.0.

Smothering

Large plants that can be replanted will be removed before the construction works begin.

Oil Pollution

Refuelling of heavy machinery should be done on land. Appropriate refuelling equipment (such as funnels) and techniques should be always used. There should be appropriate minor spill response equipment (for containment and clean up) kept on hand.

Loss of Habitat

Suitable terrestrial vegetation will be replanted on the dune after the placement of sand to design grade. Additional vegetation is recommended to strengthen the dune and buffer zone areas. This vegetation must be salt and drought resistant to thrive. It is further recommended that the existing species of plants on the property be replanted to be in harmony with the surrounding properties.

Debris

Construction sites must be outfitted with designated disposal locations that are cleared with a regular frequency such as weekly.

Monitoring

Monitoring efforts should be done to track the success of the implemented works and determine the magnitude of impacts. A monitoring plan for the

DRAFT

operational phase should include data collection, data processing and possible maintenance works. Major fields should be monitored including the beach/buffer zone topography, and terrestrial vegetation monitoring. Other parameters such as air quality are assumed to be covered in other sections of this report.

It is important to measure how the beach and dune area are progressing over time, particularly if multiple hurricanes have passed in a season. Two methods can be used to track the beach width, through a profile survey done by a commissioned land surveyor or by tracking a series of rectified photos. The photos can be taken using a drone with a GPS attached or a permanent benchmark could be set up on the site for amateur photographs to be taken. All methods provide varying levels of detail and can be used to check that the beach remains dynamically stable.

Water quality testing is a strongly advised as a monitoring activity. The water quality in recreational water is typically governed by EPA standards for parameters such as bacteria and nutrients. It is of the utmost importance that the water quality remains like baseline conditions. If the water quality is negatively affected there could be an impact on the touristic value of the property and nearby lots. Water quality testing should be done for typical nutrients and bacteria. These tests can be done on island and have a much faster turnaround time than low nutrient testing routines.

Benthic resources within the project nearshore should be monitored to qualitatively assess the impacts of construction and operations. There should also be follow-up assessments to determine if there have been any unexpected long-term impacts from the works (such as damage from more tourists snorkelling). Finally, a trained ecologist should perform regular assessments to determine if the planted vegetation is growing as expected or if it should be replaced with another recommended plant.

A monitoring schedule is proposed to guide future monitoring works and their frequency (Table 32.0).

DRAFT

Table 32.0: Proposed monitoring works after construction, frequency and estimate of days needed by resources.

No.	Item	Category	Duration (days)	Frequency	Resources
1	**Beach/Site Topography – Drone Photos**				
1.1	Purchase and setup Drone, accessories, and software	Procurement	2	One Time Instalment	1 Surveyor, 1 Technicians
1.2	Drone Survey	Data Collection	3	Annually	1 Surveyor, 1 Technician
1.3	Convert data to DEM and Orthomosaic	Analysis and Report	2	Annually	1 Surveyor
1.4	Analyze imagery and develop *Shoreline Evolution Report*	Analysis and Report	4	Annually	1 GIS Specialist
2	**Beach/Site Topography – Beach Profiles**				
2.1	Purchase and setup traverse kit	Procurement	2	One Time Instalment	1 Surveyor, 2 Technicians
2.2	Beach topography survey	Data Collection	12 (6) *3 days per survey*	Year 1 – quarterly After – semi-annually	1 Surveyor, 1 Technician
2.3	Analyze data and develop *Beach Evolution Report*	Analysis and Report	7	Year 1 – quarterly After – semi-annually	1 Coastal Engineer, 1 Surveyor
3	**Water Quality Testing**				
3.1	Site Visit and Sample Collection	Data Collection	2	Semi-annually	2 Technicians
3.2	Water Quality	Lab Analysis	14	Semi-annually	2 Technicians, 1 Marine

No.	Item	Category	Duration (days)	Frequency	Resources
	Testing				Biologist/ Environmentalist
3.3	*Water Quality Report*	Analysis	4	Semi-annually	1 Technicians, 1 Marine Biologist/ Environmentalist
4	**Benthic Resources**				
4.1	Benthic Assessment	Data Collection	12 (6) *3 days per survey*	Year 1 – quarterly After – semi-annually	2 Technicians, 1 Marine Biologist/Environmentalist
4.2	*Visual Benthic Reports*	Analysis	12 (6) *3 days per survey*	Year 1 – quarterly After – semi-annually	2 Technicians, 1 Marine Biologist/Environmentalist
5	**Terrestrial Plants Monitoring**				
5	Flora Assessment	Data Collection	12 (6) *3 days per survey*	Year 1 – quarterly After – semi-annually	2 Technicians, 1 Marine Biologist/Environmentalist
5.1	*Dune Vegetation Reports*	Analysis	12 (6) *3 days per survey*	Year 1 – quarterly After – semi-annually	2 Technicians, 1 Marine Biologist/Environmentalist

DRAFT

Each report produced should predict trends based on previous reports and comment on the overall successes and shortcomings of the coastal works implementation. Any anomalies should be highlighted with possible causes mentioned. For example, a beach profile survey report might show a period of erosion after a swell event. This should be noted in the report to determine whether the erosion is episodic or a constant.

Actions to be taken to mitigate against impacts to groundwater resource are to include:

Pre- construction –	Water quality sample episode 2 weeks prior to Construction
Construction –	Weekly water quality sampling episodes
Post- construction	Quarterly water quality sampling episodes

6.1.1 impacts on the terrestrial and marine life (Displacement).

Potential activities that could be considered to minimize and/or offset ecological impacts on landside resources should include:

1. Salvaging and relocating minimally motile intertidal organisms (e.g., *Cerion* and *Hemitrochus* snails) to suitable off-site receiver locations before land clearing.

2. Pro-actively planning to enhance plant abundance and biodiversity by planting site-appropriate native vegetation and/or integrating other species of native plants that are not presently on the property (e.g., Turks cap cactus (*Melocactus intortus*)) into the landscape plan for the project.

3. Ensuring that field monitoring is conducted to avoid impacts to nesting birds during land clearing.

4. Removing all pest plants from the site and implementing a monitoring programme to prevent their re-establishment.

DRAFT

5. Incorporating state-of-the-art environmentally conscious design and management techniques into the project.

6. Considering the development of educational materials notifying future residents of the presence of species of notable plants in the waterward setback zone and that the collection and transport of endemic, endangered, and/or threatened species is prohibited.

7. Ensuring coordination with the landscape team ensures that no ornamental species on the list of invasive plants are introduced onto the property.

8. Prohibiting unleashed dogs on beaches to eliminate or minimize adverse impacts on shorebirds and other coastal resources.

9. Conducting periodic beach clean-ups to remove flotsam, jetsam, and/or other solid waste or debris that may accumulate on the shore; and

10. Resisting beach management initiatives that would mechanically remove naturally occurring tidal wrack (e.g., seaweed) from the beach, as it harbors prey for foraging shorebirds and is beneficial to the localized ecology, except when situations warrant more aggressive management.

The buffer zone will have available apace for the replanting of vegetation. The mitigation measures are focused on replanting more vegetation in this area than what was there before the development.

6.1.2 Impact on Water Quality

The potential impact on open water/the marine environment from the creation of the swim zone would be turbidity caused by anchorage and buoys. Mitigating any potentially harmful effects on the open water quality is extremely important

for the scope of construction. Implementing the following measures will assist with the preservation of the site:

- Turbidity monitoring—The Turbidity reading should not exceed fifteen (15) NTU. If the threshold is met or exceeded, work should immediately halt until the unlevel levels return to acceptable levels.

All efforts should be made to keep turbidity at a minimum. Control measures to reduce turbidity in the marine environment are extremely important as suspended sediments that cause turbidity can block light to aquatic plants such as seagrass, smother aquatic organisms, and carry contaminants and pollutants and pathogens, such as lead and bacteria.

The baseline turbidity reading will be taken closer to project commencement. The construction activities are not expected to exceed fifteen (15) NTU, a holding point for activities. The Environmental Monitor (EM) will conduct daily environmental management and monitoring. Turbidity monitoring will be conducted during activities to ensure that turbidity does not exceed fifteen (15) NTUs above the baseline. Turbidity monitoring should be conducted upstream (50 m from the work area) and downstream (50m from the work area) or in any visible turbidity plume area. Turbidity reading should be conducted daily, twice per day.

Although turbidity is not expected to reach or exceed the fifteen (15) NTU mark, all in-water activities will be measured. Monitoring should also be done for any signs of turbidity, regardless of activity. The first effort will be to limit the amount of turbidity generated due to the activity as much as possible. The contractor will monitor weather conditions to ensure that work ceases during unfavorable weather conditions.

Avoiding the coastal waters acts as the most impactful mitigation measure in the coastal option. During the operation phase, monitoring measures will be implemented to ensure that increased traffic does not impact water quality in the bay.

6.1.2.1 Water Quality Mitigations

Monitoring ground water quality

Pre- construction -	Water quality sample episode 2 week prior to Construction
Construction -	Weekly water quality sampling episodes
Post- Construction -	Quarterly water quality sampling episodes

Saltwater encroachment will be monitored. When salinity measurement exceeds the freshwater threshold of 600 parts per million the groundwater abstraction regime will be modified to reduce the impact on the freshwater lens. Salinity measurements greater than 1200 parts per million will cause the groundwater abstraction regime to be shut down and rest until salinity measurements return to measurements below 600 parts per million.

Additionally, nutrient loading will be closely monitored to ensure that individual parameters are kept within satisfactory limits. Any parameter(s) exceeding satisfactory limits will cause the application of fertilizers to be modified to reduce the negative impact.

6.1.3 Impact of noise and light

Coastal construction is to be strictly done within the hours of 8am to 5pm so that neighbours are not disturbed in the night and early morning hours. Once the construction is complete the impact of noise is almost negligible. A new source of light pollution will be present on the beach, and it is assumed that possible disruptions have been addressed in other sections of this report.

Light disturbances due to construction activities need to be managed to reduce the impact on the surrounding businesses, residents, and wildlife. Contractors should be aware of and identify any sources of light disturbances and train all on-site workers to be aware of noise or light issues and how to minimize disturbances where possible. The level of light from construction operations shall be periodically assessed by the Contractor and the Owner in relation to the significance of potential disturbance to reduce the impacts on the surrounding areas/community and wildlife (such as sea turtles that may nest on beaches).

DRAFT

Sources of light disturbances should be identified and minimized where possible.

If construction is to occur during hours when enough daylight is not available and lighting of the work area is required, the Contractor is expected to manage excess lighting and glare by:

- Strategic placement of lights away from residential areas and the beach,
- Tilting lights downwards, and
- Using shielding to restrict the glare of lights.

An Operational Management Plan should be implemented, and we should incorporate the above techniques to reduce light on the beach. Additional techniques that can be implemented include:

- Motion sensor light for areas near the beach,
- Tint windows that face the beach.
- Use opaque curtains or blinds after dark to reduce light visible from the beach.

6.1.4 Impact of incursion of invasive species of flora and fauna

No invasive plant species should be replanted on the property.

6.1.5 Impact to resettled wildlife – Birds nesting

The baseline assessment indicated that the beach isn't being used as a nesting site for either seabird species or turtle species. It's suggested that the PANP is used as a foraging area for sub-adult and adult turtle and avian species. Due to no direct and permanent development happening within the marine environment, the development should not impact on any resettled marine species.

6.2 Proposed actions to mitigate against noise pollution

The human ear can perceive a large range of noise levels. Noise levels are typically expressed on a logarithmic scale in units called decibels (dB). The commonly used frequency weighting for environmental noise is A-weighting (dBA), which simulates how an average person hears sound.

DRAFT

The proposed Romanza on Grace Bay townhouses and condominium project would generate tremendous levels of noise during construction. Noise generated during construction could be bothersome to nearby residents and businesses. Construction workers would also be subjected to construction noise while working on the site.

The most prevalent noise source during the construction phase of the project will come from internal combustion engines, earth moving equipment, material handling equipment, and stationary engine-powered equipment. Mobile equipment operates at sound levels that vary in a cyclic fashion, but stationary equipment (e.g. pumps, generators, and compressors) operates at sound levels that are constant over time.

Noise at the construction site can be controlled at three locations:

- At the source, with mufflers and quieter engines.
- Along the noise path, with barriers such as noise walls and shielding, and.
- At the receptors, with insulation such as windows, doors or increased insulation in walls.

Construction noise could be reduced by using enclosures or walls to surround noisy equipment, installing mufflers on engines, substituting quieter equipment or construction methods, minimizing times of operation and locating equipment farther from sensitive receptors. Construction activities will meet requirements established under local ordinances and legislation. To reduce the impact of construction noise on neighbouring residents and businesses, construction activities would be limited to normal working hours (7:00 am to 5:00 pm).

Further, to reduce construction noise the following mitigation measures will be incorporated into the construction work plan:

- Erection of noise berms, fences and barriers as early as possible to provide noise shielding.
- Limit construction activities to normal working hours.

DRAFT

- Equip construction equipment engines with adequate mufflers, silencers, and engine enclosures to reduce their noise.
- Specify the quietest equipment available to reduce noise.
- Turn off construction equipment during prolonged periods of nonuse to eliminate noise from construction equipment during those periods.
- Require contractors to maintain all equipment and train their equipment operators to reduce noise levels and increase efficiency of operation.
- Locate stationary equipment away from receiving properties to decrease noise from that equipment in relation to the increased distance, and,
- Construct temporary noise barriers or curtain walls around stationary equipment.

Increased dust levels from construction activities is another nuisance that can be expected during the early stage of construction. Dust levels can be reduced by enclosing and screening the property prior to commencement of earth moving works. Dust nuisance can also be reduced by watering down site at least two times per day.

6.3 Storm surge analysis and mitigation plan for sea level rises

The Caribbean region is vulnerable to tropical storms and hurricanes each year from June to November. Dramatic and abrupt changes to the coastline can occur because of these storms. In general, coastal protection structures are designed to withstand wave attack from these extreme storm events, e.g., the selection of armour stone size for a coastal structure, or the determination of design wave forces on critical infrastructure from extreme waves. Extreme waves occur infrequently, and decades or centuries of data must be explored to adequately describe the statistics.

For the Atlantic Ocean, detailed information on tropical cyclones, including all hurricanes from 1851 to present, is provided by the US National Oceanic and Atmospheric Administration (NOAA), specifically at the National Hurricane Center (NHC). This database of storm tracks and other parameters was the main source of information describing the individual storms. Figure shows the

DRAFT

extracted historical paths of major hurricanes (category 3 and higher) passing within a 300km radius of Providenciales

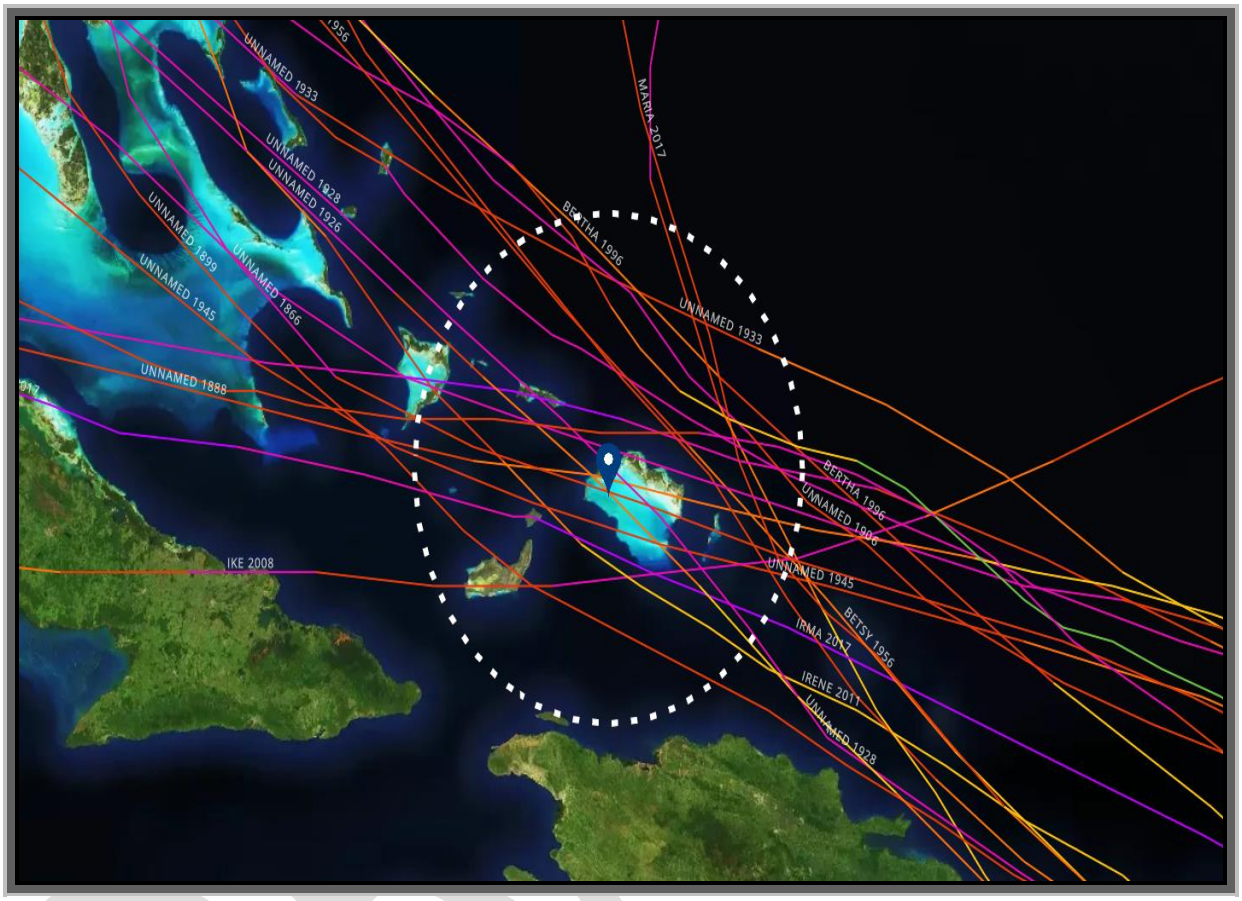


Figure 54.0: Major hurricanes passing within a 300km radius of Providenciales from 1851 to 2020 (Source: NOAA-NHC)

Turks and Caicos lies to the north of 'Hurricane Alley', an area of water in the Atlantic Ocean within which hurricanes typically form from warmer sea surface temperatures there. Historical paths of hurricanes in the North Atlantic basin tend to form between latitudes 5°N and 25°N off the west coast of Africa and then track across the Atlantic Ocean. Those formed at the lower latitudes are usually pushed on a westerly track by the north-east Trade Winds, whereas those of the higher latitudes track more to the north and north- west. Multiple storms have impacted the Providenciales coast as it is located where many storms turn towards Florida in the north.

Historical Hurricane Activity

Historical hurricane information from the NOAA's National Hurricane Center (NHC) database was reviewed (for storms occurring between 1851 and 2020). All hurricanes passing within a 300km radius of the project site were extracted from the database. The results show that since the year 1851, 148 tropical storms and hurricanes have passed within this radius of Providenciales. The total number of storms can be broken down according to the categories described by the Saffir Simpson scale (Figure 54.0).

The graph shows that the study area was more frequently hit by tropical storms (89) and was affected by hurricanes (59 count) less frequently. Of these 59 storms, 28 storms were major hurricanes. Figure 55.0 shows the temporal distribution of storms while Figure 56.0shows majors hurricanes passing grouped into 20-year intervals. The graph shows that many years can pass without a major hurricane. The figure also shows that over the last 40 years, there has been a significant increase in the number of storms and the strength of storms. The period between 1995 and 2018 was very active, with many years featuring more than one storm passing near the site. Particularly in 2017, Hurricane Irma passed to the south of the island at a category 5.

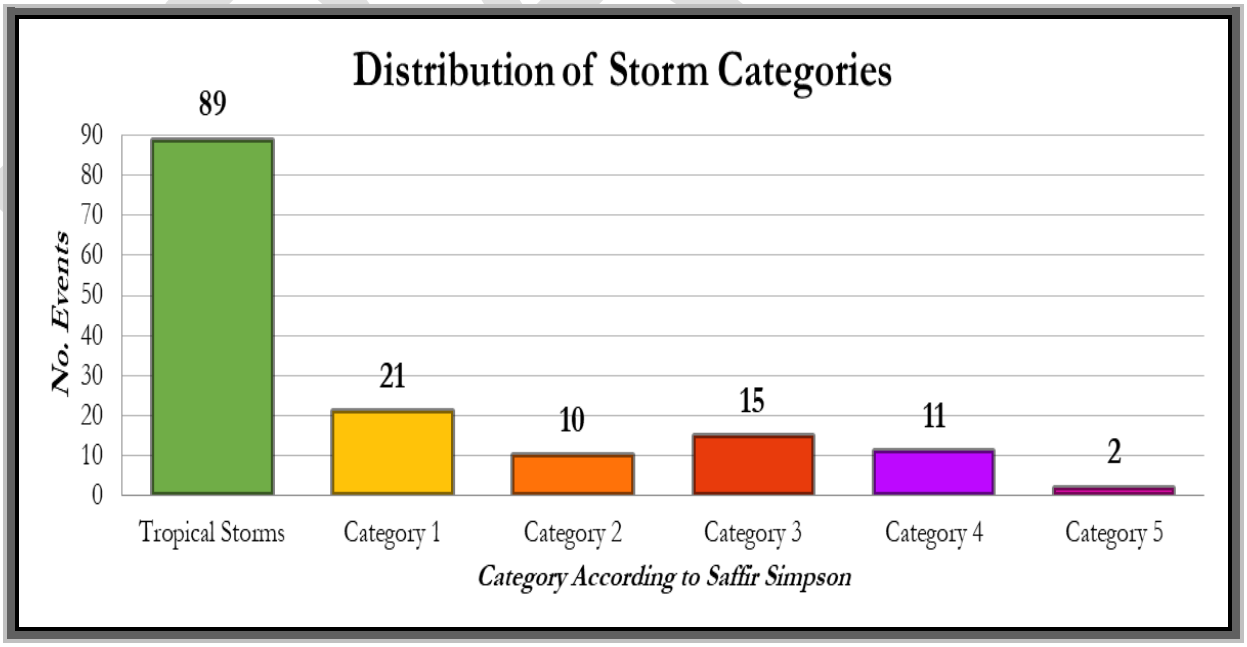


Figure 55.0: Storm distribution, according to Saffir Simpson classification, since 1850 showing storms that have passed within a 300km radius of the project site

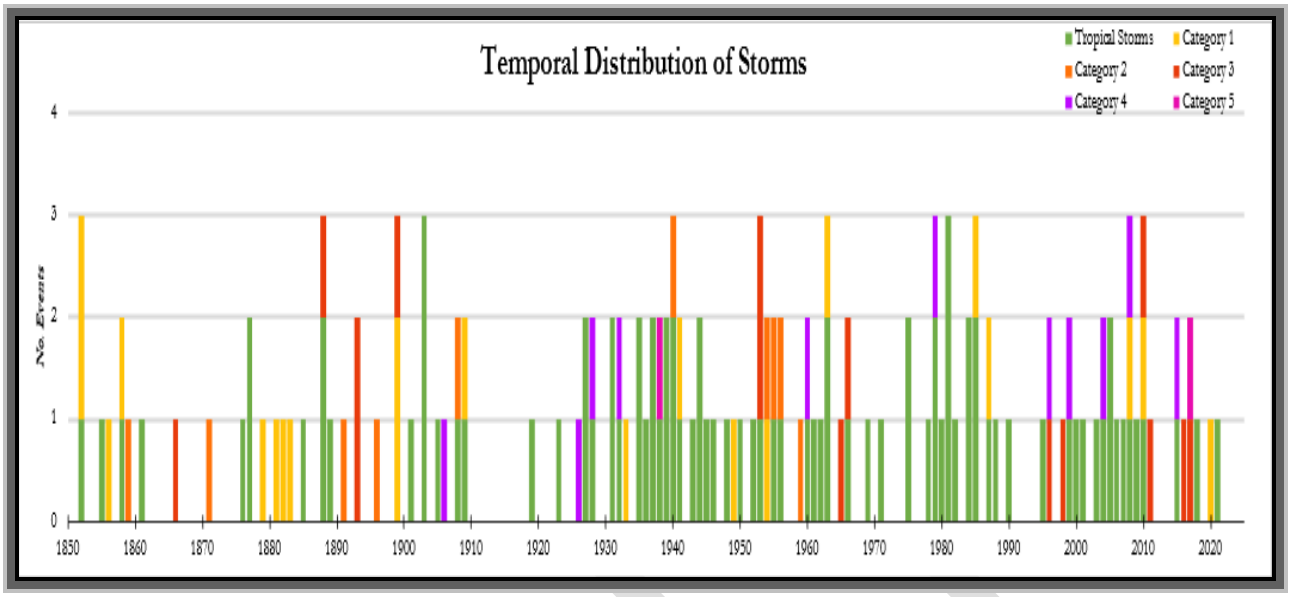


Figure 56.0 Storm distribution since 1851 showing storms that have passed within a 300km radius of the project site.

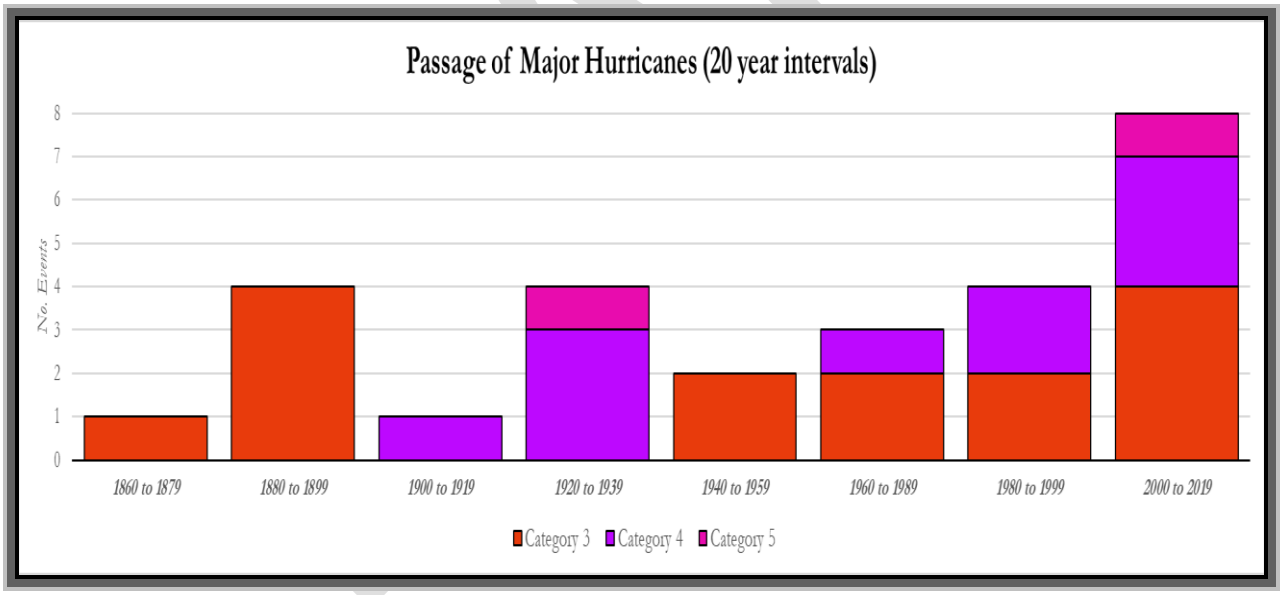


Figure 57.0: Passage of major hurricanes over the period (divided into 20-year intervals)

Hurricane Simulations

Offshore Hurricane Waves

Deep-water wave parameters were calculated for each selected tropical cyclone using parametric models (Cooper, 1988; Young and Burchell, 1996). The resulting wave conditions were segmented into directional sectors and fit to a statistical function describing their exceedance probability. The wave parameter values for 50-year and 100-year return periods were determined from the best-fit statistical distribution. Table 33.0 shows the wave heights, wind speeds, and periods for the directional sectors that would affect the project site.

As shown in the table, the highest waves come from the east with deep water wave heights of 14.3m for the 100-year storm. The wave height is higher than the wave height recorded for Hurricane Irma in the ERA5 database. This difference is related to an increased frequency of storms. As was shown in Figure 55.0 and Figure 56.0, recently more hurricanes have hit within a smaller time frame. Therefore, this reduces the "return period" of the storm as they "return" more often. Based on the hindcasting, Hurricane Irma would be classified as a 1 in 75yr storm.

The highest wind conditions came from the north-east. However, the highest deep-water conditions do not necessarily translate to the highest nearshore conditions due to the complex bathymetry, which may induce breaking of waves. MIKE 21 SW and HD models were used to simulate the interaction of the deep waters with the bathymetry to ascertain the highest wave conditions in the nearshore of the project site.

Table 33.0: Boundary wave and uniform wind conditions used for all investigated return-period simulations.

Return Period	Direction	Windspeed (m/s)	Wave height (m)	Wave period (s)
50-Year Storm	West	27.6	7.5	11.8
	North-West	23.9	8.0	12.2
	North	33.0	7.7	12.0
	North-East	**39.8**	11.5	15.3
	East	35.1	**12.5**	**16.2**
100-Year Storm	West	30.6	8.7	12.9
	North-West	27.1	9.3	13.4

	North	37.2	9.4	13.4
	North-East	**44.3**	13.2	16.7
	East	39.2	**14.3**	**17.6**

Surge Levels

Water levels increase during the passage of a hurricane due to inverse barometric pressure rise (IBR), which is caused by the low atmospheric pressure in the centre of the hurricane. As with the wave heights, water levels were computed from each historical storm and the data fitted to various statistical distributions. Because of the non-directionality of the water level increase phenomenon, the analysis was not carried out on a directional basis. The best-fit distribution was selected based on correlation and goodness-of-fit to the most extreme values. In addition to the extreme eventualities, it is important to consider the expected long-term trends from global sea level rise.

Global Sea Level Rise (GSLR) has been predicted by scientists according to current rates of sea level rise and forecasting of the effects of climate change on the thermal expansion of the seas and the melting of glaciers and polar ice caps. The sea level rise component was obtained by using an averaged version of the *IPCC Summary for Policymakers* projections for sea level rise for the RCP8.5 scenarios. RCP8.5 is recommended as it is a more risk-averse estimate. Additional effects such as increased thermal expansion in shallow banks like Caicos Bank were not directly addressed in this analysis. Rather, they were assumed in GSLR projections.

Tidal variations were considered and based on the tide measurements published by the Admiralty Chart, spring high tide above MSL was determined to be 0.50m. These effects were added to the IBR and the GSLR to produce final deep-water levels for the 50-year and 100-year storm, which are shown in Table 35.0.

Table 34.0: IBR and design deep water surface level (m) for all return periods investigated

Parameter	Value	
	50yr	100yr
IBR – Determined through statistical hind-casting analysis (m)	0.44	0.55
Spring High Tide (m)	0.50	
Sea Level Rise Component to about 2070 (m)	0.48	
Rate of Sea Level Rise – RCP8.5 Scenario value from IPCC (mm/yr)	*9.5*	
SLR Horizon – How long structure is to last (not related to design storm)	*50yr*	
Total design deep water surface level (m)	***1.42***	***1.53***

Design Criteria

A distinction should be made between the design life and the return period of a storm. The design life describes how long a particular structure should last. The return period of a storm is based on long term statistics on storms. Further context comes from the exposure risk of a project component. This describes how likely a given return period storm is to hit over a design life. The probability for typical values is shown below in Table 35.0. For example, within the next 50 years (project life span), there is an 87% chance that the 1 in 25-year event will occur, a 64% chance that a 1 in 50-year event will occur and a 39% chance that a 1 in 100-year storm event will occur. A 50-year design life is typical for coastal design and will be used for this project.

Table 35.0: Exposure risks (%) over a project life span (blue) for different return periods (green)

Storm Event Return Period (years)	Design Life (years)			
	25	50	100	200
10	93%	99%	100%	100%
25	64%	87%	98%	100%
50	40%	64%	87%	98%
100	22%	39%	63%	87%
200	12%	22%	39%	63%
500	5%	10%	18%	33%

Nearshore wave transformation of hurricane waves

Previously described deep-water conditions were transformed to the nearshore regions and up to the project site using MIKE21 modelling software. Conditions for the extreme wave climate as listed in Table 34.0 and the deep-water surface levels Table 35.0 were applied to the boundary of the model and transformed to the nearshore from the five main directional sectors – west, north-west, north, north-east and east. Also, the wind fields (magnitude and direction) were applied as a constant over the entire model domain. The wind directions in a hurricane change rapidly, therefore, the worst-case scenario for wind direction was used, with winds approaching from the same dominant direction as the waves.

The coupling of hydrodynamics and waves in the numerical model is an important aspect of storm surge computations, particularly in areas such as the Caribbean where wave set-up is a significant component of the total storm surge. As large waves approach shallow water with steep bathymetry (like Caico's bank) and break, the water level is increased, causing localized currents. These currents and changing water levels affect the waves by allowing them to travel farther inland. To capture the full extent of the possible inundation the two phenomena must be coupled.

For both design storms, the maximum conditions across the five directional sectors tested were calculated and plotted. Results are presented in Figure 57.0 and Figure 58.0. Figure 57.0shows the maximum static storm water elevation for both storms. All results have the same scales to show how parameters vary across design storms Figure 58.0 shows the maximum wave heights for each storm.

DRAFT

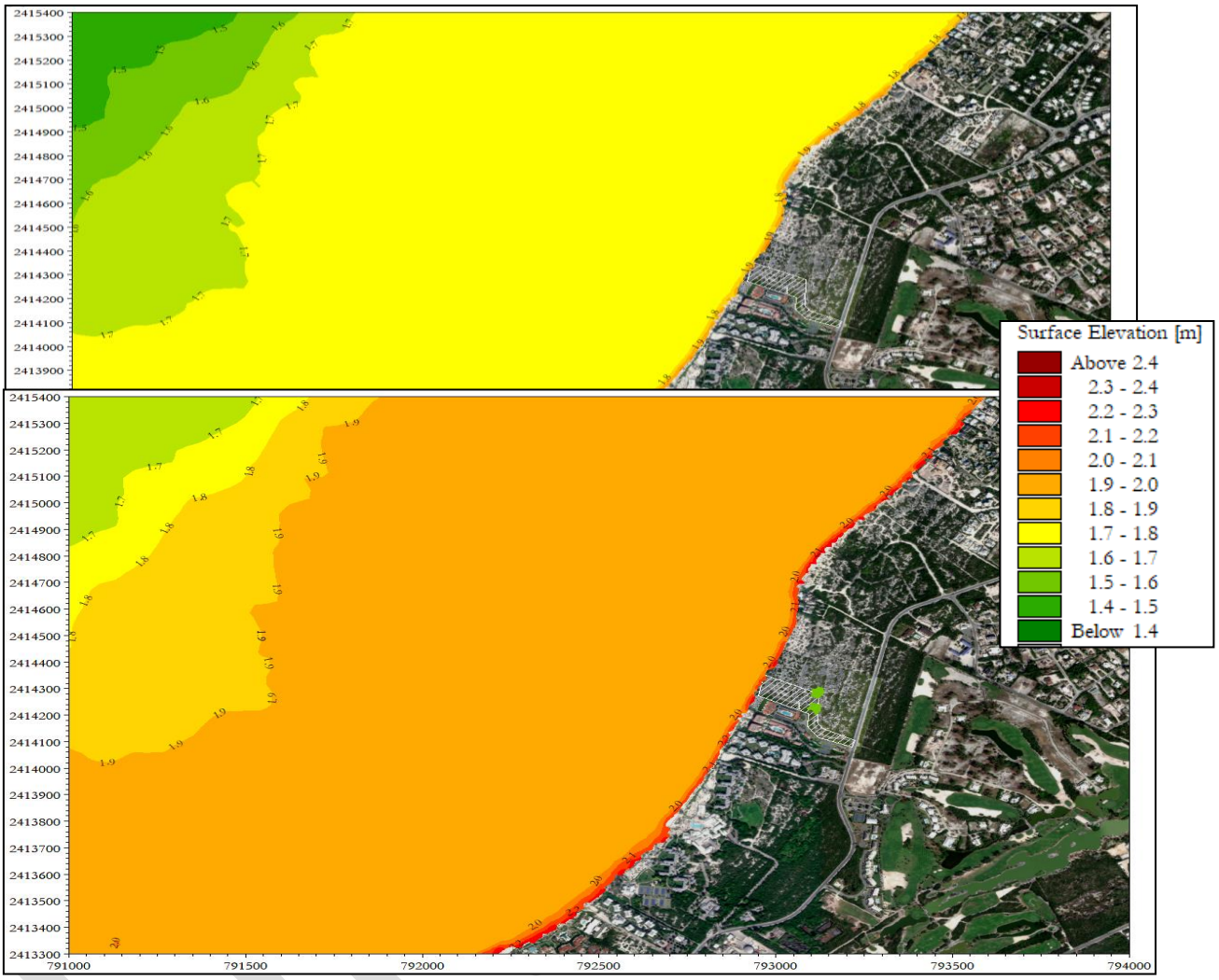


Figure 58.0: Storm surge results for the 50-year (top) and 100-year (bottom) storm with a SLR design horizon to 2070.

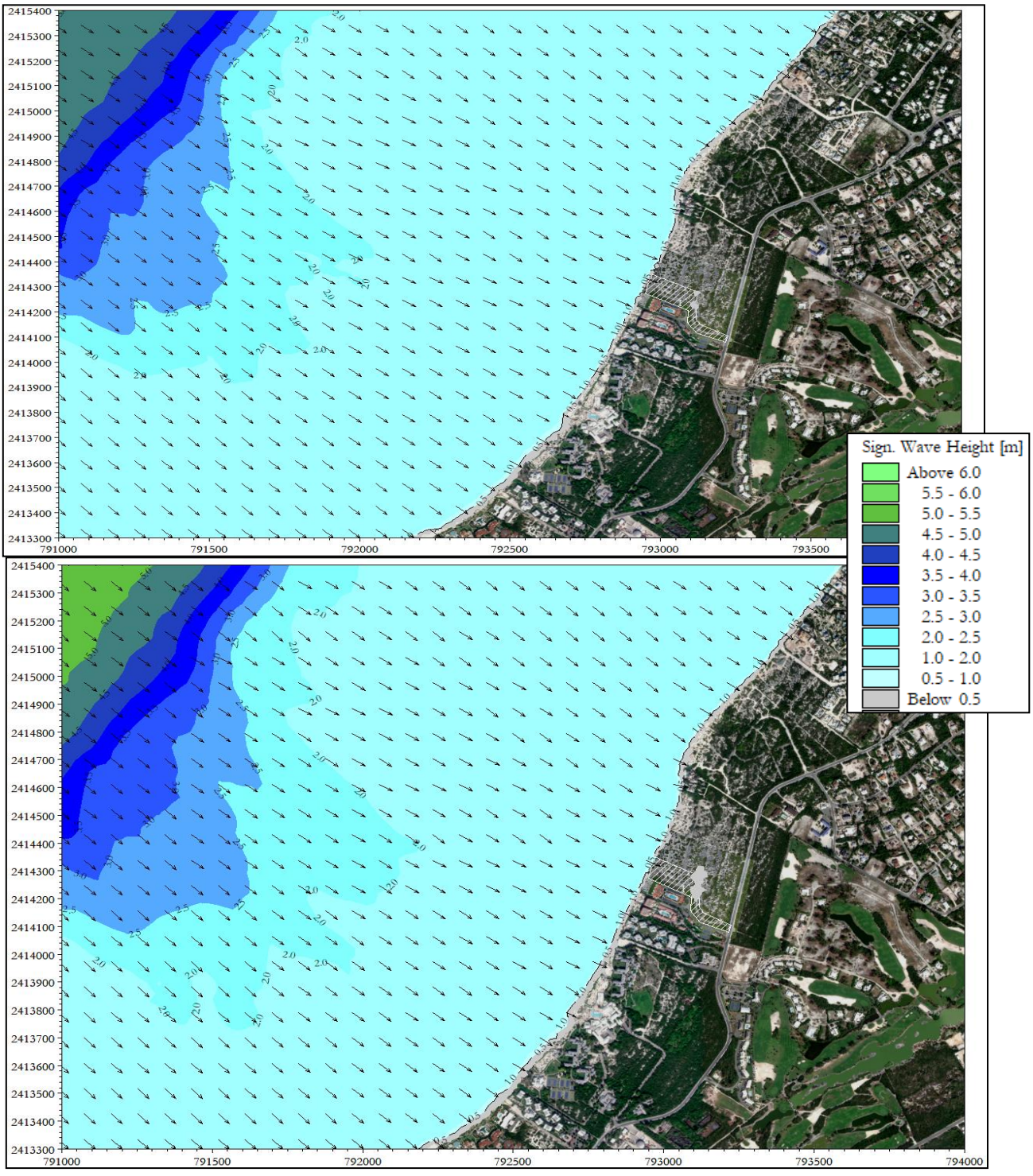


Figure 59.0: Storm wave results for the 50-year (top) and 100-year (bottom) storm with a SLR design horizon to 2070.

In both cases, wave set-up of about 0.3m was seen as waves partially broke over the reef sections. For the 50-year storm the water levels were below 1.45m outside of the reef and 1.7m inside the reef. At the shoreline the static surge levels were up to 1.9m near the project site. Under the 100-year storm conditions, the water level was 1.6m above MSL outside of the reef and 1.9m in the bay. At the project site the static surge levels were up to 2.2m above MSL.

Storm wave heights and direction results are shown in **Error! Reference source not found.**. The maximum hurricane sector was the north-west when looking at offshore conditions. Wave refraction led to the highest waves within the bay coming from the west-northwest and northwest. In the 50-year storm, the wave heights offshore were 4.5m outside of the reef and 1m at the shoreline. 100-year storm wave results show wave heights offshore were 5m outside of the reef and 1.2m at the shoreline of the Romanza property.

The storm surge derived from the MIKE 21 models represents the static water level that will occur close to the shoreline. However, wave run-up needs to be investigated to properly define the total surge levels.

Wave Run-up Levels

Wave heights, wave periods, wind speeds and water level set-up from the 50-year and 100-year storm events were extracted at the seaward end of the profiles from the domain of the MIKE21 results. The data was then input to the previously described XBeach model with a direction perpendicular to the shore (representative of the worst-case scenario). The XBeach model was run in a non-hydrostatic mode to properly capture the water surface. The representative sediment grain sizes (as shown in Table 13.0) were input to the model to show possible erosion and accretion zones along the profile.

Figure 59.0 shows the XBeach results for the profile under a 50-year storm. The maximum ($R_{2\%}$) wave run-up was 3.4m above MSL. This wave run-up height is 1.5m higher than the static surge calculated in MIKE21. The wave height was about 1.7m before shoaling and breaking along the beach face. The results show erosion of the face of the dune and deposition of sediment at the base of beach slope (about 1.7m scour depth). There was inundation up to 220m inland from the property boundary. The water depths were up to 1.5m within the depression on the property.

The profile results for the 100-year event are shown in Figure 60.0. The maximum surge level with wave run-up incorporated was also 3.4m above MSL based on the profile not having elevations higher than 3.4m. This value is 1.5m above the static surge in the area. The wave height of 1.9m at the shoreline created significant inundation once the waves broke. There was overtopping of the dune and erosion of the dune up to a 1.7m depth below existing. The valley behind the dune was inundated, with water depths up to 1.5m.

Wave run-up simulations show that there is significant erosion at the dune face during storm events. The finer sediment in this area is likely easily churned up which would lead to significant sediment movement.

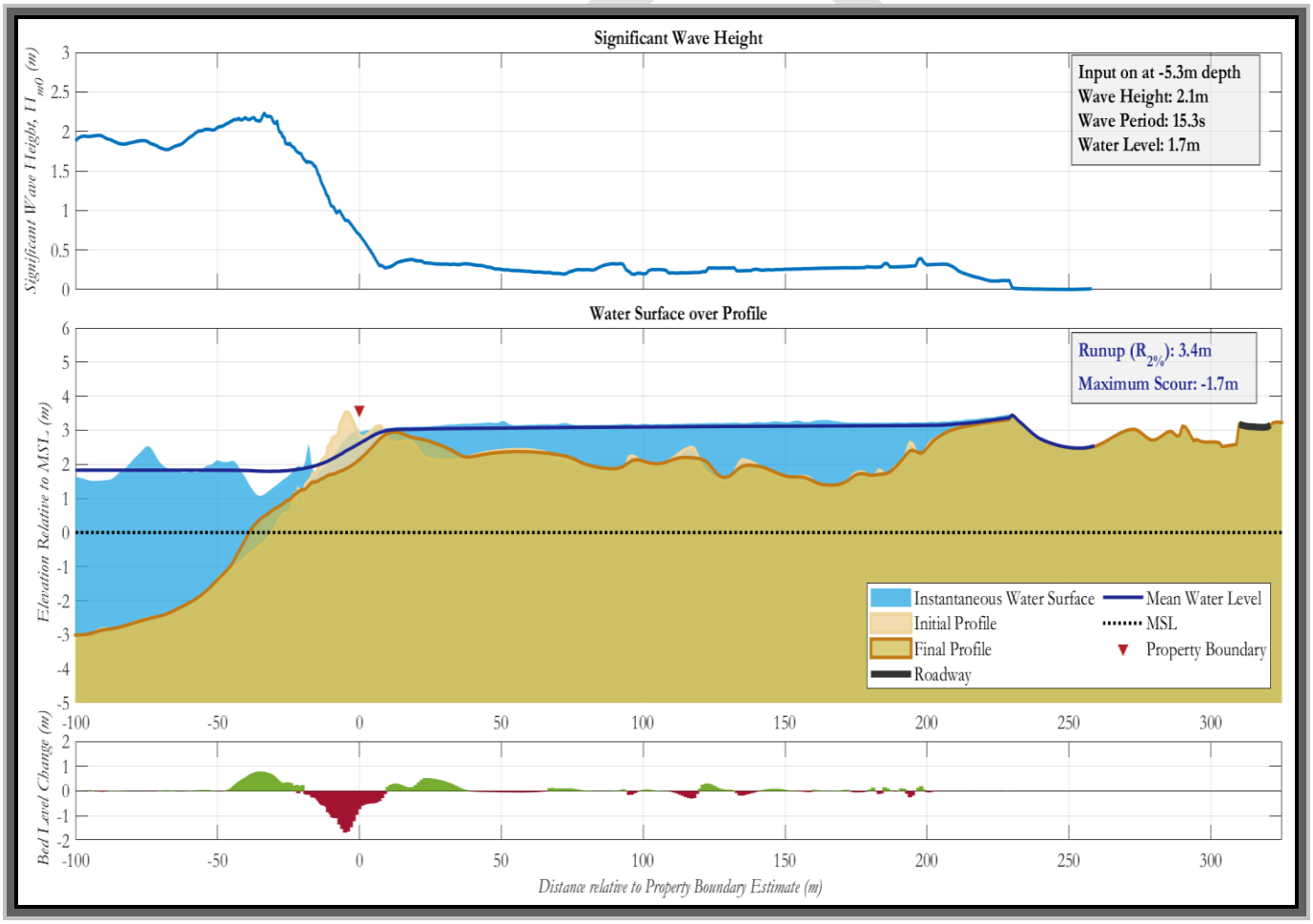


Figure 60.0: XBeach non-hydrostatic model results along P1 (profile 1) for 50-year storm event.

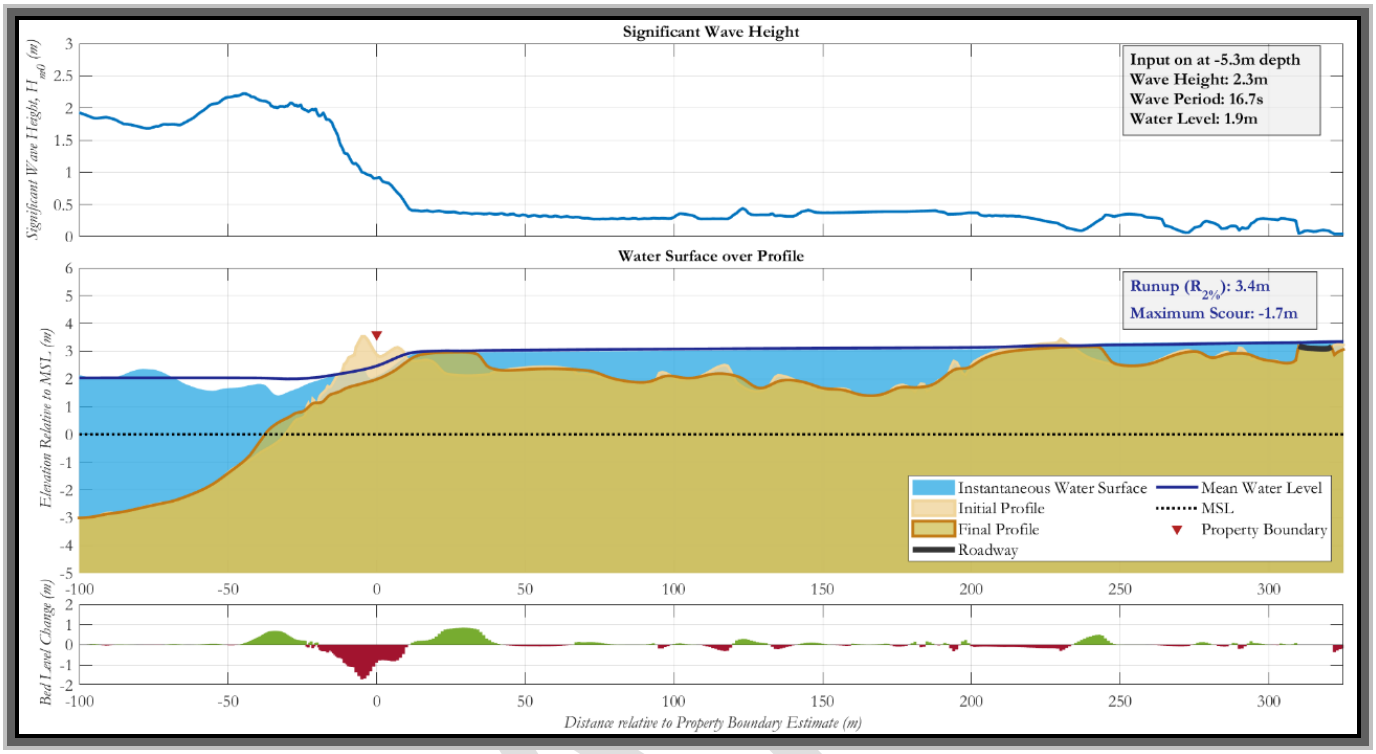


Figure 61.0: XBeach non-hydrostatic model results along P1 (profile 1) for 100-year storm event.

Impact Assessment

The proposed concept will provide protection against wave run-up, scour and overtopping by increasing the height of the dune crest and raising the land. The levels for this addition to the dune were specified based on the hurricane surge conditions. To ensure that the concept provided adequate protection the proposed concept was also studied using XBeach to find the maximum surge levels and inundation. The results for the 50-year storm are shown in Figure 60.0while the results for 100-year storm are shown in Figure 62.0.

Under the 50-year design storm and the proposed concept implemented, there was no inundation beyond the buffer zone on the property, compared to a 220m extent of inundation under baseline conditions. The highest surge level was on the fill slope at 4m above mean sea level. The erosion at the dune face was reduced to 0.9m for the proposed concept. This is a reduction of 0.8m when compared to the existing conditions.

Under the 100-year design storm and the proposed concept implemented, the inundation was also stopped at the buffer zone within the property boundary. The highest run-up level was 4.2m above MSL, which occurred on the fill slope. The maximum erosion was 1.2m of scour along the dune face with the proposed concept and corresponded to about 5m of land recession at the property boundary. This eroded sediment was deposited on the beach face and increased the beach width at the end of the simulation by about 10m.

Generally, increasing the dune height and land filling within the property boundary provided valuable protection against inundation during extreme events.

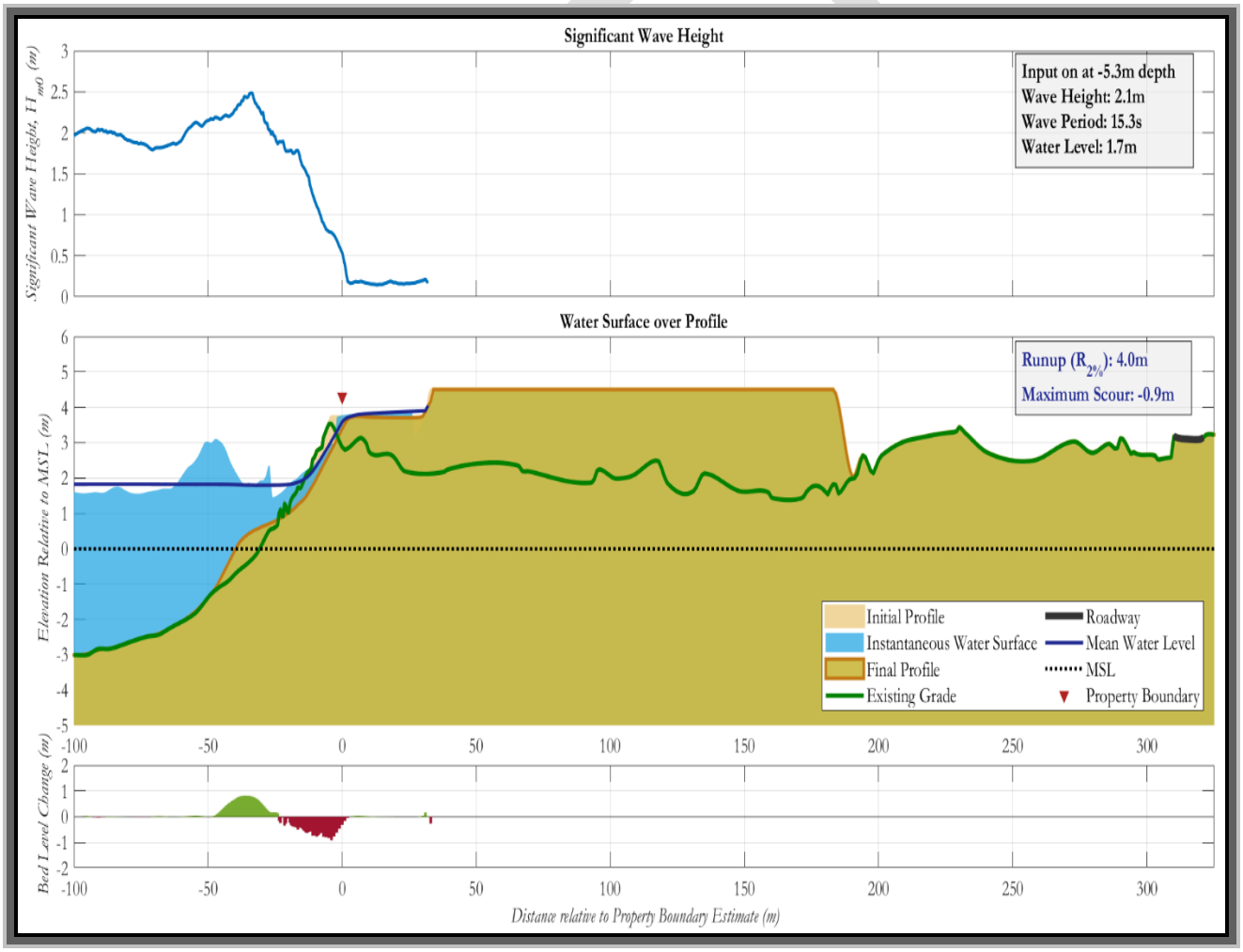


Figure Error! No text of specified style in document.2.0: XBeach non-hydrostatic model results along P1 (profile 1) for 50-year storm event under proposed conditions.

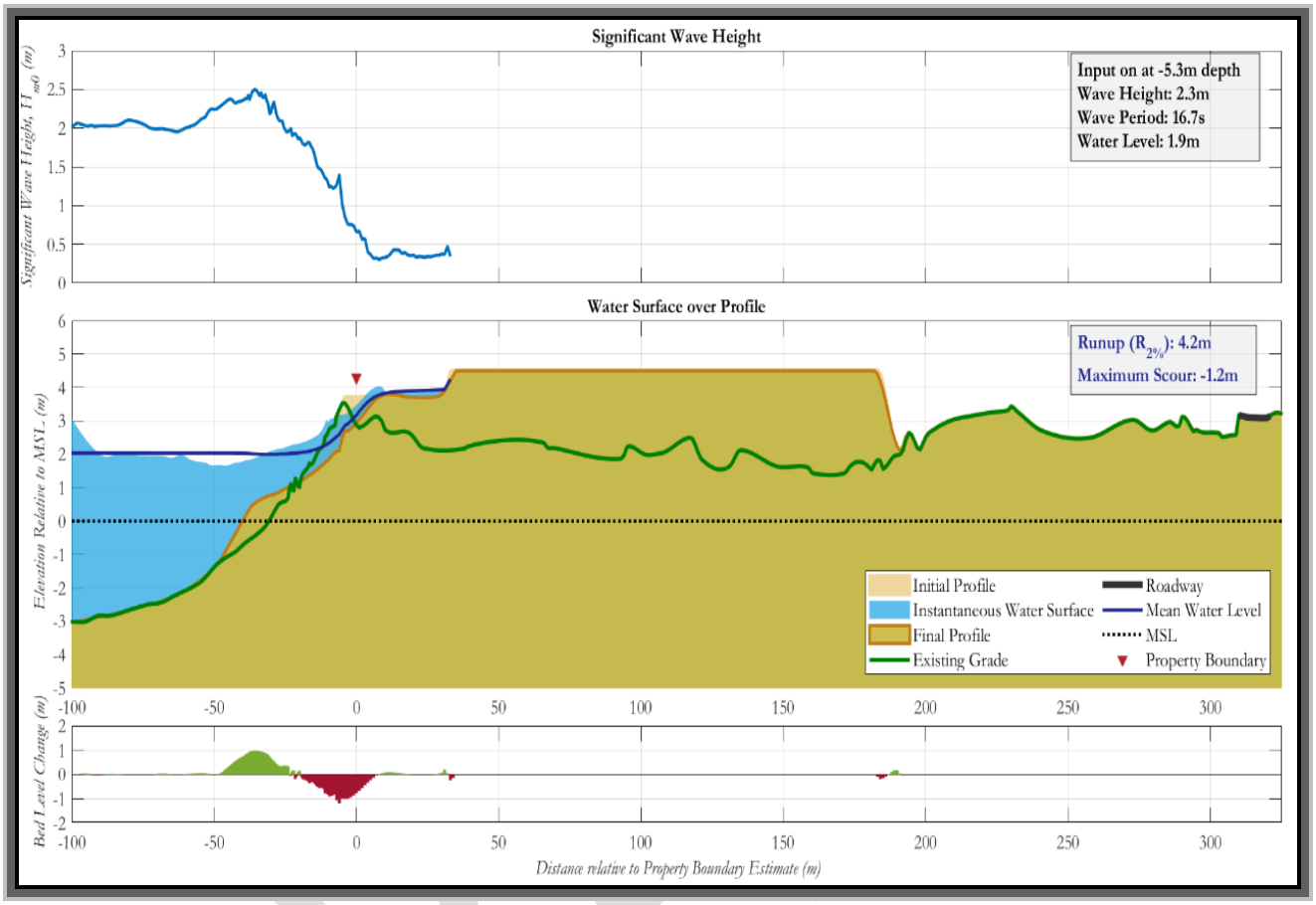


Figure 63.0: XBeach non-hydrostatic model results along P1 (profile 1) for 100-year storm event under proposed conditions

6.4 Building around, or rescue and removal of rare, threatened, and Endangered species of plants

The implementation of the proposed site plan will require that fill be brought in to raise the elevation of the ground surface on the entire property to meet building standards. This requirement pre-empts the typical sequential process of attempting to avoid, then minimizing impacts on environmentally sensitive resources.

The ecological assessment that was completed for this site revealed the presence of populations of ten species of plants that are notable for their inclusion on the TCIG's lists of Endemic Plants, Lucayan Archipelago Endemics and/or Native Plants of Special Conservation Concern (See Table 3). While it is recognized that individuals of several of these species may not transplantable due to their unique biology, other species can be salvaged and/or relocated with a comparatively high level of success and confidence. Activities that should be considered to further reduce ecological impacts include:

1) Salvaging all individuals of all native orchids prior to undertaking any land clearing activities.

2) Salvaging all individuals of all native *Tillandsia* air plants prior to undertaking any land clearing activities.

3) Working with landscaping and native plant professionals to assess the individual biology of the other species identified in Table 7.0 to determine the extent to which they can be salvaged and/or transplanted with a high enough expectation of success that a plant salvage undertaking would be practical.

4) Developing and implementing a programmed to relocate all notable plants, including the identification of location and procedure for temporary relocation of floral species that could be removed from the site prior to land clearing, and then moved back onto the site following the addition of fill.

DRAFT

5) Ensuring that additional ecological mapping of the location of notable plants is performed to prepare for relocation of individuals of notable plant species prior to construction.

6) Schedule the clearing of vegetation to avoid being performed during the bird nesting season, ensure that no active nests (i.e., nests with eggs or young incapable of sustained flight) will be damaged or destroyed.

6.5 Landscaping/replanting plan utilizing native species

It is recommended that the project design and construction teams work with professionals who are knowledgeable about plant species that are native to the Turks and Caicos Islands and that a minimum of 80% of the species and numbers of plants be natives.

A monitoring program should be developed and implemented to maximize the rate of survival for the native plants that are to be salvaged.

Management of the dune system within the required coastal setback limit; with restoration or maintenance of dues with dune flora and removal and control of invasive dune-threatening flora (including *Casuarina equisetifolia* and *Scaevola taccada*).

It is recommended that:

i The project design and construction teams work with landscape professionals who are knowledgeable about plant species that are native to the Turks and Caicos dunes and that 100% of the species and numbers of plants be either nursery-grown natives or plants that have been salvaged from the site; and

ii A monitoring programmed be developed to ensure that invasive pest plants do not become re-established on the site.

DRAFT

6.6 Proposed techniques and models to mitigate against light pollution, including impacts on nesting sea turtles and migratory birds

Light disturbances due to construction activities need to be managed to reduce the impact on the surrounding businesses, residents, and wildlife. Contractors should be aware of and identify any sources of light disturbances and train all on-site workers to be aware of noise or light issues and how to minimize disturbances where possible. The level of light from construction operations shall be periodically assessed by the Contractor and the Owner in relation to the significance of potential disturbance to reduce the impacts to the surrounding areas/community and wildlife (such as sea turtles that may nest on beaches). Sources of light disturbances should be identified and minimized where possible.

If construction is to occur during hours when enough daylight is not available, and lighting of the work area is required, the Contractor is expected to manage excess lighting and glare by:

- Strategic placement of lights away from residential areas and the beach,
- Tilting lights downwards, and
- Using shielding to restrict the glare of lights.

An Operational Management Plan should be implemented and the above techniques to reduce lights on the beach. Additional techniques that can be implemented include:

- Motion sensor light for areas near the beach,
- Tint windows that face the beach.
- Use opaque curtains or blinds after dark to reduce light visible from the beach.

6.7 Proposed Climate Change mitigation both locally with in the Turks and Caicos Islands and Globally

Climate change impacts have been considered in the design process mainly through the inclusion of sea level rise in design storms. This was done over a time horizon of 50 years and was 0.48m of added water elevation based on

recent projections. Further mitigation against sea levels and surges were incorporated by adding a freeboard of 0.3m to the finished floor levels of the buildings.

6.8 Financial resources for mitigation

Financial obligation for mitigative measure belongs with the Developer. The developer is responsible for ensuring at all mitigation and monitoring efforts are funded and in place before works begin. This is inclusive of mitigation measure outline in the contingency plan.

Impacts of the proposed development can be divided into project impacts and process impacts. Project impacts are associated with project design and mitigation of project impacts is firmly rooted in the Planning and Environmental Impact Assessment processes. Process impacts are associated with the actual construction process and the mitigation of these impacts is the effective management of the construction process.

The coastal marine environment coral reef ecosystems in the Turks and Caicos Islands are vulnerable environmental resources that provide significant economic goods and services to the economy. The health of these ecosystems is critical to human well-being; they contribute to the livelihoods, food security and health of local people. The proposed Romanza on Grace Bay Residences development (Townhouse and condominium units) and all other associated tourism-related businesses within the Grace Bay tourist district benefit directly from these marine ecosystems. Therefore, it is imperative that developers take due care of the environment during both the construction and operational phases of development.

Construction management will ensure that Best Practices Construction Methodologies are employed by the contractor carrying out the proposed construction works. The best technical mitigation measures are to include selection of the most suitable construction equipment.

Several mitigation measures aimed at minimizing the impact of the proposed construction works on both the marine and terrestrial environments will have financial cost to the developers and economic value to the process, they are summarized in table 36.0 below:

Table 36.0 – Summary of economic cost for recommended mitigation measures

Recommended Mitigation Measures	*Approximate Cost*
Landscaping uses native salt-tolerant and drought-tolerant species.	Included in the landscaping budget.
Properly operated and maintained sewage treatment package plant to avoid effluent spillage.	Included in operation budget.
Annual follow-up testing of water quality in the near-shore area, to ensure that secondary impacts on water quality do not occur.	Estimated at $5,000.00.
Use of organic fertilizers in landscaping.	Included in the landscaping budget.
Reduce, reuse and recycle components of solid waste to reduce the volume of solid waste that goes to the landfill.	Included in operational budget.
Use of grey water for landscaping purposes.	Including in the landscaping budget.
Enclosure and screening of Construction site.	Included in hoarding budget.
Reduction of construction related noises by installing mufflers on engines, substituting quieter equipment of construction methods.	Included in construction budget.
Avoid project delays due to the availability of building inspectors for timely inspections, by the appointment of Special Inspector.	Estimated at $160,000.00 annually.
Dune restoration and filling work	Estimated $ 570,000.00

Surge protection alternatives	Estimated $689,000.00

6.9 Environmental monitoring and financial requirements

It is recommended that:

1) A biological monitoring program is developed and implemented such that monitoring for invasive species is completed not less than quarterly, and that protocols are implemented to ensure that invasive pest plants do not become re-established on the site and that the uses of chemicals (e.g., herbicides, pesticides, rodenticides, fertilizers etc.) be prohibited or minimized.

Environmental monitoring

Monitoring activities during construction and post construction will be carried out to eliminate or reduce any adverse environmental impacts.

The Developer will hire an Environmental Monitor (EM) who will be responsible for ensuring that The Project complies with the design of the swim zone and environmental mitigation requirements. Monitoring during the construction phase of The Project will include the following methods:

- The EM will convene a preconstruction meeting with the Site Inspector and Contractor to review approved plans for the swim zone and outline compliance with environmental requirements.
- The EM and Contractor will be required to inform their workers on the environmental mitigation requirements.
- The Site Inspector and EM will have the authority to halt any activity that is noncompliant with or damaging to the environment.
- During construction, the EM will conduct weekly monitoring meetings, and a site visit every week and record all observations, including digital photo documentation. This information will be submitted to the Development Control Officer, Department of Planning.

DRAFT

Pre-Construction Phase Monitoring

Pre-construction surveys should be conducted to establish a baseline for subsequent surveys, both during construction and post-construction events. Both turtle nesting and avian nesting surveys should be conducted on the beach before construction starts to ensure the beach isn't being utilized.

Construction Phase Monitoring

Due to activities occurring adjacent to the PNAP, the EM will be required to conduct construction monitoring during the swim zone's construction. The EM will organize to have the original qualitative assessments repeated. An inspection of the benthic features within one hundred (100) meters of The Project site will be carried out. Any changes to seagrass beds, fish counts, sediment levels, or substrate will be documented.

Both turtle and avian nesting surveys should be conducted during construction activities to ensure the beach isn't being utilized for that purpose. If a turtle or avian nest is observed, the area should be marked off and not disturbed by staff. The Department of Coastal Resources should be contacted for guidance on further steps to be taken.

Post-Construction Phase Monitoring

Due to activities occurring adjacent to the PNAP, the EM will need to conduct post-construction monitoring to assess marine wildlife and water quality. Monitoring during the post-construction phase of The Project will include repeating the coastal assessment from the shoreline to one hundred meters (100 m) seaward to ensure wildlife is not impacted by the development.

Financial Requirements for Environmental Monitoring

The developer has a financial obligation for mitigation measures. The developer is responsible for ensuring that all mitigation and monitoring efforts are funded and in place before work begins. This includes mitigation measures outlined in the contingency plan.

DRAFT

Table 37.0: Summary table describing impacts

No.	Environmental Parameter	Potential Impacts
1	Terrestrial flora	No faunal species that are endemic to the TCI were observed on the site.
2	Terrestrial fauna	Secondary impacts may involve reductions in prey items, and therefore reduced nesting productivity for birds and temporary reductions in plant abundance.
3	Ground water resources	No changes to regional hydrologic conditions are anticipated, including water quality and the condition of groundwater resources within the region.
4	Beach – sand dune system	Plants of this species within the dune system could be damaged or destroyed by as an innocuous activity as the removal of the existing security fence. Impacts to the dune should include the placement of the dune walkovers which should prevent long term trampling of the dune by beach goers.
5	Wetlands	No wetlands were present on the property.
6	Endemic plant species	No plant species endemic to the TCI were observed on the site.
7	Traffic	Increased volume of vehicular traffic in the area.
9	Sewage & solid waste Facilities	The development will result in increased volumes of sewage and solid waste to be disposed of in the landfill.

10	Noise	The most prevalent noise source at the project's site would be from internal combustion engines, earth moving equipment, material handling equipment, and stationary engine-powered equipment.
11	Air quality	The project will produce several sources of air pollution including exhaust from hauling equipment, booster pump engines, concrete trucks and other devices used in the construction of the facility.
12	Neighbouring developments & businesses	Direct and indirect impacts on the physical and visual qualities of neighbouring developments and businesses are expected.
13	Marine-life on intermittent hard substrate	No development is proposed within the marine environment therefore, no direct impact is expected. However, indirect impacts are expected from guest using the marine environment for swimming, snorkeling and water sports activities.
14	Coastal water quality	The test results indicate no elevated level of constituents and no evidence of enrichment or pollution.
15	Fisheries	No submerged aquatic vegetation or barren bottoms are proposed to be affected, so adverse impacts on fisheries are expected to be non-existent.

Table 38.0: Environmental Impact Prediction Checklist
The Romanza on Grace Bay Townhouses and Condo development

ITEM	NATURE OF LIKELY IMPACTS									
	ADVERSE						BENEFICIAL			
	ST	LT	R	IR		W	ST		SI	N
Soil Erosion	●		●		●					
Surface Water	●		●		●					
Ground Water	●		●		●					
Air Quality		●								
Noise	●				●					
Aquatic Ecosystems	●		●		●					
Terrestrial Ecosystems	●		●		●				●	
Endangered & Endemic Species		●	●							
Migratory Species	●									
Public Health								●		
Land Use		●						●	●	
Employment							●		●	
Community Stability									●	
Cultural Values	●	●						●	●	
Tourism/Recreation							●	●	●	
Property Values							●		●	
Immigration	●	●						●		
Solid Waste	●	●					●		●	
Training							●	●	●	
Income Distribution							●	●	●	
Archaeological Sites								●		
Road Development							●		●	
Beach Erosion	●	●	●		●			●		
Tourism/Marketing							●		●	
Tourist Arrivals							●		●	
Government Revenue							●		●	
Traffic	●	●								

NOTE: ST - Short Term
LT - Long Term
R - Reversible
IR - Irreversible
L - Local
W - Wide
SI - Significant
N - Normal

6.10 Public Consultation/Social Listening/Monitoring

Public Consultation is an important component of the EIA process. It ensures stakeholder concerns are addressed and integrated into the project decision-making process. Stakeholder consultations (pre-application), during the EIA process and once an application has been submitted, is essential to ensure that the permitting process runs as smoothly as possible, and all concerns are noted and addressed in an open and transparent manner.

An application for the proposed Romanza on Grace Bay townhouses and condominium development was reviewed by the Department of Planning and the Physical Planning Board. A public advertisement for the proposed development was published in the local newspaper and in the Turks and Caicos Gazette. The purpose of the advertisement process is to make the public aware of the development and afford them the opportunity to comment on the application. Additionally, in accordance with Section 7 of the Physical Planning (Development Permission) Regulations 2014 notices of the proposed development were erected on the site of the proposed development and served on properties owners within 200 feet of the proposed development (Figures 63.0 and 64.0 below). Comments and statements on the development were made in the form of written representation to the Planning Department, online commentary and Television news.

Stakeholders' consultations were carried out by the EIA team with various government agencies. The public will have an opportunity to review the draft EIA report during a six-week public consultation process. During which time the report will be uploaded to the Planning Department's webpage and hard copies will be available at the Planning Department offices on Providenciales and Grand Turk for public review. The review process with cumulate with a public consultation meeting at the Planning Department's conference room where the EIA will make oral presentations to the public and the public will have the opportunity to raise any concerns or questions they make have and make recommendations to the EIA team.

DRAFT

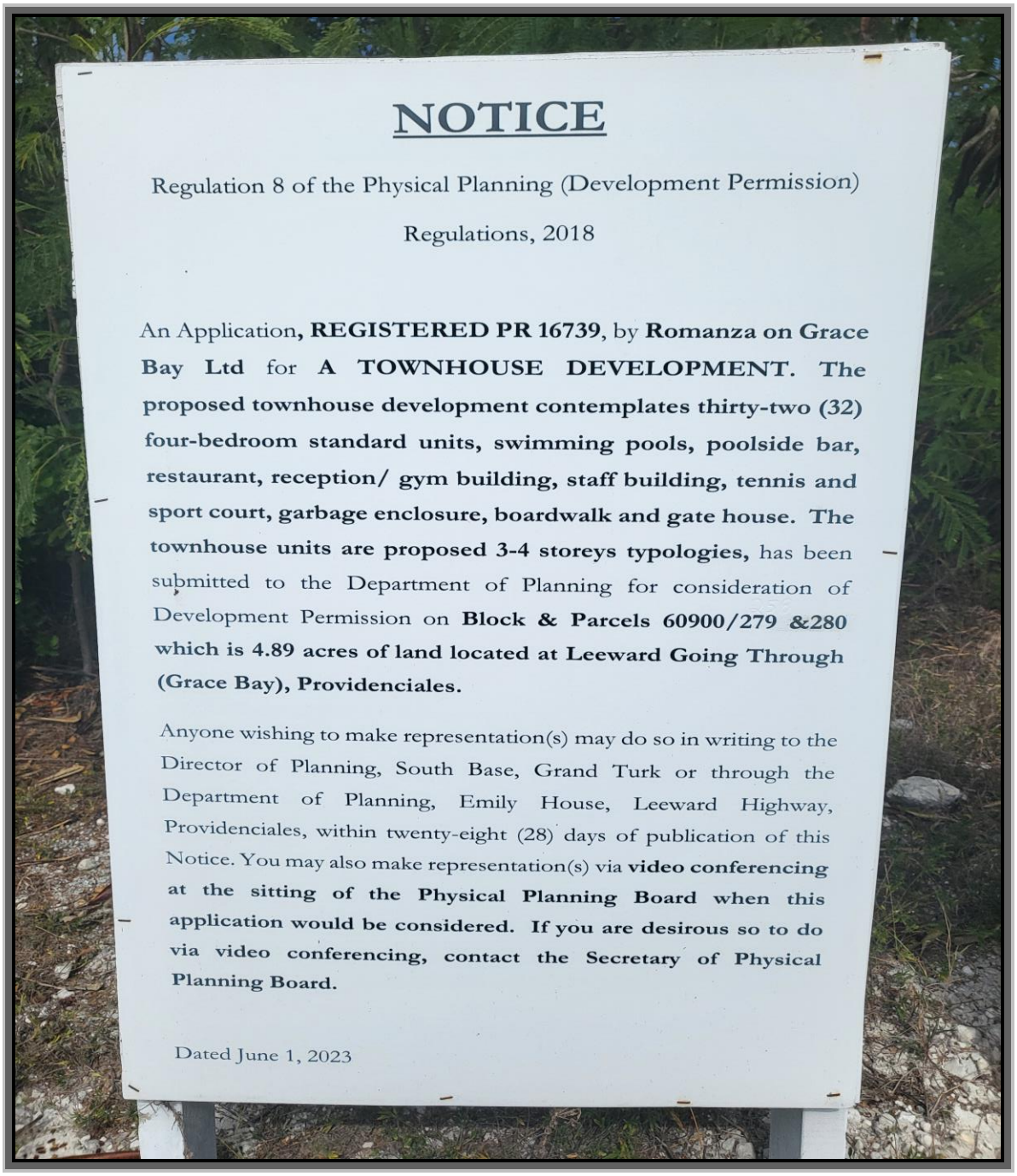


Figure 64.0: Advertisement Notice Erected on the site of the proposed development.



Figure 65.0: Rendering Plan of the proposed development Erected on the site

6.11 Biodiversity Management Plan

Emphasis will be placed on observing the presence and management of all wildlife on site and any marine epifauna populations. Before the anchorage of the swim zone buoys, the area will be assessed to ensure that no epifauna are present within the footprint. Any epifauna observed will be removed and placed outside the work area.

Due to The Project occurring within the Princess Alexander National Park, the EM, the contractor, and all subcontractors should remind workers to obey the rules and laws associated with the park. This includes but is not limited to:

- qA 15 mph (24 km/h) speed limit for power vessels in the National Park.
- The area is a No-take zone, meaning taking any natural item or historical artifact from this National Park is illegal. This includes seashells, animals, plants and flowers, and coral.
- Fishing (except for lionfish, with appropriate licenses) and collecting conch and lobster is illegal and punishable by fines and/or imprisonment.
- Littering and vandalism are against the law and punishable by fines and/or imprisonment.
- Open fires are not permitted in the national park.

6.12 Environmental Management Plan (EMP)

An Environmental Management Plan has been compiled to summarise the works and their impacts to the surrounding environment. The plan is provided as a separate document as per the terms of the contract signed.

The environmental management plan for the hydrogeological component will include preconstruction testing of well performance of the injection / disposal wells, seawater quality, groundwater quality, environmental noise and ambient air quality.

DRAFT

The Grace Bay coastal area has been the subject of numerous developments over the past three decades. The proposed Romanza on Grace Bay townhouses and condominium project is not the only development planned for the area. There are other developments and natural processes occurring in this vicinity that can result in incremental changes to the marine and terrestrial resources and coastal processes. Specifically, this area has been subjected to several hotel/condominium projects and other tourist related commercial activities, which have several cumulative impacts. The impacts identified in the TOR and addressed in this EIS are not all inclusive. Therefore, this project will attempt to address any unidentified impacts that may surface during the construction phase of this project.

DRAFT

SECTION VII

7.0 Recommendations and Conclusions

The findings, recommendations and conclusions of this EIA are summarized below.

- The proposed development does not pose any potential impact on the geological environment. The intact, geological formation is homogeneous and contiguous across the project and is absent of kart geological features.

- No coastal or marine infrastructural work is proposed. The potential impact to the marine environment would be turbidity caused by anchorage of the buoys and navigational markers for the swim zone and boat access lane. During construction, necessary mitigation measures will be implemented around the project site and near the shoreline to reduce turbidity.

- The marine ecosystem is not expected to be disturbed in any substantial way as there is no direct development occurring in the marine or coastal environments.

- It is recommended that the project team work with professionals who are knowledgeable about plant species that are native to the Turks and Caicos Islands and that a minimum of 80% of the species and numbers of plants be natives.

- A monitoring program should be developed and implemented to maximize the rate of survival for the native plants that are to be salvaged.

- A monitoring programmed be developed to ensure that invasive pest plants do not become re-established on the site.

DRAFT

- Management of the dune system within the required coastal setback limit; with restoration or maintenance of dues with dune flora and removal and control of invasive dune-threatening flora (including *Casuarina equisetifolia* and *Scaevola taccada*).

- The project team work with landscape professionals who are knowledgeable about plant species that are native to the Turks and Caicos dunes and that 100% of the species and numbers of plants be either nursery-grown natives or plants that have been salvaged from the site; and

- A biological monitoring programme be developed and implemented such that monitoring for invasive species is completed not less than quarterly, and that protocols are implemented to ensure that invasive pest plants do not become re-established on the site and that the uses of chemicals (e.g., herbicides, pesticides, rodenticides, fertilizers etc.) be prohibited or minimized.

- Over exploitation of the fresh groundwater lens will result in saltwater intrusion and groundwater contamination.

- Groundwater abstraction should be limited to an abstraction rate of less than 10 US gal per minute

- Footing should be constructed above the water table level

- Groundwater should be used for irrigation and filling swimming pools

- Based on the baseline conditions a few options were proposed for the site with the optimal option being raising the dune height and land in the buffer zone.

- A +4.5m finish floor level was also proposed to provide resilience against large storm events. This level included a 0.3m freeboard as a mitigation

DRAFT

measure against the worsening impacts of climate change such as, future sea level increases and increased storminess.

- With the proposed option, material (fill, boulders) sourcing will be a challenge. If any alternative options for material supply are available at the time of construction, they should be investigated as a possible source to reduce environmental impacts and construction costs.
- Coastal impact assessments were done to describe possible impacts during the construction and operational phases. Negative impacts were mainly temporary, had a small impact zone and occurred during the construction works. Positive impacts were based on the reduced inundation and asset protection during major storms.
- To round out the analysis, mitigation measures and monitoring exercises were proposed to reduce the scale of impacts. Most measures are related to performing construction works with best practices in mind so that impacts such as oil pollution or turbidity are avoided or contained.
- One important mitigation measure will be to vegetate the dune with suitable or relocated vegetation from the pre-construction site.
- Coastal works and building construction will disturb existing vegetation whether by smothering or equipment movement.
- The replanting of the dune will restore previously lost habitat and maintain the aesthetic of the shoreline.
- Owners should seek out collaboration opportunities with other developers and planners for material sourcing. This would reduce the unit cost of the sand required for the proposed works.
- Ensure that all available land space is vegetated as best as in practical in the landscaping plans. This will reduce scour and erosion on land.
- Long-term negative impacts on the marine resources in the area are not expected to occur because of the proposed construction work. Construction will be closely monitored to prevent contamination of the adjacent marine habitats. Generally, the potential environmental marine impacts associated with The Project include the following:

DRAFT

- Water quality Impacts
- Light Impacts
- Solid Waste Impacts

During the installation of swimming zones buoys proper monitoring should be carried out to ensure sedimentation impacts do not exceed the threshold (fifteen (15) NTU).

- Prior to the commencement of works, pre-construction surveys should be conducted to establish a baseline for subsequent surveys, both during construction and post-construction events.

- Construction method statements should also be produced prior to construction activities. These method statements should outline how the activities should be carried out and the environmental considerations that will be used during scheduled activities.

- It is recommended that safety and security measures be in place before the commencement of construction activities to ensure the greatest environmental protection. Some of the environmental measures to be implemented include designation of an area for storage of waste containers, ensuring adequate waste containers are present on site, and that appropriate signage and fencing are placed around the site for workers and beach goer safety.

- It is recommended that during construction, the Contractor or the Environmental Manager (EM) conduct weekly monitoring meetings, and a site visit every week and record all observations, including digital photo documentation. The EM should have the authority to halt any activity that is noncompliant with or damaging to the environment.

- Post-construction monitoring should be conducted by the EM to assess the surrounding marine life and water quality. Monitoring during the post-construction phase of The Project will include the

following_benthic assessment to note any changes in benthic habitat and marine fauna populations.

- The contingency plan should be developed prior to the commencement construction activities and should aim to be proactive in reducing the risk of environmental damage due to human machine failure, intentional destruction and/or natural disasters.

The site of the proposed Romanza on Grace Bay Townhouses and condominium is in an area of Grace Bay that has accommodated many similar developments. The impacts on the environment have been managed at a sustainable level. However, it should be noted that the two major components of the proposed development comprise low impact residential and condominium units. Once properly constructed and adhering to planning, environmental policies and regulations the impact should be reduced or occurring at manageable levels.

Based on the overall findings, including the baseline assessments, description and identified potential environmental impacts, and proposed mitigation and monitoring measures outlined in this EIA study the EIA Team concluded that the development would not have any substantial or unmitigated impact on the receiving environment. Therefore, approval of the development with appropriate conditions, if necessary, is anticipated.

DRAFT

SECTION VIII

8.0 Statement of Understanding of the Environment Charter (2001) and Climate Change Charter (2022)

8.1 Statement of Understanding of the Environment Charter (2001) from the Proponents

The development proponents support the Environmental Charter 2001-TCI and agree to comply with protected area management strategies fully. To this end, an Environmental Management Plan was created, which calls for the routine monitoring and testing of marine water quality, groundwater quality, and ambient air quality.

The data collected and test results will be routinely shared with TCIG.

8.2 Statement of Understanding of the Terms of the Charter (2022) from the Proponents

While the Turks and Caicos Islands are not among the top ten countries impacted by climate change, development proponents keenly support the initiatives outlined in the TCI National Physical Sustainable Development Plan related to the physical development of the Turks and Caicos Islands.

To this end, the development proponents agree to provide funding for the employment of a Special Inspector (Environmental) to monitor the phases of development and provide TCIG with updated reports on the progress of work.

8.3 Proponents Declaration of intent to guide the development by the recommendations of the EIA consultants, with an updated Declaration following response to public or TCIG requesting or requiring alteration to any part of the EIA.

I/We, the undersigned development proponents, hereby declare our intentions to fully comply with the conditions set out under the grant of Detailed

DRAFT

Development Permission and comments made by TCIG government departments.

DRAFT

SECTION IX

9.0 Appendices

9.1 Appendix A - Grant of Outline Development Permission

FORM DOP 10

TURKS AND CAICOS ISLANDS

THE PHYSICAL PLANNING ORDINANCE 1989
(No. 10 of 1989)
THE PHYSICAL PLANNING (DEVELOPMENT PERMISSION) REGULATIONS 1990

GRANT OF OUTLINE DEVELOPMENT PERMISSION
(Section 30)

APPLICATION NO: PR 16739 **BLOCK & PARCEL NO:** 60900 / 258

To: ROMANZA ON GRACE BAY LTD

In pursuance of powers conferred under the above mentioned Ordinance, the Board hereby GRANTS in accordance with the terms and conditions authorised by the Ordinance, approval in principle to undertake the following development:

Proposed Construction of thirty-two (32) townhouse units including swimming pools, poolside bar, restaurant building, reception/gym building, staff building tennis and sports court, garage enclosure, boardwalk and gate house.

as described in your application for a grant of outline development permission dated 17/Mar/2023 and in the plans and drawings attached thereto, subject to compliance with the relevant statutory provisions and with the following conditions:

1. The submission to and approval by the Board of full details of the development.
2. See Notes 1 and 2
3. The applicant shall seek variance for the minimum setback distance between two buildings. The applicant shall provide adequate parking spaces for restaurant Development prior to consideration of Detail Development Permision.

4.The minimum setback distances for the proposed development shall be approved by the Development Control Engineer on site. The exterior walls of the townhouse building shall be constructed of 8-inch concrete block or 6-inch reinforced concrete construction and built to standards laid down in the TCI Building Code, 2014.

5.Parking spaces shall be reserved for handicapped persons and shall be sited within easy reach of an exit of the proposed building. Revised drawings shall be submitted for consideration and determination.

6.The pavement of the parking areas and the vehicular access could be of native stone or of concrete or of asphalt properly sealed.

7.Parking shall be provided with concrete kerbs and clearly defined. Parking spaces shall be 8 feet in width by 16 feet in length and painted with white or yellow florescent paint. The aisle for maneuvering shall be a minimum width of 18 feet.

8.All parking and vehicular access areas shall be constructed of well-compacted fill and asphalt surfaced.

9.Lighting shall be provided and strategically located in parking areas.

10.Fire lane shall be provided for the proposed development to ensure access for fire trucks around the full perimeter of the building.

11.Fire hydrant(s) shall be provided for the proposed development to the satisfaction of the Director of Planning and the Chief Fire Officer.

12.A comprehensive Environmental Impact Assessment (EIA) may be required. Once this is determined, a TOR will be issued with the outline which is to be done. The Terms of Reference shall be prepared by concerned government departments such as the DECR, Planning Department, DDME, etc., and shall be reviewed by the same departments.

Page 1 of 4

GRANT OF OUTLINE DEVELOPMENT PERMISSION

(Section 30)

13.The Environmental Impact Statement (EIS)/EIA report should be made available to the public (printed and digital copy) for review and scrutiny, and then be presented to the public (Public Consultation) by the developer and EIA consultancy team. Prior to the public meeting, all stakeholders should be properly notified ahead of time. The developer and EIA consultants must properly respond to all relevant questions (written representations or verbal comments made during the consultation period).

14.The concept of "green technology" in the design and operation is highly recommended.

15.Rain water harvesting and sewage treatment plant must be included in the design of the proposed project.

16.The use of input-dependent plants for landscaping is discouraged. Native species that does not require excessive watering, fertilization and pest and disease control are recommended. A Biosecurity Plan is required to ensure that unwanted plants and animals are not introduced which may have threatened the environmental integrity of the area.

17.An Environmental Management Plan (EMP) should be required to ensure that environmental issues identified in the EIA shall be properly addressed in advanced. It is the responsibilities of the developer that all needed supplier and technical staff are available when needed to properly implement the EMP.

18.A Review consultant (A special inspector) approved by the Director of Planning must be employed to inspect the development and plans at the expense of the applicant. The special inspector must report to the Development Control Engineer, Department of Planning.

19.Relevant provisions of the Physical Planning Ordinance and Development Manual that pertains to environmental protection and conservation shall be enforced to the fully possible to ensure environmental sustainability.

20.The applicant shall be financially responsible for any damage on the natural or built environment, included, but not limited to sand dunes, natural sea grasses, etc., and on uses of adjacent land.

21.A Review consultant (A special inspector) approved by the Chief Fire Officer, Fire & Rescue Department must be employed to inspect the development and plans at the expense of the applicant. The special inspector must report to the Chief Fire Officer, Fire & Rescue Department.

22.All new development, including the proposed waste water treatment plant, shall be sited within the confines of the parcel boundaries.

23.A license must be sought and obtained from the Crown Land Unit in respect of any proposed beach shade structures, boardwalks, decks and other similar structures, which may extend outside the confines of the applicant's parcel boundaries and onto lands, which are under the ownership of the Crown.

24.Building setback distances shall be strictly as per the approved site plan and there shall be no deviation whatsoever unless approved by the Director of Planning. The setback distances shall be measured from the furthest projection of the proposed building, including any roof overhang, stairway, balcony, window projection or verandah.

25.During construction, hoarding shall be erected on all parcel boundaries for safety and reduce dust nuisance.

26.During construction, measures shall be implemented to reduce dust nuisance and air pollution.

27.The proposed entrance/exit and vehicular access area shall be maintained as per the approved site plan. Parking shall be designed in a practical manner that allows vehicles to manoeuver on the parcel and leave in a forward direction.

28.Provisions shall be made for on-site garbage storage in accordance with the provisions of the latest edition of the TCI Building Code. The facility must be constructed to the satisfaction of the Director of Planning; preferably a fully enclosed structure provided with a gate and of suitable height to prevent scavenging by animals.

GRANT OF OUTLINE DEVELOPMENT PERMISSION

(Section 30)

29.The provisions for the disposal of storm water so that the effect of run-off from the parcel will not materially affect adjoining parcels shall be strictly adhered to. All asphalt surfaces shall allow for storm water to be drained safely into wells where the percolation characteristics of the ground make this possible. Consultations shall be made with the Director, EMS, TCI Government, prior to the commencement of construction of drainage facilities.

30.Adequate back up for at least three (3) days shall be provided against the possible breakdown of the primary supply. The water cistern must be of reinforced concrete construction and must be sized consistent with the provisions of Section 702.2 (b), of the latest edition of the TCI Building Code. Any opening into the water cistern must be built not less than twenty-two (22) inches above finish grade.

31.The back-up water supply shall be connected to the proposed development prior to issuance of a certificate of occupancy.

32.Clearance of native vegetation, mechanically or by hand must be restricted to the specific area(s) for the placement of approved infrastructure (roads, buildings, placement of AC units and garbage storage facilities, etc.). Other areas on the development site, which are not approved for development, must be enclosed with a temporary fence during construction to ensure preservation of native vegetation.

33.The areas affected by construction must be properly revegetated and landscaped, preferably using native vegetation. The aforementioned must be implemented prior to the issuance of completion certificate.

34.The proposed waste treatment system must be provided with all ancillary and necessary tertiary treatment facilities and must be adequately sized to sufficiently dispose of the wastewater.

35.The wastewater plant must have the surrounding ground surface so graded to prevent surface run-off from entering the plants. The covers should not be less than twelve (12) inches above ground level.

36.The applicant shall be responsible for ensuring adequate operation and maintenance of the wastewater plant to the satisfaction of the Chief Environmental Health Officer, TCI Government.

37.The kitchen in the restaurant area must be provided with self-closing doors or fitted with spring loaded hinges in order that the doors separating these areas from other parts of the building remain closed at all times.

38.The kitchen must be connected to properly designed and functional grease trap to contain grease and oils from these areas and eliminate their disposal into the sewage system.

39.There must be both hot and cold water supplied to the bar and kitchen areas.

40.The finished ground floor level of the proposed building shall be a minimum of 22 inches above finish ground level.

41.Prior to the issuance of any occupancy certificate(s), temporary or otherwise, all freight containers, plant and machinery and all other construction related articles or materials of whatever kind shall be removed from the parcel to an authorized location.

42.During operation of the development, rubble, waste, abandoned and/or derelict machinery or articles or materials of whatever of kind shall be prohibited from being stored on the parcel.

43.The construction work schedule (6-day work week Monday to Saturday commencing at 7:00 a.m. and ending at 5:00 p.m. each work day) shall be strictly adhered to.

44.No nuisances whether by noise, dust, smoke, fumes or otherwise shall be caused to the neighbors on the adjoining parcel(s).

GRANT OF OUTLINE DEVELOPMENT PERMISSION

(Section 30)

45.During the period of construction of the proposed development, temporary hoarding shall be erected around the construction phase of the development for public safety and amenity reasons. The hoarding shall be erected to the satisfaction of the Director of Planning.

46.The use of rubble as a mean of enclosing the property is strictly prohibited. Boundary walls or other means of enclosure shall not exceed the height of three (3) feet, six (6) inches unless approved otherwise by the Physical Planning Board in accordance with the Physical Planning Ordinance, 2018 and Regulations made thereunder.

47.All electrical, telecommunication, cable TV and other transmission lines shall be placed underground in conduit and to the standards and requirements of the relevant suppliers.

48.All exterior walls of the proposed development shall be of 8-inch concrete block or 6-inch reinforced concrete construction and built to standards laid down in the TCI Building Code, 2014.

The reason(s) for the imposition of the condition(s) specified (or attached) is/are:

One copy of the application and the accompanying plans and drawings are returned with this Grant.

Dated: October 3, 2023 **Signed:** DIRECTOR OF PLANNING

NOTES

1. An outline development permission means a development permission granted on the basis of an application for outline development permission, which gives approval in principle to the development the subject of the application for outline development permission, but does not of itself permit any development to be commenced. See Section 29(a) Physical Planning Ordinance.
2. An application for a detailed development permission must be submitted to the Director of Planning within one year of the date of notification of this Grant, failing which, this grant will lapse and cease to have any effect. You may however ask for an extension of that one year period, and if it is granted, this Grant will remain valid, and effective for the period of extension. See Section 37 Planning Ordinance.

All communications relating to this decision should be addressed to:

The Director of Planning
Department of Planning
Grand Turk

9.2 Appendix B - The Terms of Reference (ToR)

PLANNING DEPARTMENT
TURKS & CAICOS ISLANDS

Terms of Reference for an Environmental Impact Assessment
Romanza Grace Bay Townhouses
PR16739

Read carefully as requirements for submission may have updates or changes.

General: The Environmental Impact Assessment (EIA) must be conducted for this development with emphasis on the marine and terrestrial areas directly affected by the proposed project. **This requirement includes all applications for works relevant to the main project that will occur, including applications for ancillary works directly related to the main project.** All applications relevant to the project are expected to be supplied by the issuance of these Terms of Reference. If additional applications relevant to the main project are forthcoming, the applicant shall collate all applications for submission at the same time.

The cumulative impact of all projects in the area must be analysed (with new data and information). All environmental studies/data prior to this application must be re-validated, in consultation with Department of Environment and Coastal Resources (DECR) and Department of Planning (DoP).

Qualification: EIA process shall be carried out by fully qualified consultants in all areas of study as per these Terms of Reference.

Scientific Research Permit: All scientific field research in Turks and Caicos Islands requires a Scientific Research Permit. This includes field research towards an Environmental Impact Assessment, to be licensed with a commercial Scientific Research Permit from the Department of Environment and Coastal Resources. The EIA consultant shall apply for this permit through the Office of the Assistant Director of Environmental Research & Development in DECR using the most current application form.

Process: For an Environmental Impact Statement (EIS) to be deemed credible and acceptable, all site research work must be conducted prior to any physical works on the site that lead to degradation or change to the natural environmental conditions on the site. Environmental Impact Assessment research shall be considered void if it is carried out following site clearance, vegetation disturbance, terraforming, groundworks, or other physical works that alter the conditions of the intact habitats or affect presence of naturally-occurring flora and fauna.

Formatting Requirements: The DECR has multiple offices across the Turks and Caicos Islands and all offices have staff on the EIS review team. Therefore, all documents shall be submitted as digital files to the ***Department of Planning*** in **electronically shareable format**; that is, either **by email or reference to an online website from which the**

Telephone: 649-338-2205
E-mail: dflightbourne@gov.tc

Southbase
Grand Turk
Turks and Caicos Islands, B.W.I.

PLANNING DEPARTMENT
TURKS & CAICOS ISLANDS

documents may be downloaded until review process is complete and by multiple reviewers (**not read-online only, nor password-protected, nor time-bound, nor one-time download, nor limited to specific recipients**). Any variance from this format, or sending documents that do not open properly, will be cause for delay in review. Temporary and single-addressee file sharing sites are not generally acceptable.

Each document, report, and appendix shall be submitted in either consistently portrait or landscape layout throughout, with all images and sections in parallel alignment and proper, upright orientation (including tables and maps); and with all sections (including text within images) clear and readable. Maps (other than aesthetic representation figures) shall be presented with conventionally representative orientation (north-up). Currently accepted zoological and botanical names shall be used adjacent to common names throughout documents; valid synonyms are acceptable but not required. All documents must be submitted with security settings to allow both internal commenting and copying of text; the use of which will be restricted to within DECR and DoP to internally share comments and extract passages for responses. Documents not submitted within these requirements may be rejected and subject to review delay.

Perspective and Wording: The Environmental Impact Statement (EIS) should present analysed data objectively. Language stating obvious bias towards the development, particularly postulations that a pristine natural area is being "improved" or "enhanced" should be avoided. Lengthy explanations of the merits of the development are unnecessary; these can be deducted from the master plans and original development proposals included as appendices.

Submission: Complete Environmental Impact Statement (EIS) must be submitted to the ***Department of Planning.*** Documents may be copied to DECR with this submission but shall not be submitted directly/solely to DECR. All documents shall be submitted digitally in addition to the number of printed copies required by DoP. DoP may request additional or hard copies of documents.

Review and Response: EIS may be accepted, conditionally accepted, or rejected by DECR. For an EIS to be accepted, it will need to minimally but robustly meet the requirements for inclusion of data and analysis as set forth in the Terms of Reference. For an EIS to be accepted, the entire process must be completed (including data collection, analysis, submission, review, comments, and review of responses) **prior to any groundwork occurring on the area of impact** – including but not limited to land clearance and vegetation removal, excavation, filling, levelling or other terraforming, construction, bulldozing of survey lines or access roads, burning, or landscaping. Hand-cut survey lines and hand-cutting of access trails for research are acceptable, but no other impact shall have occurred prior to EIS process being complete for acceptance to occur. If the site is impacted from a previous permitted development, that should be clearly stated. If the site has already been impacted for works relating to the development,

Telephone: 649-338-2205
E-mail: dflightbourne@gov.tc

Southbase
Grand Turk
Turks and Caicos Islands, B.W.I.

PLANNING DEPARTMENT
TURKS & CAICOS ISLANDS

including overall or master plan, of which the application is part, this should be clearly stated.

EIS that are accepted may still be issued with comments that will require response from the consultant and/or proponent. EIS that are conditionally accepted may require resubmission of sections, data, components, imagery, or formatting that do not fulfil the requirements of the Terms of Reference; these resubmissions shall be resubmitted not piecemeal but as parts of a completely revised EIS.

Required Components of the EIS:

1. **Introduction and Overview**

1.1 Reference page with names and contact information of development proponent and EIA contractor; Department of Planning reference number; block and parcel numbers concerned; island and general location; and date completed/ submitted (revisions to include dates of revision submission following original dates).
1.2 Non-technical summary (including aims, objectives, and scoping).
1.3 A brief description of the proposed development and its relationship with other development in the area; including adjacent development in the geographic area.
1.4 Aims and objectives of the assessment.
1.5 Overview of the areas/topics to be addressed in this EIA (present the results of scoping exercise).
1.6 Impact Assessment methods/analyses.

2. **Baseline Studies**

All baseline studies shall be supplemented with date and time metadata for when surveys were conducted.

2.1 Historical overview of the site and existing development- use historical and current aerial maps (time-series visualization) and official TCI generated map (Block/Parcel). Describe the historical ownership and land-use of the proposed development, including the surrounding areas.
2.2 Biological environmental baseline assessment:
2.2.1 Baseline terrestrial environment (including areas that are cleared, bulldozed and disturbed/damaged) – Quantitative description of any terrestrial ecological assets to be directly impacted by the project and a qualitative assessment of assets that may be indirectly impacted, to include:
2.2.1.1 Description and quantification of habitats and ecosystems present.
2.2.1.2 Complete list and description of rare, threatened, and endangered species (as per IUCN Red Data List, CITES, and DECR lists).

Telephone: 649-338-2205
E-mail: dflightbourne@gov.tc

Southbase
Grand Turk
Turks and Caicos Islands, B.W.I.

PLANNING DEPARTMENT
TURKS & CAICOS ISLANDS

2.2.1.3 Complete list of flora (plants) species and any identifiable fungi species present.
2.2.1.4 Complete list of bird species with annotation as to season, time of day, and duration of surveys taken; to include any instance of nesting or breeding.
2.2.1.5 Complete list of all reptile and amphibian species present.
2.2.1.6 Complete list of any freshwater fish species present.
2.2.1.7 Complete list of any mammal species present.
2.2.1.8 Representative lists of invertebrates and fungi present.

All above categories 2.2.1.1 – 2.2.1.8 shall be supplemented with descriptions of dates, times, and durations when surveys were taken.

2.2.2 Baseline marine environment (including the adjacent coast, beach and seaward) – Quantitative description of marine ecology within all areas adjacent to the project and a qualitative assessment of areas that may be indirectly impacted (100 metres seaward), to include:
2.2.2.1 Description and quantification of marine habitats and ecosystems present. Map the marine habitats in the area directly affected by the proposed development (increased use of shallow inshore area following development). The map should be geo-referenced.
2.2.2.2 Complete list and description of rare, threatened, and endangered species (as per IUCN Red Data List, CITES, and DECR lists)
2.2.2.3 Complete list of all marine flora (plants including macroalgae) present.
2.2.2.4 Complete list of all coral species present, including soft corals.
2.2.2.5 Complete list of all seabird species present.
2.2.2.6 Complete list of all marine reptile species present.
2.2.2.7 Complete list of all fish species present.
2.2.2.8 Complete list of any marine mammal species present.
2.2.2.9 Representative list of marine invertebrate species (other than corals) present.
2.2.2.10 Description sargassum situation in the area.

All above categories 2.2.2.1 – 2.2.1.10 shall be supplemented with descriptions of dates, times, and durations when surveys were taken.

2.3 Physical environmental baseline assessment to include topography, soil type, structure, geotechnical study, sediments and profile:
2.3.1 Topography of the area. It is recommended to use professionally-processed drone-imagery.
2.3.2 Bathymetry for site shoreline, any other underwater areas conceivably affected by the project, extending at least 500 meters from the coast.

Telephone: 649-338-2205
E-mail: dflightbourne@gov.tc

Southbase
Grand Turk
Turks and Caicos Islands, B.W.I.

PLANNING DEPARTMENT
TURKS & CAICOS ISLANDS

2.3.3 Geology (check previous EIA or nearby projects, if any, validate when necessary).
2.3.4 Hydrology.
2.3.5 Sediment analyses, including grain size (beach) and testing for contaminants (if any).
2.3.6 Climate and meteorology. Meteorological parameters within the area- at least for the last 10 years.

2.4 Baseline aesthetics – this should be supported by drone/UAV imagery plus ground photography and descriptions/characterizations.

2.5 Baseline coastal processes and dynamics (this should be factored in the design of the project and impact on the beach):
2.5.1 Currents and tides.
2.5.2 Sediment transport.
2.5.3 Erosion and accretion, as applicable.
2.5.4 Coastal dynamics.

2.6 Water quality from within the area to be directly impacted by the project (e.g. marina, nearshore areas)– parameters to include dissolved oxygen (mg/l), temperature (°C), salinity (ppt), pH, turbidity (NTU), total dissolved solids (mg/l), ammonia (as mgN/l), nitrate/nitrite (as mnN/l), nitrite (as mgN/l), total dissolved phosphorus (mg/l), total chlorophyll (µg/l), pheophytin (µg/l), active chlorophyll (µg/l) and total Coliform. Nutrient loads are to be tested to an ultra-low level.

2.7 Social-economic:
2.6.1 Demographics.
2.6.2 Employment: labor & skills demand at construction and operation; local and foreign workers needed.
2.6.3 Safety/security concerns within the community.
2.6.4 Economic impact: short-term and long-term.
2.6.5 Others.

2.8 Other relevant parameters identified during the scoping exercise by the consultants.

3. **Legislative and Regulative Context** – To include a discussion of any **aspects of law, regulation and/or policy relevant to the project**, such as, but not limited to the legislation (including limits/ zones designated under any legislation, regulations, or policy relevant to the subject area) listed below. *This section should not be a summary of laws, but rather how the laws pertain to the project*.

Telephone: 649-338-2205
E-mail: dflightbourne@gov.tc

Southbase
Grand Turk
Turks and Caicos Islands, B.W.I.

PLANNING DEPARTMENT
TURKS & CAICOS ISLANDS

3.1 TCI Development Plan/Master Plan.
3.2 TCI National Physical Development Plan 2020
3.3 Physical Planning Ordinance and subsidiary legislations.
3.4 TCI Development Manual.
3.5 TCI Building Code.
3.6 National Parks Ordinance
3.7 Coast Protection Ordinance and subsidiary legislations.
3.8 Mineral (Exploration and Exploitation) Ordinance and subsidiary legislations.
3.9 Marine Pollution Ordinance and subsidiary legislations.
3.10 Fisheries Protection Ordinance and subsidiary legislations.
3.11 Wild Bird Protection Ordinance.
3.12 International treaties and conventions.
3.13 Turks and Caicos Islands Vision 2040
3.14 Turks and Caicos Islands Environment Charter 2001
3.15 Turks and Caicos Islands Climate Change Charter 2021
3.16 Other relevant laws and regulations.

4. Project Description and Construction and Operation and alternatives

4.1 Description of the proposed project/components.
4.2 Project Justification – socio-economic, ecological, etc.
4.3 How the proposed project may affect erosion or accretion.
4.4 Coastal/beach development and management including beach access.
4.5 Solid waste management during construction and operation.
4.6 Surface-run-off management/ Storm water runoff and treatment.
4.7 Traffic flow and safety (marine, coastal).
4.8 Water and electrical demand and source (construction and operations).
4.9 Landscaping (initial phase and maintenance/operation).
4.10 Construction phase activities:
4.10.1 Construction methods and program, including phasing of the development.
4.10.2 Site security and hoarding.
4.10.3 Storage of materials and equipment (including any soil or excavated materials).
4.10.4 Beach traffic impact and safety.
4.10.5 Temporary sanitary facilities.
4.10.6 Access and staging.
4.10.7 Solid waste management- those generated during construction, if any.
4.10.8 Liquid waste management, including control of runoff- those generated during construction, if any.
4.10.9 Control of air, dust, water and noise pollution (generated by the project/heavy equipment, if any).
4.10.10 Control/storage of fuels and other dangerous substances, if any.

Telephone: 649-338-2205
E-mail: dflightbourne@gov.tc

Southbase
Grand Turk
Turks and Caicos Islands, B.W.I.

PLANNING DEPARTMENT
TURKS & CAICOS ISLANDS

4.10.11 Emergency mitigation plan.

4.11 Social-economic:
- 4.11.1 Demographic.
- 4.11.2 Employment – labor & skills demand at construction and operation; availability of local workforce and need for foreign workers.
- 4.11.3 Safety/security concerns within the community (construction and operation).
- 4.11.4 Issues raised in the public consultation (written and verbal/oral concerns).
- 4.11.5 Others.

4.12 Impact to terrain including method of clearing of site and quantified description of natural vegetative cover to be removed, retention of natural vegetation cover, disposal of removed vegetation and soils, and statement of understanding of limitations of wholesale land clearance as per Development Manual and Planning legislation and regulations.

4.13 Potential Alternatives.

5. Impact Assessment.

5.1 Impact identification.

5.2 Description of impact:
- 5.2.1 Potential impacts to the biotic environment, including predicted direct and indirect impacts coastal, and marine assets.
- 5.2.2 Potential impact of added lighting, including impacts on marine life (specifically, sea turtle nesting), bird life (especially migratory birds), and others.
- 5.2.3 Potential impact to any species identified as endemic, near-endemic, rare, threatened, or endangered (by either IUCN or CITES listing), and any species uniquely dependent on the site for vital life-cycle phases (e.g. bird nesting, turtle nesting).
- 5.2.4 Potential impacts to the aesthetic and other built environment.
- 5.2.5 Water quality and noise pollution (construction and operation).
- 5.2.6 Ecosystem and economic analyses (may summarize above; valuation is needed) to determine the best use of the area.
- 5.2.7 Socio-economic impact – Socio-economic and cultural baseline (including labor, tourism, public infrastructure, crime, etc., Predicted impacts (positive and negative- influx of population/ workers, safe & security) to the above baseline, Identification and involvement of stakeholder groups:
  - 5.2.7.1 Public beach access – considering that the beach is public in TCI.
  - 5.2.7.2 Potential impact to neighboring developments, businesses and residential houses.
  - 5.2.7.3 Potential Climate Change impacts, both locally within the Turks and Caicos Islands, and globally (including resulting global transportation changes).

Telephone: 649-338-2205
E-mail: dflightbourne@gov.tc

Southbase
Grand Turk
Turks and Caicos Islands, B.W.I.

PLANNING DEPARTMENT
TURKS & CAICOS ISLANDS

5.2.7.4 Other Impacts.
5.3 Impact assessment.
5.4 Derivation of significance.

Note: Use computer modelling, as appropriate, for wind-wave prediction, wave energy dissipation, waves and currents and sediment transport and shoreline changes, etc. Particular attention should be given to sensitivity and vulnerability of important geomorphological features and processes; how these are likely to respond to particular impact, regardless of whether the effects are temporary, long-term, reversible or permanent. The potential cumulative impacts of and to other project components and nearby developments (as applicable) must be noted and addressed.

6. Mitigation and Monitoring

6.1 Proposed actions and schedule to mitigate against any environmental impact (including proposed monitoring activities), including:
- 6.1.1 Impacts to terrestrial and marine life (displacement).
- 6.1.2 Impacts to water quality.
- 6.1.3 Impacts of noise and light.
- 6.1.4 Impacts of incursion of invasive species of flora and fauna.
- 6.1.5 Impacts to resettled wildlife (e.g. bird nesting causing hazards to property or people).

6.2 Proposed actions to mitigate against noise pollution.
6.3 Storm surge analysis and mitigation plan for sea level rise.
6.4 Building around, or rescue and removal of rare, threatened, and endangered species of plants where possible.
6.5 Landscaping/ replanting plan utilizing native species (list species).
6.6 Proposed techniques and models to mitigate against light pollution, including impacts on nesting sea turtles and migratory birds.
6.7 Proposed Climate Change mitigation both locally within Turks and Caicos Islands and globally.
6.8 Financial resources for mitigation.
6.9 Environmental monitoring and financial requirements.
6.10 Public Consultation/social listening/monitoring.
6.11 An **Environmental Management Plan (EMP)** must be prepared with the following minimum components:
- 6.11.1 Summary of the potential impacts of the proposal;
- 6.11.2 Description of the recommended mitigation measures;
- 6.11.3 Statement of compliance with relevant standards;
- 6.11.4 Allocation of resources and responsibilities for plan implementation;
- 6.11.5 Schedule of the actions to be taken;
- 6.11.6 Programme for surveillance, monitoring and auditing; and
- 6.11.7 Contingency plan when impacts are greater than expected.

Telephone: 649-338-2205
E-mail: dflightbourne@gov.tc

Southbase
Grand Turk
Turks and Caicos Islands, B.W.I.

PLANNING DEPARTMENT
TURKS & CAICOS ISLANDS

The Environmental Management Plan (EMP) for pre-, during- and post-construction phases (contents may be modified, as applicable).

7. Recommendations and Conclusions

8. Statement of Understanding EIA recommendations, of Environment Charter (2001), and Climate Change Charter (2022)

8.1 Statement of Understanding of terms of Environment Charter 2001 from proponent, with explanation of how this development approaches best practices towards the protection of biodiversity and the environment as noted in the Charter.

8.2 Statement of Understanding of terms of Climate Change Charter 2022 from proponent, with explanation of how this development approaches best practices toward mitigation, adaptation, and resilience to climate change as noted in the Charter.

8.3 Proponent's Declaration of Intent to guide the development by the recommendations of the EIA consultant, with updated Declaration following response to public or TCIG commentary requesting or requiring alterations to any part of the EIA.

9. Appendices

9.1 The Terms of Reference (ToR) for the EIA, as issued by DoP, TCIG.

9.2 Qualifications of the EIA team of experts and the special requirements and information needed to form the team to conduct the EIA for this project. The contact information (functional phone numbers and email addresses) must be provided. Curricula vitae and résumés should be relevantly abridged to **no more than two pages for each consultant**.

9.3 Government Permits (e.g. work permit, research permit, etc., if required)

9.4 Site Plan, project plans, architectural drawing and other related documents.

9.5 Portable data format (pdf) file of the reports of independent consultants involved in the EIA.

9.6 Scientific analyses reports (pdf copy from the Laboratory that analyzed the samples, and the like), if any.

9.7 Standards or protocols and assumptions used in predicting the environmental impacts.

9.8 Public Consultative Meeting and Stakeholders meeting reports. Include evidence of advertisement for Public Consultative Meetings, the names and contact information for those who attended the meetings, issues raised and conclusions.

9.9 Photo documentations (with captions – dates, place, description of the subject of the photo).

Telephone: 649-338-2205
E-mail: dflightbourne@gov.tc

Southbase
Grand Turk
Turks and Caicos Islands, B.W.I.

PLANNING DEPARTMENT
TURKS & CAICOS ISLANDS

9.10 Certification/legal document from the EIA group/company that submits the EIS, that all submitted reports/documents and etc. as part of the EIA report/EIS were first-hand information and if it taken from secondary source, the authors should be properly acknowledged or compensated.

9.11 Documentation of schedules of fieldwork; noting dates, times, duration, and purpose, to demonstrate that sufficient seasonal, cyclical, and observational considerations were made for fieldwork.

Checklist of items for EIS	
Cover/ reference page as described in 1.1	
All images and sections in upright orientation, clear and readable	
Maps oriented conventionally, north-up	
Saved in manner to allow for text copying and comments to be inserted	
Files shareable by email or download transfer website, available throughout entire review process, and able to be downloaded by multiple reviewers	
All sections in ToR addressed by EIS	
All appendices attached (may be in separate files) as described in 9	

Prepared by the Department of Planning in collaboration with the Department of Environment and Coastal Resources

December 07th, 2022

Telephone: 649-338-2205
E-mail: dflightbourne@gov.tc

Southbase
Grand Turk
Turks and Caicos Islands, B.W.I.

9.3 Appendix C - Approval Letter EIA Team

PLANNING DEPARTMENT
TURKS & CAICOS ISLANDS

MINISTRY OF PHYSICAL PLANNING AND INFRASTRUCTURE, DEVELOPMENT
DEPARTMENT OF PLANNING

March 04th, 2024

Mr. Oswald Williams
CEDA
Grand Turk
Turks and Caicos Islands

Re: **Request for Approval of the EIA Team of Consultants – For Romanza Town Houses on Grace Bay, Development, – PR. 16739 – 60900/258, Grace Bay, Providenciales, Turks and Caicos Islands.**

Dear Mr. Williams:

Please be advised that in accordance with the Section 45 (1) (b) of the Physical Planning Ordinance, 2018, and as per your communication dated February 28th, 2024, the subject EIA team has been approved.

During the assessment, the applicant shall consult with the relevant Government Departments and agencies. The list of the Team members are as follows:

1. Philip Warner, Coastal Engineer - Smith Warner International, Jamaica & TCI
2. Janeen Bullard, Marine Biologist - JSS Consultants (Nassau, Bahamas)
3. Greg Braun, Terrestrial Consultant - Sustainable Ecosystem International, Jupiter, Florida
4. Ezekiel Hall, Geologist and Hydrologist - Environmental All, Turks and Caicos
5. Oswald R. Williams, Environmental Planner - Caribbean Environmental Design Associates, TCI
6. Oswald R. Willaims, CEDA - Project Coordinator

Once Completed, three (3) hard copies and one (1) soft copy of the EIA document shall be submitted to the Department of Planning.Please be advised and guided accordingly. Should you have any queries, please do not hesitate to contact me.

Respectfully

B Thomas

Dr. Bethia Thomas
Environmental Impact Assessment Specialist For: *Director of Planning*

EIA SPECIALIST
BTHOMAS@GOV.TC
1-649-338-2208

SOUTHBASE
GRAND TURK
TCI

1

9.4 Appendix D – Consultant's Contact Information

Table 1.0: EIA Team and their contact information

Team Member	Study Area	Nationality	Contact Information	
			Phone	Email
Sustainable Ecosystems International	Terrestrial	USA (Florida)		
Philip Warner Smith Warner International Ltd	Coastal Processes	Jamaican	1876-9788-8950	philip@smithwarner.com
Janeen Bullard JSS Consulting (Environmental)	Marine	Bahamian	242-357-9262	Janeen2JSS Consultants.com
Ezekiel Hall EnvironmentalALL	Geology	TCI	649-246-8263	Hallenvironment1@gmail.com
Oswald R. Williams Caribbean Environmental Design Associates	Socio-economic/ Terrestrial	TCI	649-231-0371	oswaldwilliams51@gmail.com
Oswald R. Williams	Projector Coordinator	TCI	649-231-0371	oswaldwilliams51@gmail.com

DRAFT

9.5 Appendix E - Scientific Research/Conservation Permit

Department of Environment and Coastal Resources
Ministry of Tourism, Environment, Fisheries, Maritime Affairs, Culture & Heritage, Agriculture, and Religious Affairs.
Turks and Caicos Islands Government
Lower Bight Road, Providenciales
Turks and Caicos Islands

SCIENTIFIC RESEARCH PERMIT

SRP No.: 2024-03-27-15

Main Title of Research:	Romanza Town Houses on Grace Bay (PR. 16739)
Principal:	Caribbean Environmental Design Associates (Oswald R. Williams)
Other applicants:	Smith Warner International (Philip Warner), JSS Consulting (Janeen Marlo Bullard), Sustainable Ecosystems International (Greg Bruan), and EnvironmentalAll (Ezekiel Hall)
Partners/collaborators in TCI (if any):	EnvironmentalAll (Ezekiel Hall)
Type of application:	Comm
Location:	Grace Bay, Providenciales, Turks and Caicos Islands (60900/258)
Total duration of application:	1 year
Period covered by this application:	01 March 2024 – 28 February 2025
Research Fee:	$500 TCIG Treasury Receipt #2534560610

Authorized Approving Officer:

Luc Clerveaux
Director, DECR

Date: 27 March 2024

TURKS AND CAICOS ISLANDS
Scientific Research Permit
DECR 2024

Not Valid without the Official Seal of the DECR

TURKS AND CAICOS ISLANDS
DEPARTMENT OF ENVIRONMENT AND COASTAL RESOURCES

Note:

This Permit should be presented to authorized-DECR Officers or TCIG officials when requested during monitoring activities which may be done anytime throughout the duration of the approved activities. The Application for Research Permit, Conditions of Approval and required attachments may be requested too.

9.6 Appendix F - Sections of Terms of Reference assignment to various consultants.

Terms of Reference for Environmental Impact Assessment
Romanza Grace Bay Townhouses, Grace Bay, Providenciales
Turks and Caicos Islands

PR. 16739

Sections Assignment to EIA Team

General Requirements

PLEASE FOLLOWED THE ISSUED TERMS OF REFERENCE (ToR)

General: The Environmental Impact Assessment (EIA) must be conducted for this development with emphasis on the marine and terrestrial areas directly affected by the proposed project. **This requirement includes all applications for works relevant to the main project that will occur, including applications for ancillary works directly related to the main project.** All applications relevant to the project are expected to be supplied by the issuance of these Terms of Reference. If additional applications relevant to the main project are forthcoming, the applicant shall collate all applications for submission at the same time.

The cumulative impact of all projects in the area must be analysed (with new data and information). All environmental studies/data prior to this application must be re-validated, in consultation with the Department of Environment and Coastal Resources (DECR) and the Department of Planning (DoP).

Qualification: The EIA process shall be carried out by fully qualified consultants in all areas of study as per these Terms of Reference.

Scientific Research Permit: All scientific field research in Turks and Caicos Islands requires a Scientific Research Permit. This includes field research toward an Environmental Impact Assessment, to be licensed with a commercial Scientific Research Permit from the Department of Environment and Coastal Resources. The EIA consultant shall apply for this permit through the Office of the Assistant Director of Environmental Research & Development in DECR using the most current application form.

Process: For an Environmental Impact Statement (EIS) to be deemed credible and acceptable, all site research work must be conducted before any physical works on the site that lead to degradation or change to the natural environmental conditions on the

site. Environmental Impact Assessment research shall be considered void if it is carried out following site clearance, vegetation disturbance, terraforming, groundworks, or other physical works that alter the conditions of the intact habitats or affect the presence of naturally occurring flora and fauna.

Formatting Requirements: The DECR has multiple offices across the Turks and Caicos Islands and all offices have staff on the EIS review team. Therefore, all documents shall be submitted as digital files to the ***Department of Planning*** in **electronically shareable format**; that is, either **by email or reference to an online website from which the documents may be downloaded until review process is complete and by multiple reviewers** (**not read-online only, nor password-protected, nor time-bound, nor onetime download, nor limited to specific recipients**). Any variance from this format, or sending documents that do not open properly, will be cause for delay in review. Temporary and single-addressee file sharing sites are not generally acceptable.

Each document, report, and appendix shall be submitted in either consistently portrait or landscape layout throughout, with all images and sections in parallel alignment and proper, upright orientation (including tables and maps); and with all sections (including text within images) clear and readable. Maps (other than aesthetic representation figures) shall be presented with conventionally representative orientation (north-up). Currently accepted zoological and botanical names shall be used adjacent to common names throughout documents; valid synonyms are acceptable but not required. All documents must be submitted with security settings to allow both internal commenting and copying of text; the use of which will be restricted to within DECR and DoP to internally share comments and extract passages for responses. Documents not submitted within these requirements may be rejected and subject to review delay.

Perspective and Wording: The Environmental Impact Statement (EIS) should present analysed data objectively. Language stating obvious bias towards the development, particularly postulations that a pristine natural area is being “improved” or “enhanced” should be avoided. Lengthy explanations of the merits of the development are unnecessary; these can be deducted from the master plans and original development proposals included as appendices.

Submission: Complete Environmental Impact Statement (EIS) must be submitted to the ***Department of Planning*****.** Documents may be copied to DECR with this submission but shall not be submitted directly/solely to DECR. All documents shall be submitted digitally in addition to the number of printed copies required by DoP. DoP may request additional or hard copies of documents.

Review and Response: EIS may be accepted, conditionally accepted, or rejected by DECR. For an EIS to be accepted, it will need to minimally but robustly meet the

requirements for inclusion of data and analysis as set forth in the Terms of Reference. For an EIS to be accepted, the entire process must be completed (including data collection, analysis, submission, review, comments, and review of responses) **prior to any groundwork occurring on the area of impact** – including but not limited to land clearance and vegetation removal, excavation, filling, levelling or other terraforming, construction, bulldozing of survey lines or access roads, burning, or landscaping. Handcut survey lines and hand-cutting of access trails for research are acceptable, but no other impact shall have occurred prior to EIS process being complete for acceptance to occur. If the site is impacted from a previous permitted development, that should be clearly stated. If the site has already been impacted for works relating to the development, including overall or master plan, of which the application is part, this should be clearly stated.

EIS that are accepted may still be issued with comments that will require response from the consultant and/or proponent. EIS that are conditionally accepted may require resubmission of sections, data, components, imagery, or formatting that do not fulfil the requirements of the Terms of Reference; these resubmissions shall be resubmitted not piecemeal but as parts of a completely revised EIS.

NOTE CONSULTANTS ARE TO ADDRESS ANY APPLICAIBLE SECTION OF 3.0 (LEGISTATIVE AND REGULATIVE CONTEXT) AS IT RELATES TO YOUR ASSIGNED SECTIONS.

DRAFT

Smith Warner International – Coastal Engineers	JSS Consulting Janeen Bullard – Marine	Grey Braun – Sustainable Ecosystems International	EnvironmentAll – Hydrogeologist	Caribbean Environmental Design Associates (CEDA) – Project Coordinator
Required EIA Components of the EIA 1. Introduction and Overview 1.2 Non-technical summary (Including aims, objectives, and scoping). 1.4 Aims and objectives of the assessment. 1.5 Overview of areas/topics to be addressed in this EIA (present the results of scoping exercis	Required EIA Components of the EIA 1. Introduction and Overview 1.2 non-technical summary (including aims, objectives, and scoping). 1.4 Aims and objectives of the assessment. 1.5 Overview of the areas/topics to be addressed in this EIA (present the results of scoping exercise). 1.6 Impact Assessment methods/analyses. **2.Baseline Studies** 2.2.1 Inclusion of history on the ponds	Required EIA Components of the EIA 1. Introduction and Overview 1.2 Non-technical summary (including aims, objectives and scoping) 1.4 Aims and objectives of the assessment. 1.5 Overview of the areas/topics to be addressed in this EIA (present the results of scoping exercise). 1.6Impact Assessment methods/analyses. **2 Baseline Studies** 2.2. Biological environmental baseline assessment	Required EIA Components of the EIA Introduction and Overview 1.2 Non-technical summary (including aims, objectives and scoping). 1.4 Aims and objectives of the assessment. 4. Impact Assessment methods/analyses 1.5 Overview of the areas/topics to be addressed in this EIA (present the results of scoping exercise). 1.6Impact Assessment methods/analyses. **2.Baseline Studies** 2.2 Biological	Required EIA Components of the EIA 1 Introduction and Overview 1.2 Non-technical summary (including aims, objectives and scoping) 1.3 A brief description of the proposed development and its relationship with other development in the area; including adjacent development in the geographic area. 1.4 Aims and objectives of the assessment. 1.5 Overview of the areas/topics to be addressed in this EIA (present the results of scoping exercise). 1.6 Impact Assessment methods/analyses. **2.Baseline Studies**

DRAFT

e). 1.6 Impact Assessment methods/analyses **2. Baseline Studies** 2.2 Biological environmental baseline assessment 2.3.2 Bathymetry for site shoreline, any other underwater areas conceivably affected by the project, extending at least 500 meters from the coast and within the entire footprint of proposed project. 2.3.4 Hydrology. 2.3.5 Sediment analyses, including grain size (beach) and testing for contaminants (if any).	and borrows pits and their current function as recovered wetlands and dunes. 2.2 Biological environmental baseline assessment 2.2.2 Baseline marine environment (including the coast, iron-shore, beach and seaward) – to include a quantitative description of marine ecology, within all areas to be directly impacted by the project and a qualitative assessment of areas that may be indirectly impacted. Describe sargassum invasion in the area. Map the marine habitats in the area directly affected by the proposed development. The map should be geo-referenced. 2.2.2.1 Description and quantification of marine habitats	2.2.1 Baseline terrestrial environment (including areas that are cleared, bulldozed and disturbed/damaged) – to include a quantitative description of any terrestrial ecological assets (flora and fauna; habitats; rare, threatened, and endangered species) to be directly impacted by the project and a qualitative assessment of assets that may be indirectly impacted. 2.2.1.1 Description and quantification of habitats and ecosystems present. 2.2.1.2 Complete list and description of rare, threatened, and endangered species (as per IUCN Red Data List, CITES, and DECR lists) 2.2.1.3 Complete list of flora (plants) species and any identifiable fungi species present. This should include	environmental baseline assessment 2.3 Physical environmental baseline assessment to include topography, soil type, structure, geotechnical study, sediments, and profile: 2.3.1 Topography of the area. It is recommended to use drone-imagery and processed by professionals. 2.3.3 Geology (check previous EIA or nearby projects, if any, validate when necessary). 2.3.6 Climate and meteorology. Meteorological parameters within the area- at least for the last 10 years. 2.8 Other relevant parameters identified during the scoping exercise by the consultants. **4.Project Description and Construction and Operations and**	2.1 Historical overview of the site and existing development- use historical and current aerial maps (time-series visualization) and official TCI generated map (Block/Parcel). Describe the historical ownership and land-use of the proposed development, including the surrounding areas. 2.4 Baseline aesthetics – this should be supported by drone/UAV imagery plus ground photography and description/characterizations. 2.7 Social-economic: 2.7.1 Demographic. 2.7.2 Employment: labor & skills demand at construction and operation; local and foreign workers needed. 2.7.3 Safety/security concerns within the community. 2.7.4 Economic impact: short-term and long-term. 2.7.5 Others. 2.8 Other relevant parameters identified during the scoping exercise by the consultants. **3. Legislative and Regulative**

DRAFT

2.5 Baseline coastal processes and dynamics (this should be factored in the design of the project and maintenance/operation of the beach, if applicable): 2.5.1 Currents and tides 2.5.2 Sediment transport. 2.5.3 Erosion and accretion, as applicable. 2.5.4 Coastal dynamics. 2.6 Water quality from within the area to be directly impacted by the project (e.g. marina, nearshore areas)– parameters to include dissolved oxygen (mg/l), temperature (°C), salinity (ppt), pH, turbidity (NTU), total dissolved solids (mg/l), ammonia (as mgN/l), nitrate/nitrite (as mnN/l), nitrite (as	and ecosystems present, including accurate representations of seagrass beds. Map the marine habitats in the area directly affected by the proposed development. The map should be geo-referenced. 2.2.2.2.2 Complete list and description of rare, threatened, and endangered species (as per IUCN Red Data List, CITES, and DECR lists) 2.2.2.3 Complete list of all marine flora (plants including seagrass and macroalgae) present. 2.2.2.4 Complete	rare and near-endemic plant species likely to be present including Inagua silver thatch palm *Coccothrinax inaguensis*, Inagua wild-thyme *Euphorbia inaguaensis*, Bahama cocobey *Varronia bahamensis*, and purple mistletoe *Dendropemon cf. purpureus* as well as others. 2.2.1.5 Complete list of all reptile and amphibian species present. 2.2.1.8 Representative lists of invertebrates and fungi present. 2.2.1.9 In the case of presence of karst habitats, complete lists of cave biota, both terrestrial and aquatic, from qualified researchers.	**alternatives** **4.10.11 Emergency mitigation plan** 4.11.4 Issues raised in the public consultation (written and verbal/oral concerns). 4.11.5 Others **5. Impact Assessment.** 5.1 Impact identification. 5.2 Description of impact: 5.2.5 Water quality and noise pollution (Construction and operation).. 5.2.8 Ecosystem and economic analyses (may summarize above; valuation is needed) to determine the best use of the area. 5.3 Impact assessment. 5.4 Derivation of significance.	**Context** – to include a discussion of any aspects of law, regulation and/or policy relevant to the project, such as, but not limited to the following (including limits/ zones designated under any legislation, regulations, or policy relevant to the subject area): 3.1 TCI Development Plan/Master Plan. 3.2 Physical Planning Ordinance and subsidiary legislations. 3.3 TCI Development Manual. 3.4 TCI Building Code. 3.5 Coast Protection Ordinance and subsidiary legislations. 3.6 Mineral (Exploration and Exploitation) Ordinance and subsidiary legislations. 3.7 Marine Pollution Ordinance and subsidiary legislation. 3.8 Fisheries Protection Ordinance and subsidiary legislations. 3.9 International treaties and conventions. 3.10 Other relevant laws and regulations.

DRAFT

mgN/l), total dissolved phosphorus (mg/l), total chlorophyll (µg/l), pheophytin (µg/l), active chlorophyll (µg/l) and total Coliform. Nutrient loads are to be tested to an ultra-low level. 2.7 Other relevant parameters identified during the scoping exercise by the consultants. **4. Project Description and Construction and Operation and alternatives** 4.2 Project Justification – ecological, etc. 4.3 How the proposed project will affect erosion or accretion? 4.4 Describe the coastal engineering plans, including modeling of how these plans (for example engineering	list of all coral species present, including soft corals. 2.2.2.5 Complete list of all seabird species present. 2.2.2.6 Complete list of all marine reptile species present. 2.2.2.7 Complete list of all fish species present. 2.2.2.8 Complete list of all marine mammal species present. 2.2.2.9 Representative list of marine invertebrate species (other than	All above categories 2.2.1.1 – 2.2.1.9 shall be supplemented with descriptions of dates, times, and durations when surveys were taken. 2.7 Other relevant parameters identified during the scoping exercise by the consultants. 2.8 Other relevant parameters identified during the scoping exercise by the consultants. **4.Project Description and Construction and Operations and alternatives** This section will outline a detailed description of the proposed project and possible alternatives to be considered, and will include the following:	**6. . Mitigation and Monitoring** 6.1 Proposed actions and schedule to mitigate against any environmental impact (including proposed monitoring activities). 6.1.2 Impact to water quality. 6.8 Financial resources for mitigation. 6.9 Environmental monitoring and financial requirements. 6.10 Public Consultation/social listening/monitoring. **6.11 An Environmental Management Plan (EMP)** must be prepared with the following minimum components: 6.11.1 Summary of the potential impacts of the proposal. 6.11.2 Description of the recommended mitigation measures.	This section shall point out the section of the laws that are permissible or otherwise with this proposed development. **4 Project Description and Construction and Operation and alternatives** 4.1 Description of the proposed project/components. 4.2 Project justification- socio-economic justifications, other justifications. 4.5 Solid waste management during construction and operation. 4.9 Traffic flow and safety (marine, coastal). 4.8 Water and electrical demand and source (construction and operations). 4.10 Construction phase activities: 4.10.1 Construction methods and program, including phasing of the development. 4.10.2 Site security and hoarding. 4.10.3 Storage of materials and equipment (including soil and excavated (dry) materials).

DRAFT

structures) will affect the flow of currents and transport 4.5 Coastal/beach development and management including beach access. 4.6 Source and quality of beach sand, fill and other materials to be used for coastal structures and terraforming, if applicable. 4.12.3 Sources of sand for beach nourishment. 4.12.4 Sources of work for coastal works. 4.12.9 How the minerals (sand) are placed and spread 4.12.9 How the new sand will be protected from erosion during swells? 4.12.14 Emergency mitigation plan.	corals) present. 2.2.2.10 Description sargassum situation in the area. All above categories 2.2.2.1 – 2.2.1.10 shall be supplemented with descriptions of dates, times, and durations when surveys were taken. 2.8 Other relevant parameters identified during the scoping exercise by the consultants. *4* Project Description and Construction and Operation and alternatives 4.2 Project Justification – ecological, etc. 4.5 Coastal/beach	4.2 Project Justification – ecological, etc. 4.11 Landscaping (initial phase and maintenance/operation). **4.12.14 Emergency Mitigation Plan** 4.13.4 Issues raised in the public consultation (written and verbal/oral concerns). 4.13.5 Others. 4.14 Impact to terrain including method of clearing of site and quantified description of natural vegetative cover to be removed, retention of natural vegetation cover, disposal of removed vegetation and soils, and statement of understanding of limitations of wholesale land clearance as per Development Manual and Planning legislation and regulations.	6.11.3 Statement of their compliance with relevant standards. 6.11.4 Allocation of resources and responsibilities for plan implementation. 6.11.5 Schedule of the actions to be taken. 6.11.6Programme for surveillance, monitoring and auditing. 6.11.7 Contingency plan when impacts are greater than expected. The EMP Environmental management plan (EMP) for pre-, during- and postconstruction phases (contents may be modified, as applicable). 7.Recommendations and Conclusions 8.Statement of	4.10.5 Temporary sanitary facilities. 4.10.6 Access and staging. 4.10.7 Solid waste management- those generated during construction, if any. 4.10.8 Liquid waste management, including control of runoff- those generated during construction, if any. 4.10.9 Control of air, dust, water and noise pollution (generated by the project/heavy equipment, if any). 4.10.10 Control/storage of fuels and other dangerous substances, if any. **4.10.11 Emergency mitigation plan.** 4.11 Social-economic: 4.11.1 Demographic. 4.11.2 Employment – labor & skills demand at construction and operation; availability of local workforce and need for foreign workers. 4.11.3 Safety/security concerns within the community (construction and operation).

DRAFT

4.15 Potential Alternatives. **5.0 Impact Assessment.** 5.1 Impact identification. 5.2 Description of impact: 5.2.2 Potential impact to coastal environment and processes (beach creation, beach nourishment, etc.). In the case of coastal works, for 500 meters along coast in each direction from the limits of project site; with additional requirement for 5km in both directions for any site on the northern coast of Providenciales or western coast of Grand Turk. 5.2.8 Ecosystem and economic analyses (may summarize above; valuation is needed) to determine the best use of the	development and management including beach access. 4.9 Traffic flow and safety (marine, coastal). 4.12.6 Beach traffic impact and safety. 4.12.14 Emergency mitigation plan. 4.13.4 Issues raised in the public consultation (written and verbal/oral concerns). 4.13.5 Others **5. Impact Assessment.** 5.1 Impact identification 5.2 Description of impact: 5.2.1 Potential impacts to the biotic environment,	**5. Impact Assessment.** 5.1 Impact identification. 5.2 Description of impact: 5.2.1 Potential impacts to the biotic environment, including predicted direct and indirect impacts. 5.2.8 Ecosystem and economic analyses (may summarize above; valuation is needed) to determine the best use of the area. 5.3 Impact assessment. 5.4 Derivation of significance. **6. Mitigation and Monitoring** 6.1 Proposed actions and schedule to mitigate against any environmental impact (including proposed monitoring activities). 6.1.1 Impacts to terrestrial and marine life (displacement), specifically inclusive of	Understanding of Environment Charter (2001) and Climate Change Charter (2022) 8.1 Statement of Understanding of terms of Environment Charter 2001 from proponent, with explanation of how this development approaches best practices towards the protection of biodiversity and the environment as noted in the Charter. 8.2 Statement of Understanding of terms of Climate Change Charter 2022 from proponent, with explanation of how this development approaches best practices toward mitigation, adaptation, and resilience to climate change as noted in the Charter. 8.3 Proponent's Declaration of Intent to guide the development by the recommendations of the EIA consultant, with updated Declaration following response to public or TCIG	4.11.4 Issues raised in the public consultation (written and verbal/oral concerns). 4.11.5 Others. 4.13 Potential Alternatives. **5. Impact Assessment.** 5.1 Impact identification. 5.2 Description of impact 5.2.4 Potential impacts to the aesthetic and other built environment. 5.2.6 Ecosystem and economic analyses (may summarize above ; valuation is needed) to determine the best use of the area. 5.2.7 Socio-economic impact – Socio-economic and cultural baseline (including labor, tourism, public infrastructure, crime, etc., Predicted impacts (positive and negative- influx of population/ workers, safe & security) to the above baseline, Identification and involvement of stakeholder groups: 5.2.7.1 Public beach access – considering that the beach is public in TCI.

DRAFT

area. 5.3 Impact assessment. 5.4 Derivation of significance. Note: Use computer modelling, as appropriate, for wind-wave prediction, wave energy dissipation, waves and currents and sediment transport, shoreline changes, etc. Particular attention should be given to the sensitivity and vulnerability of important geomorphological features and processes; how these are likely to respond to particular impact, regardless of whether the effects are temporary, long-term, reversible or permanent. The potential cumulative impacts of and to other project components and nearby developments (as applicable) must be noted and	including predicted direct and indirect impacts coastal, and marine assets. 5.2.3 Potential impact of added lighting, including impacts on marine life (specifically, sea turtle nesting), bird life (especially migratory birds), and others. 5.2.4 Potential impact to any species identified as endemic, near-endemic, rare, threatened, or endangered (by either IUCN or CITES listing), and any species uniquely dependent on the site for vital life-cycle phases (e.g. bats in caves, bird nesting, turtle nesting).	the wetlands and dune areas; and of the adjacent seagrass beds. 6.1.3 Impacts of incursion of invasive species of flora and fauna. 6.1.4 Impacts to resettled wildlife (e.g. bird nesting causing hazards to property or people). 6.4 Building around, or rescue and removal of rare, threatened, and endangered species of plants where possible. 6.5 Landscaping/ replanting plan utilizing native species. 6.8 Financial resources for mitigation. 6.9 Environmental monitoring and financial requirements 6.10 Public Consultation/social listening/monitoring	commentary requesting or requiring alterations to any part of the EIA.	5.2.7.2 Potential impact to neighboring developments, businesses and residential houses. 5.2.7.3 Other Impacts. 5.3 Impact assessment. 5.4 Derivation of significance. ***6.0* Mitigation and Monitoring** 6.1 Proposed actions and schedule to mitigate against any environmental impact (including proposed monitoring activities). 6.8 Financial resources for mitigation. 6.9 Environmental monitoring and financial requirements. 6.10 Public Consultation/social listening/monitoring. **6.11** An **Environmental Management Plan (EMP)** must be prepared with the following minimum components : 6.11.1 Summary of the potential impacts of the proposal ; 6.11.2 Description of the recommended mitigation measures ;

addressed. **6. Mitigation and Monitoring** 6.1 Proposed actions and schedule to mitigate against any environmental impact (including proposed monitoring activities). 6.3 Storm surge analysis and mitigation plan for sea level rises. 6.5 Financial resources for mitigation. 6.6 Proposed techmiques and models to mitigate against light pollution, including impacts on nesting sea turtles and migratory birds. 6.7 Proposed Climate Change mitigation both locally within the TCI and globally. 6.7 Public Consultation/social listening/monitoring.	5.2.8 Ecosystem and economic analyses (may summarize above; valuation is needed) to determine the best use of the area. 5.3 Impact assessment. 5.4 Derivation of significance. **6. Mitigation and Monitoring** 6.1 Proposed actions and schedule to mitigate against any environmental impact (including proposed monitoring activities). 6.1.1 Impacts to terrestrial and marine life (displacement), specifically inclusive of the wetlands and dune areas; and of the	**6.11 An Environmental Management Plan (EMP)** must be prepared with the following minimum components: 6.8.1 Summary of the potential impacts of the proposal. 6.8.2 Description of the recommended mitigation measures. 6.8.3 Statement of their compliance with relevant standards. 6.8.4 Allocation of resources and responsibilities for plan implementation. 6.8.5 Schedule of the actions to be taken; 6.8.6 Programme for surveillance, monitoring and auditing; and 6.8.7 Contingency plan when		6.11.3 Statement of their compliance with relevant standards ; 6.11.4 Allocation of resources and responsibilities for plan implementation. 6.11.5 Schedule of the actions to be taken. 6.11.6 Programme for surveillance, monitoring and auditing. 6.11.7 Contingency plan when impacts are greater than expected. **7 . Recommendations and Conclusions.** **8.0 Statement of Understanding EIA recommendations –** 8.1 Statement of Understanding of terms of Environment Charter 2001 from proponent, with explanation of how this development approaches best practices towards the protection of biodiversity and the environment as noted in the Charter. 8.2 Statement of Understanding of terms of Climate Change Charter

DRAFT

	adjacent seagrass beds. 6.1.3 Impacts of incursion of invasive species of flora and fauna. 6.1.4 Impacts to resettled wildlife (e.g. bird nesting causing hazards to property or people). 6.4 Building around, or rescue and removal of rare, threatened, and endangered species of plants where possible. 6.5 Landscaping/ replanting plan utilizing native species (list species). 6.6 Proposed techniques and models to mitigate against light	impacts are greater than expected. The EMP Environmental management plan (EMP) for pre-, during- and postconstruction phases (contents may be modified, as applicable). **7** Recommendations and Conclusions *8. Statement of Understanding of Environment Charter (2001) and Climate Change Charter (2022*		2022 from proponent, with explanation of how this development approaches best practices toward mitigation, adaptation, and resilience to climate change as noted in the Charter. 8.3 Proponent's Declaration of Intent to guide the development by the recommendations of the EIA consultant, with updated Declaration following response to public or TCIG commentary requesting or requiring alterations to any part of the EIA.

DRAFT

	pollution, including impacts on nesting sea turtles and migratory birds. 6.8 Financial resources for mitigation. 6.9 Environmental monitoring and financial requirements. 6.10 Public Consultation/social listening/monitoring. **6.11 An Environmental Management Plan (EMP)** must be prepared with the following minimum components: 6.11.1 Summary of the potential impacts of the proposal. 6.11.2 Description of the recommended mitigation measures. 6.11.3 Statement of their compliance with relevant			

DRAFT

	standards. 6.11.4 Allocation of resources and responsibilities for plan implementation. 6.11.5 Schedule of the actions to be taken. 6.11.6 Programme for surveillance, monitoring and auditing; and Contingency plan when impacts are greater than expected. The EMP Environmental management plan (EMP) for pre-, during- and postconstruction phases (contents may be modified, as applicable). **7.Recommendations and Conclusions**			

DRAFT

	8.0 Statement of Understanding of Environment Charter (2001) and Climate Change Charter (2022) 8.1 Statement of Understanding of terms of Environment Charter 2001 from proponent, with explanation of how this development approaches best practices towards the protection of biodiversity and the environment as noted in the Charter. 8.2 Statement of Understanding of terms of Climate Change Charter 2022 from proponent, with explanation of how this development approaches best practices toward mitigation, adaptation, and resilience to climate change as noted in the Charter.			

DRAFT

	8.3 Proponent's Declaration of Intent to guide the development by the recommendations of the EIA consultant, with updated Declaration following response to public or TCIG commentary requesting or requiring alterations to any part of the EIA. **Public Consultation Meeting**			
6.8 Financial resources for mitigation. 6.9 Environmental monitoring and financial requirements. 6.10 Public Consultation/Social listening/monitoring.		8.1 Statement of Understanding of terms of Environment Charter 2001 from proponent, with explanation of how this development approaches best practices towards the protection of biodiversity and the environment as noted in the Charter. 8.2 Statement of		

DRAFT

		Understanding of terms of Climate Change Charter 2022 from proponent, with explanation of how this development approaches best practices toward mitigation, adaptation, and resilience to climate change as noted in the Charter. 8.3 Proponent's Declaration of Intent to guide the development by the recommendations of the EIA consultant, with updated Declaration following response to public or TCIG commentary requesting or requiring alterations to any part of the EIA.		
6.11 An Environmental Management Plan (EMP) must be prepared with the				.

DRAFT

following minimum components: 6.11.1 Summary of the potential impacts of the proposal; 6.11.2 Description of the recommended mitigation measures; 6.11.3 Statement of their compliance with relevant standards; 6.11.4 Allocation of resources and responsibilities for plan implementation; 6.11.5 Schedule of the actions to be taken; 6.11.6 Programme for surveillance, monitoring and auditing; and Contingency plan when impacts are greater than expected.			.:	

DRAFT

The EMP Environmental management plan (EMP) for pre-, during- and postconstruction phases (contents may be modified, as applicable). **7.Recommendations and Conclusions** 8.0 **Statement of Understanding of Environment Charter (2001) and Climate Change Charter (2022)** 8.1 Statement of Understanding of terms of Environment Charter 2001 from proponent, with explanation of how this development				

DRAFT

approaches best practices towards the protection of biodiversity and the environment as noted in the Charter. 8.2 Statement of Understanding of terms of Climate Change Charter 2022 from proponent, with explanation of how this development approaches best practices toward mitigation, adaptation, and resilience to climate change as noted in the Charter. 8.3 Proponent's Declaration of Intent to guide the development by the recommendations of the EIA consultant, with updated Declaration				

DRAFT

following response to public or TCIG commentary requesting or requiring alterations to any part of the EIA.				
Public Consultation Meeting	**Public Consultation Meeting**	**Public Consultation Meeting**	**Public Consultation Meeting**	**Public Consultation Meeting**

DRAFT

Appendices

To include the qualifications of the team of experts and the special requirements and information needed to form the team to conduct the EIA for this project.

1. The Terms of Reference (TOR) for the EIA as issued by DoP, TCIG.

2. Qualifications of the EIA team of experts and the special requirements and information needed to form the team to conduct the EIA for this project. Contact information (functional phone numbers and email addresses) must be provided. Curricula vitae and résumés should be relevantly abridged to **no more than two pages for each consultant**.

3. Government Permits (e.g. work permit, research permit, etc, if required).

4. Site Plan, project plans, architectural drawings and other related documents.

5. Portable data format (pdf) file of the reports of independent consultants involved in the EIA.

6. Scientific analyses reports (pdf copy from laboratory that analyzed the samples, and the like), if any.

7. Standards or protocols and assumptions used in predicting the environmental impacts.

8. Public Consultative Meeting and Stakeholders meeting reports. Include evidence of advertisement for Public Consultative Meetings, the names and contact information for those who attended the meetings, issues raised and conclusions.

9. Photo documentations (with captions – dates, place, description of the subject for the photo).

10. Certification/legal document from EIA group/company that submits the EIS, that all submitted reports/documents and etc. as part of the EIA report/EIS were first-hand information and if taken from secondary sources, the authors should be properly acknowledged or compensated.

DRAFT

NB: The EIA Report must be submitted as digital files; with all images and sections in proper, upright orientation; and with all sections [including text within images] clear and readable; in addition to the number of printed copies required by DoP.

Checklist of items for EIS	
Cover/ reference page as described in 1.1	
All images and sections in upright orientation, clear and readable	
Maps oriented conventionally, north-up	
Saved in manner to allow for text copying and comments to be inserted	
All sections in ToR addressed by EIS	
All appendices attached (may be in separate files) as described in 9	

DRAFT

9.7 Appendix G – Certification/Legal Document from EIA consulting Team.

CARIBBEAN ENVIRONMENTAL DESIGN ASSOCIATES
Architects, Planners & Property Appraisers
Grand Turk, Turks and Caicos Islands
649-231-0371 – email Oswaldwilliams51@gmail.com

Certification/Legal Document from the EIA Consulting Team

For The Romanza on Grace Bay Townhouses and Condominium Development

EIA Study

Certification/legal document from the EIA group/company that submits the EIS Report for the Romanza on Grace Bay Townhouses and condominium project, that all the submitted reports/documents and etc as part of the EIA report/EIS were first-hand information and if taken from secondary sources, the authors should be properly acknowledged or compensated.

TO WHOM IT CONCERN

The EIA consulting team, authors of The Environment Impact Assessment Study for the Romanza on Grace Bay Townhouses and Condominium development, hereby certify that to the best of their knowledge, the contents, including text, illustrations, and graphics of the EIS report for the Romanza on Grace Bay Townhouses and Condominium project are for the most part first-hand information and that in cases where secondary sources were quoted or referenced, the authors were properly acknowledged.

This 6th. Day of February 2025, Oswald R. Williams for and on behalf of the said EIA consulting team.

DRAFT

9.8 Appendix H – Turks and Caicos Endemic Flora List

Department of Environment and Coastal Resources (DECR)
Ministry of Tourism, Environment, Heritage and Culture (MTEHC)
Turks and Caicos Islands Government (TCIG)
Providenciales, Turks and Caicos Islands

The following flora and fauna are protected species because they are endemic, rare and endangered.

THE SCHEDULES

I. Protected Flora & Fungi

A. Turks & Caicos Endemic Plants

1. Turks & Caicos heather *Limonium bahamense*
2. Lucayan pear *Opuntia x lucayana*
3. Britton's buttonbush *Spermacoce brittonii*
4. Capillary buttonbush *Spermacoce capillaries*
5. Stipitate dog-strangle *Metastelma stipitatum*
6. Slender-stemmed peppergrass *Lepidium filicaule*
7. Caicos Encyclia orchid *Encyclia caicensis*
8. Caroline's pink *Stenandrium carolinae*
9. Silvery silverbush *Argythamnia argentea*
10. Broom bush *Evolvulus bahamensis*
11. Hatpin sedge *Eleocharis bahamensis*

B. Endemic and vital species of fungi

1. Ectomychrrhizal species in the genera *Neoboletus, Octaviana, Diplocystis, Melanogaster, Sebacinaceae, Tomentella, Thelophora, Thelophoraceae, Entoloba*, and *Inocybe*
2. Pine truffle *Rhizopogon floscorubens*
3. *Russula littoralis*
4. *Scleroderma bermudense* and other ectomycorrhizal *Scleroderma*
5. *Sullus cothurnatus*
6. *Amanita arenicola*

C. Lucayan Archipelago Endemic Plants

1. Haulbark *Thouinia discolor*
2. Inagua Encyclia orchid *Encyclia inaguensis*
3. Correll's rock orchid *Encyclia correllii* (*ex Encyclia gracilis*)
4. Rufous Encyclia *Encyclia rufa*
5. Inagua gum-elemi *Bursera inaguensis*
6. Frenning's gum-elemi *Bursera frenningae*
7. Sea sage *Lantana involucrata*
8. Inagua silver-top palm *Coccothrinax inaguensis*
9. Nakedback *Euphorbia gymnonota*

Department of Environment & Coastal Resources
Turks and Caicos Islands

TCI protected species/page1 of 10 pages

A - 1



Department of Environment and Coastal Resources (DECR)
Ministry of Tourism, Environment, Heritage and Culture (MTEHC)
Turks and Caicos Islands Government (TCIG)
Providenciales, Turks and Caicos Islands



10. Wild thyme *Euphorbia inaguensis*
11. Inagua century plant *Agave inaguensis*
12. Lucayan century plant *Agave millspaughii*
13. Bahama love grass *Eragrostis bahamensis*
14. Nash's pepperwort *Marsilea nashii*
15. Inagua fimbry sedge *Fimbristylis inaguensis*
16. Caicos pine *Pinus caribaea* var. *bahamensis*
17. Brasiletto *Caesalpinia reticulata*
18. Pineyard golden creeper *Ernodea serratifolia*
19. Low ashy heliptrope *Heliotropium nanum*
20. Thyme-leaved buttonbush *Spermacoce thymifolia*
21. Lucayan lobelia *Lobelia lucayana*
22. Lucayan cocobey *Varronia lucayana*
23. Bahama cocobey *Varronia bahamensis*
24. Lucayan silverbush *Argythamnia lucayana*
25. Yellow silverbush *Argythamnia sericea*
26. Bumbo-bush *Lepidaploa arbuscula*
27. False holly *Anastraphia paucifloscula*
28. Lucayan boneset *Chromalaena lucayana*
29. Rong-bush *Wedelia bahamensis*
30. Heliotrope *Heliotropium diffusum*
31. Nash's heliotrope *Heliotropium nashii*
32. Wilson's pinweed spurge *Euphorbia lecheoides*
33. Bahama milkpea *Galactia bahamensis*
34. Swamp-bush *Pavonia bahamensis*
35. Correll's spider-grass *Aristida correlliae*
36. Catesby's lily-thorn *Catesbaea foliosa*
37. Winder *Clematis plukenetii*
38. Golden creeper *Ernodea millspaughii*
39. Savanna buttonbush *Spermacoce savannarum*
40. Big sage *Lantana balsamifera*
41. Horse pear *Consolea nashii*

D. Native Plants of Special Conservation Concern

1. Tall Encyclia orchid *Encyclia altissima*
2. Britton's shadow-witch orchid *Ponthieva brittonae*
3. Adder's mouth orchid *Malaxis spicata*
4. Spring ladies tresses *Spiranthes vernalis*
5. Green ladies tresses *Spiranthes polyantha*
6. Cuban dune mat *Guilleminea brittonii*
7. Woolly nipple cactus *Mammillaria nivosa*
8. Smooth pear *Opuntia bahamana*
9. Dildo cactus *Pilosocereus royenii*

TCI protected species/page2 of 10 pages

10. West Indian mahogany *Swietenia mahagoni*
11. Holy lignum vitae *Guaiacum sanctum*
12. True lignum vitae *Guiaiacum officinale*
13. Mauby *Colubrina elliptica*
14. Brook's cereus *Harrisia brookii*
15. Monkey-fiddle *Euphorbia tithymaloides* var. *bahamensis*
16. Pork-and-doughboy *Acacia acuifera*
17. Leatherleaf casha *Acacia coriophylla*
18. Bahama savia *Savia bahamensis*
19. Brasiletto *Caesalpinia bahamensis*
20. Bloody powderpuff *Calliandra haematomma*
21. Popcorn *Chamaecrista caribaea*
22. Mistletoe *Dendropemon purpureus*
23. Wild hibiscus *Hibiscus clypeatus*
24. Taylor's jujube *Ziziphus taylori*
25. Bahama buttonbush *Spermacoce bahamensis*
26. Mahogany mistletoe *Phoradendron northropiae*
27. Pineyard rat-tail bush *Stachytarpheta fruticosa*

II. Protected Fauna

A. Turks & Caicos Endemic Fauna

1. Turks & Caicos rock iguana *Cyclura carinata*
2. Caicos pygmy trope boa *Tropidophis greenwayi (T. g. greenwayi & T. g. lathanus)*
3. Caicos barking gecko *Aristelliger hechti*
4. Turks snake-doctor *Spondylurus turksae*
5. Caicos snake-doctor *Spondylurus caicosae*
6. Turks dwarf gecko *Sphaerodactylus underwoodi*
7. Caicos dwarf gecko *Sphaerodactylus caicosensis*
8. Dwarf Greater Antillean bullfinch *Loxigilla violacea ofella*
9. Turks & Caicos thick-billed vireo *Vireo crassirostris stalagmium*
10. Cave crustacean *Deevaya spiralis*
11. Cave crustacean *Speonebilia cannoni*
12. Cave crustacean *Bahadzia stocki*
13. Cave crustacean *Lasionectes entrichoma*
14. Cave crustacean *Erebonectoides macrochaetus*
15. Cave crustacean *Fosshagenia ferrarii*
16. Cave crustacean *Pelagomacellicephala iliffei*
17. Cave crustacean *Kaloketos pilosus*
18. Cave crustacean *Godzillius robustus*
19. Cave crustacean *Bahalana caicosana*
20. Cave crustacean *Spelaeonicippe provo*



Department of Environment and Coastal Resources (DECR)
Ministry of Tourism, Environment, Heritage and Culture (MTEHC)
Turks and Caicos Islands Government (TCIG)
Providenciales, Turks and Caicos Islands



B. Protected Birds. List of Turks & Caicos Islands Native, Migratory, and Regionally Vagrant Bird Species.

Flamingos (Phoenicopteriformes)
1. Caribbean Flamingo *Phoenicopterus ruber*

Tropicbirds (Phaethontiformes)
2. White Tailed Tropicbird *Phaethon lepturus*

Petrels (Procellariiformes)
3. Herald petrel *Pterodroma arminjoniana*
4. Black-capped petrel *Pterodroma hasitata*
5. Audubon's shearwater *Puffinus lherminieri*
6. Cory's shearwater *Calonectris borealis*
7. Pelicans, Cormorants, Herons Pelecaniformes
8. Brown pelican *Pelecanus occidentalus*
9. Brown Booby *Sula leucogaster*
10. Masked booby *Sula dactylatra*
11. Northern gannet *Morus bassanus*
12. Red-footed booby *Sula sula*
13. Double Crested Cormorant *Phalacrocorax auritus*
14. Olivaceous Cormorant *Phalacrocorax olivaceus*
15. Magnificent Frigatebird *Fregata magnificens*
16. Great Blue Heron *Ardea herodias*
17. Great Egret *Casmerodius albus*
18. Snowy Egret *Egretta thula*
19. Little Blue Heron *Egretta caerulea*
20. Tricolored Heron *Egretta tricolor*
21. Reddish Egret *Egretta rufescens*
22. Cattle Egret *Bubulcus ibis*
23. Green Heron *Butorides virescens*
24. Black Crowned Night Heron *Nycticorax nycticorax*
25. Yellow Crowned Night Heron *Nyctanassa* violacea
26. American Bittern *Botaurus lentiginosus*
27. Glossy Ibis *Plegadis falcinellus*
28. White ibis *Eudocimus* albus
29. Roseate Spoonbill *Ajaia ajaja*

Rails and Cranes (Gruiformes)
30. Clapper Rail *Rallus longirostris*
31. King rail *Rallus elegans*
32. Sora Rail *Porzana carolina*
33. Purple gallinule *Porphyrio martinicus*
34. Common gallinule *Gallinula galeata*
35. American coot *Fulica americana*
36. Caribbean coot *Fulica caribaea*
37. Sandhill crane *Grus canadensis*

Department of Environment & Coastal Resources Turks & Caicos Islands



Department of Environment and Coastal Resources (DECR)
Ministry of Tourism, Environment, Heritage and Culture (MTEHC)
Turks and Caicos Islands Government (TCIG)
Providenciales, Turks and Caicos Islands



38. Limpkin *Aramus guarauna*

Geese, Swans and Ducks (Anseriformes)

39. West Indian Whistling Duck *Dendrocygna arborea*
40. Fulvous whistling duck *Dendrocygna bicolor*
41. Green Winged Teal *Anas crecca*
42. White-cheeked Pintail *Anas bahamensis*
43. Blue-winged Teal *Anas discors*
44. Ruddy Duck *Oxyura jamaicensis*
45. Least Grebe *Tachybaptus dominicus*
46. Pied-billed Grebe *Podilymbus podiceps*
47. Greater Scaup *Aythya marila*
48. Lesser scaup *Aythya affinis*
49. Ring-necked duck *Aythya collaris*
50. Hooded merganser *Lophodytes cucullatus*
51. Common merganser *Mergus merganser*
52. Red-breasted merganser *Mergus serrator*
53. Canada goose *Branta canadensis*
54. Masked Duck *Nomonyx dominicus*
55. Redhead *Aythya americana*
56. Northern shoveler *Spatula clypeata*
57. Gadwall *Mareca strepera*
58. American wigeon *Mareca americana*
59. Mallard *Anas platyrhynchos* (excludes domestic breeds)
60. American black duck *Anas rubripes*
61. Northern pintail *Anas acuta*
62. Shorebirds *Charadriiformes*
63. American Oystercatcher *Haemotopus palliatus*
64. Black-necked Stilt *Himantopus mexicanus*
65. American Avocet *Recurvirostra americana*
66. Lesser Golden Plover *Pluvialis dominica*
67. Grey plover *Pluvialus squatarola*
68. Semipalmated Plover *Charadrius semipalmatus*
69. Wilson's Plover *Charadrius wilsonia*
70. Killdeer *Charadrius vociferus*
71. Snowy Plover *Charadrius alexandrinus*
72. Piping Plover *Charadrius melodus*
73. Black-bellied Plover *Pluvialis squatarola*
74. Upland Sandpiper *Bartyramia longicauda*
75. Whimbrel *Numenius phaeopus*
76. Hudsonian Godwit *Limosa haemastica*
77. Ruddy Turnstone *Arenaria interpres*
78. Red Knot *Calidris canutus*
79. Stilt Sandpiper *Calidris himantopus*
80. Sanderling *Calidris alba*

81. Dunlin *Calidris alpina*
82. Least Sandpiper *Calidris minutilla*
83. White-rumped Sandpiper *Calidris fuscicollis*
84. Pectoral Sandpiper *Calidris melanotos*
85. Semipalmated Sandpiper *Calidris pusilla*
86. Western Sandpiper *Calidris mauri*
87. Short-billed Dowitcher *Limnodromus griseus*
88. Wilson's snipe *Gallinago delicata*
89. Common Snipe *Gallinago gallinago*
90. Spotted Sandpiper *Actitus macularia*
91. Solitary Sandpiper *Tringa solitaria*
92. Willet *Catoptrophorus semipalmatus*
93. Greater Yellowlegs *Tringa melanoleuca*
94. Lesser Yellowlegs *Tringa flavipes*
95. Wilson's phalarope *Steganopus tricolor*
96. Little auk*Alle alle*
97. Pomarine skua *Stercoriarus pomarinus*
98. Brown Noddy *Anous stolidus*
99. Black Skimmer *Rhynchops niger*
100. Bonaparte's gull *Chroicocephalus philadelphia*
101. Black-headed gull *Chroicocephalus ridibundus*
102. Laughing gull *Leucophaeus atricilla*
103. Ring-billed gull *Larus delawarensis*
104. Great black-backed gull *Larus marinus*
105. American herring gull *Larus smithsonianus*
106. Sooty Tern *Sterna fuscata*
107. Bridled Tern *Sterna anaethetus*
108. Least Tern *Sterna antillarum*
109. Gull-billed tern *Gelochelidon nilotica*
110. Caspian tern *Hydroprogne caspia*
111. Black tern *Chlidonius niger*
112. Roseate Tern *Sterna dougallii*
113. Common Tern *Sterna hirundo*
114. Forster's Tern *Sterna* forsteri
115. Sandwich Tern *Sterna sandvicencis*
116. Royal Tern *Sterna maximus*

Pigeons and doves (Columbiformes)

117. White Crowned Pigeon *Columba leucocephala*
118. White-winged Dove *Zenaida asiatica*
119. Zenaida Dove *Zenaida aurita*
120. Mourning Dove *Zenaida macroura*
121. Common Ground Dove *Columbina passerina*
122. Key West Quail Dove *Geotrygon chrysia*

Cuckoos (Cuculiformes)

123. Yellow-billed Cuckoo *Coccyzus americanus*
124. Mangrove Cuckoo *Coccyzus minor*
125. Smooth-billed Ani *Crotophaga ani*

Hawks (Accipitriformes)

126. Osprey *Pandion heliaetus*
127. Red-tailed hawk *Buteo jamaicensis*
128. Sharp-shinned hawk *Accipter striatus*
129. Northern harrier *Circus cyaneus*
130. Swallow-tailed kite *Elanoides forficatus*

Owls (Strigiformes)

131. Barn Owl *Tyto alba*
132. Short-eared Owl *Asio flammeus*

Nighthawks, swifts, hummingbirds (Caprimulgiformes)

133. Common Nighthawk *Chordeiles minor*
134. Antillean Nighthawk *Chordeiles gundlachii*
135. Chuck-will's- widow *Caprimulgus carolinensis*
136. Black Swift *Cypseloides niger*
137. Chimney Swift *Chaetura pelagica*
138. Antillean palm swift *Tachornis phoenicobia*
139. Lesser Antillean swift *Chaetura martinica*
140. Bahama Woodstar Hummingbird *Calliphlox evelynae*
141. Bee Hummingbird *Mellisuga helenae*
142. Cuban emerald hummingbird *Chlorostilbon ricordii*

Kingfishers (Coriaciiformes)

143. Belted Kingfisher *Ceryle alcyon*

Falcons (Falconiformes)

144. American kestrel *Falco sparverius*
145. Merlin *Falco columbarius*
146. Peregrine falcon *Falco peregrinus*

Woodpeckers (Piciformes)

147. Yellow Bellied Sapsucker *Sphyrapicus varius*
148. Hairy Woodpecker *Picoides villosus*

Perching birds (Passeriformes)

149. Purple Martin *Progne subis*
150. Sand martin *Riparia riparia*
151. Caribbean Martin *Progne dominicensis*
152. Bahama swallow *Tachycineta cyaneoviridis*
153. Tree Swallow *Tachycineta bicolor*
154. Cave swallow *Petrochelidon fulva*
155. Northern Rough- winged Swallow *Stelgidopteryx serripennis*
156. Bank Swallow *Riparia riparia*
157. Cliff Swalow *Hirundo pyrrhonota*
158. Barn Swallow *Hirundo rustica*
159. Eastern Wood Pewee *Contopus virens*



Department of Environment and Coastal Resources (DECR)
Ministry of Tourism, Environment, Heritage and Culture (MTEHC)
Turks and Caicos Islands Government (TCIG)
Providenciales, Turks and Caicos Islands



160. Greater Antillean Pewee *Contopus caribaeus*
161. Eastern Kingbird *Tyrannus tyrannus*
162. Gray Kingbird *Tyrannus dominicensis*
163. Giant kingbird (historical range) *Tyrannus cubensis*
164. La Sagra's flycatcher *Myriacrus sagrae*
165. Hispaniolan wood peewee *Contopus hispaniolensis*
166. Cedar waxwing *Bombycilla cedrorum*
167. Cuban Crow *Corvus nasicus*
168. Blue-gray Gnatcatcher *Polioptila caerulea*
169. Gray-cheeked Thrush *Catharus minimus*
170. American robin *Turdus migratorius*
171. Gray Catbird *Dumetella carolinensis*
172. Northern Mockingbird *Mimus polyglottus*
173. Bahama Mockingbird *Mimus gundlachii*
174. Pearly-eyed Thrasher *Margarops fuscatus*
175. Chipping sparrow *Spizella passerina*
176. White-crowned sparrow *Zonotrichia leucophrys*
177. Savannah sparrow *Passerculus sandwichensis*
178. White-eyed Vireo *Vireo griseus*
179. Thick-billed Vireo *Vireo crassirostris*
180. Yellow-throated Vireo *Vireo flavifrons*
181. Philadelphia Vireo *Vireo philadelphicus*
182. Red-eyed Vireo *Vireo olivaceus*
183. Black-whiskered Vireo *Vireo altiloquus*
184. Blue Winged Warbler *Vermivora pinus*
185. Tennessee Warbler *Vermivora peregrina*
186. Nashville Warbler *Vermivora ruficapilla*
187. Northern Parula Warbler *Parula americana*
188. Yellow Warbler *Dendroica petechia*
189. Chestnut-sided Warbler *Dendroica pensylvanica*
190. Magnolia Warbler *Dendroica magnolia*
191. Cape May Warbler *Dendroica tigrina*
192. Black-throated Blue Warbler *Dendroica caerulescens*
193. Yellow-rumped Warbler *Dendroica coronata*
194. Black-throated Green Warbler *Dendroica virens*
195. Blackburnian Warbler *Dendroica fusca*
196. Yellow-throated Warbler *Dendroica dominica*
197. Kirtland's Warbler *Dendroica kirtlandii*
198. Prairie Warbler *Dendroica discolor*
199. Palm Warbler *Dendroica palmarum*
200. Bay-breasted Warbler *Dendroica castanea*
201. Blackpoll Warbler *Dendroica striata*
202. Cerulean Warbler *Dendroica cerulea*
203. Black-and-white Warbler *Mniotilta varia*



Department of Environment and Coastal Resources (DECR)
Ministry of Tourism, Environment, Heritage and Culture (MTEHC)
Turks and Caicos Islands Government (TCIG)
Providenciales, Turks and Caicos Islands



204. American Redstart *Setophaga ruticilla*
205. Prothonotary Warbler *Protonotaria citrea*
206. Worm-eating Warbler *Helmitheros vermivorus*
207. Ovenbird *Seiurus aurocapillus*
208. Townsend's warbler *Stetophaga townsendi*
209. Northern Waterthrush *Seiurus noveboracensis*
210. Louisiana Waterthrush *Seiurus motacilla*
211. Kentucky Warbler *Oporomis formosus*
212. Connecticut Warbler *Oporomis agilis*
213. Mourning Warbler *Oporomis philadelphia*
214. Common Yellowthroat *Geothlypis trichas*
215. Hooded Warbler *Wilsonia citrina*
216. Green-tailed warbler *Microligea palustris*
217. Swainson's warbler *Limnothlypis swainsonii*
218. Bananaquit *Coereba flaveola*
219. Western spindalis *Spindalis zena*
220. Summer Tanager *Piranga rubra*
221. Scarlet Tanager *Piranga olivacea*
222. Rose Breasted Grosbeak *Pheucticus ludovicianis*
223. Blue Grosbeak *Guaraca caerulea*
224. Indigo Bunting *Passerina cyanea*
225. Painted Bunting *Passerina ciris*
226. Dickcissel *Spiza americana*
227. Black-faced Grassquit *Tiaris bicolor*
228. Greater Antillean Bullfinch *Loxigilla violacea ofella*
229. White-crowned Sparrow *Zonotrichia leucophrys*
230. Bobolink *Dolichonyx oryzivorus*
231. Brown-headed Cowbird *Molothrus ater*
232. Shiny cowbird *Molothrus bonariensis*
233. Northern Oriole *Icterus galbula*
234. Buff-bellied pipit *Anthus rubescens*

C. Protected Reptiles and Amphibians

1. Southern Bahamas rainbow boa *Chilabothrus chrysogaster*
2. Mayaguana dwarf gecko *Sphaerodactylus mariguanae*
3. Jamaican slider *Trachemys terrapen*†
4. Inagua slider *Trachemys stejnegeri*†

Department of Environment & Coastal Resources
Turks & Caicos Islands

5. Thread snake *Typhlops platycephalus?*
6. American crocodile *Crocodylus acutus*‡
7. Green turtle *Chelonia mydas*
8. Hawksbuill turtle *Eretmochelys imbricata*
9. Loggerhead turtle *Caretta caretta*

D. Protected Mammals

1. All bats; all species in order *Chiroptera*
2. All hutias; *Geocapromys* species
3. All whales, dolphins, and porpoises, all members of order *Cetacea*
4. West Indian manatee *Trichechus manatus*
5. All other marine mammals, including vagrant species

E. Protected Terrestrial Invertebrates

1. Turks Island leafwing
2. Drury's hairstreak
3. Cave shrimp *Typhlatya garciai*
4. Cave shrimp *Barbouria cubensis*

Department of Environment
& Coastal Resources
Turks & Caicos Islands

9.9 Appendix I – Hydrogeological Data

HYDROGEOLOGICAL DATA

Sample Calculation (Sieve Analysis of Fine Sand)				
ASTM E-11 Sieve Size (mm)	Weight Retained (kg)	%. Weight Retained	Cumulative % Weight Retained	Cumulative % Weight Passing
1.8	0	0	0	100
1	0.1	10	8	90
0.6	0.85	85	94	6
0.3	0.02	2	95	5
0.15	0	0	0	0
0.075	0	0	0	0
Pan	0	0	0	0
				201
				2.01

ASTM E-11 Sieve Size (mm)	Cumulative % Weight Passing
1.8	100
1	90
0.6	6
0.3	5
0.15	0
0.075	0
Pan	0

D60	0.85714286
D30	0.71428571
D10	0.61904762

C_u =	1.38461538	value must be 4 to 6 to be well graded < 4 means uniformly graded
Cc =	0.36848073	Value must be between 1 and 3 to be well graded

DRAFT

Test Pit Data
Depth vs. Salinity Profiles

Test Pit	GPS Coordinates		Lithology	Water Level (ft)	Depth (ft)	Salinity (ppm Cl-)
1	21°48'24"N	72°09'52W	Limestone	3.67	5	380
					6	380
					7	420
					8	460
					9	560
					10	560
					11.5	580
2	21°48'28"N	72°09'56W	Limestone	3.25	4	330
					5	330
					6	360
					7	410
					8	480
					9	480
					10	540
					11.0	540

DRAFT

DRAFT

9.10 Appendix J – GPS points along the transect.

	Start				End				Habitat Description	Species	Amount	Observations
Transect	Waypoint	Latitude	Longitude	Time	Waypoint	Latitude	Longitude	Time				
1	T1 Start	21°48.732'N	72° 10.214'W	15:17	T1 End	21°48.573'N	72°10.283'W	15:40				
	1	21°48.732'N	72°10.217'W	15:17					Bare Sand			
	2	21°48.719'N	72°10.227'W	15:19					Bare Sand with sparse macroalgae (sargassum)			
	3	21°48.713'N	72°10.231'W	15:21					Bare Sand with sparse macroalgae (sargassum)			
	4	21°48.694'N	72°10.242'W	15:24					Bare sand with rubble and macroalgae	Jointed stalk algae, sargassum		
	5	21°48.695'N	72°10.235'W	15:27					Patch of turtle grass			
	6	21°48.687'N	72°10.236'W	15:28					Patch of turtle grass	Black Ball Sponge	2	
	7	21°48.683'N	72°10.234'W	15:28					Patch of turtle grass	Black Ball Sponge	1	
	8	21°48.673'N	72°10.225'W	15:29					Bare sand			
	9	21°48.659'N	72°10.228'W	15:29					Tire	ocean surgeonfish	1	
	10	21°48.642'N	72°10.248'W	15:32					Bare sand with rubble			
	11	21°48.630'N	72°10.256'W	15:33					Bare sand with sparse rubble	Finger Coral	Few	~4cm, dead
	12	21°48.616'N	72°10.266'W	15:37					Turtle and manatee grass			
	13	21°48.592'N	72°10.274'W	15:38					Moderate Turtle grass			
	14	21°48.590'N	72°10.282'W	15:40					Moderate Turtle grass			

2	T2 Start	21° 8.559'N	72° 10.253'W	15:43	T2 End	21°48.714'N	72°10.176'W	15:52				
	15	21°48.569'N	72°10.254'W	15:43					Sandy bottom with moderate turtle grass			
	16	21°48.564'N	72°10.250'W	15:43					Bare Sand			
	17	21°48.559'N	72°10.249'W	15:44					Bare Sand			
	18	21°48.608'N	72°10.233'W	15:46					Sandy bottom with sargassum (moderate to dense			
	19	21°48.645'N	72°10.220'W	15:49					Sandybottom with sargassum (moderate to dense			
	20	21°48.669'N	72°10.206'W	15:50					Bare Sand			
	21	21°48.690'N	72°10.2190'W	15:51					Sandybottom with sargassum (sparse)			
	22	21°48.685'N	72°10.185'W	15:52					Bare Sand			
3	T3 Start	21°48.697'N	72° 10.140'W	15:52	T3 End	21°48.541'N	72°10.221'W	16:11				
	23	21°48.674'N	72°10.171'W	15:52					Bare sand			
	24	21°48.659'N	72°10.152'W	15:54					Sandy bottom with macroalgae			
	25	21°48.626'N	72°10.178'W	15:55					Sandy bottom with sargassum (sparse)			visibility decrease to ~5
	26	21°48.617'N	72°10.194'W	15:56					Sandy bottom with rubble			
	27	21°48.619'N	72°10.193'W	15:58					Sparse turtle grass			

	28	21°48.597'N	72°10.199'W	15:59					Sandy bottom moderate seagrass			
	29	21°48.574'N	72°10.214'W	16:00					Bare Sand			
	30	21°48.552'N	72°10.220'W	16:01					Bare sand	Long Spined squirrelfish	5	
	31	21°48.537'N	72°10.195'W	16:02					Sandy bottom with rubble	Stoplight parrotfish	3	
										Grey Snapper	2	
	32	21°48.537'N	72°10.201'W	16:05					Sandy bottom with rubble	Elliptical coral dead	1	Boulder
										Finger coral	2	
										Symmetrical brain coral	1	
	33	21°48.538'N	72°10.201'W	16:08					Sandy bottom with rubble	Ofav (dead)	1	Boulder
	34	21°48.533'N	72°10.174'W	16:10					Sandy bottom with rubble	Blue Tang	4	
										Ocean Surgeon	3	
4	T4 Start	21°48.535'N	72°10.172'W	16:12	T4 End	21°48.673'N	72°10.085'W	16:19				
	35	21°48.528'N	72°10.182'W	16:12					Sandy bottom with moderate seagrass			
	36	21°48.535'N	72°10.172'W	16:13					Sand with rubble			
	37	21°48.536'N	72°10.150'W	16:15					Bare Sand			
	38	21°48.593'N	72°10.122'W	16:16					Sandy bottom with sargassum	silverside	many	visibility decrease to ~3
	39	21°48.639'N	72°10.090'W	16:19					Bare sand			
5	T5 Start	21°48.649'N	72° 10.037'W	16:33	T5 End	21°48.497'N	72°10.123'W	16:39				Started to rain, High Traffic
	40	21°48.626'N	72°10.043'W	16:33					Bare Sand			

	41	21°48.608'N	72°10.058'W	16:34					Bare Sand			
	42	21°48.581'N	72°10.078'W	16:35					Bare Sand			
	43	21°48.537'N	72°10.109'W	16:36					Seagrass Patch			Sparse
	44	21°48.524'N	72°10.117'W	16:37					Seagrass Patch			Moderate density with algae
	45	21°48.521'N	72°10.124'W	16:38					Bare Sand			
	46	21°48.509'N	72°10.116'W	16:39					Sandy bottom with sparse algae			
6	T6 Start	21°48.480'N	72° 10.087'W	16:40	T6 End	21°48.634'N	72°10.002'W	16:46				
	47	21°48.513'N	72°10.084'W	16:40					Bare Sand			
	48	21°48.526'N	72°10.066'W	16:42					Bare Sand			
	49	21°48.634'N	72°09.997'W	16:46					Bare Sand			
7	T7 Start	21°48.621'N	72° 9.973'W	16:47	T7 End	21°48.464'N	72°10.053'W	16:55				
	50	21°48.620'N	72°09.997'W	16:47					Bare Sand			
	51	21°48.611'N	72°09.980'W	16:49					Bare Sand			
	52	21° 8.573'N	72° 9.996'W	16:50					Bare Sand			
	53	21° 8.529'N	72° 10.022'W	16:52					Bare Sand			
	54	21° 8.490'N	72° 10.035'W	16:53					Bare Sand			

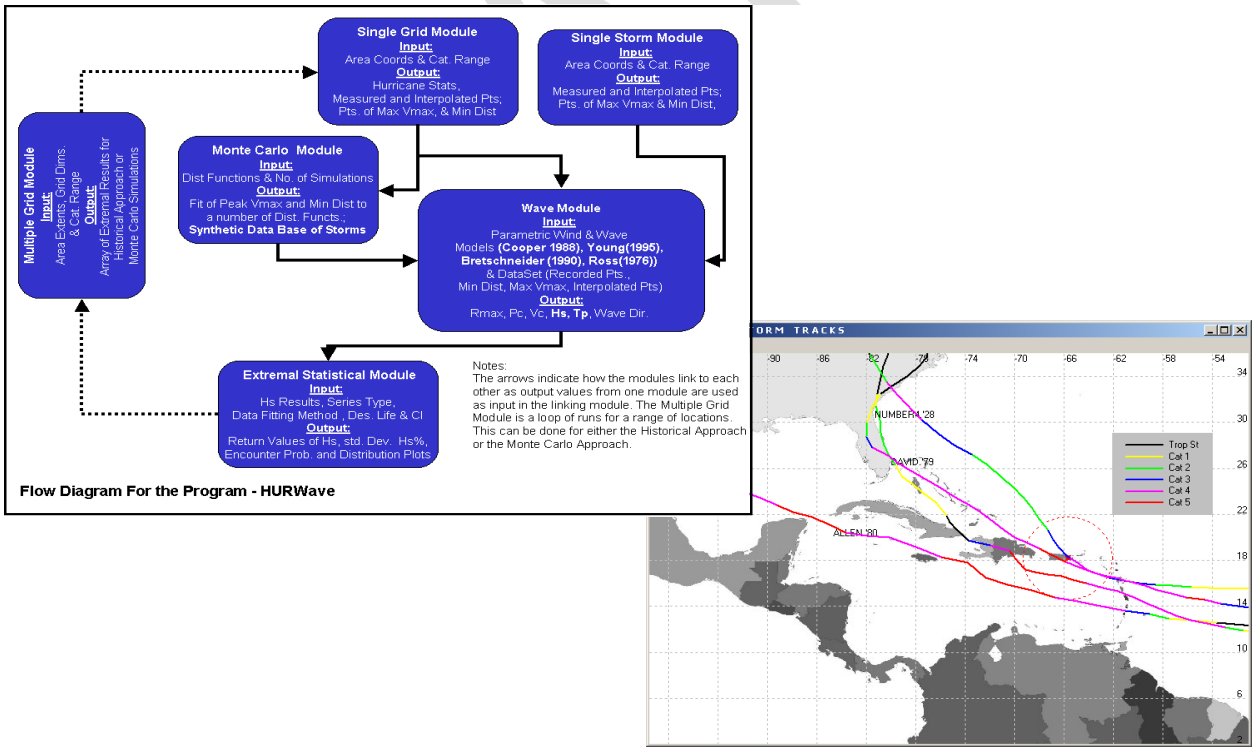
9.11 Appendix K – Numerical Modelling

Multiple modelling tools were used to develop the design wave conditions at the site. This appendix describes the tools and how they were used.

A.1 HurWave

A package of Hurricane Parametric Wave Models and Extremal Statistical Analyses by Jamel D. Banton (Banton, 2002). HURWave combines the database of the National Oceanic and Atmospheric Administration (NOAA), of hurricane tracks, with wind and wave distribution algorithms to statistically determine deep-water design wave conditions at any location within the Caribbean and the Gulf of Mexico.

The program consists of six main modules, namely: The Single Grid Module; The Single Storm Module; The Wave Module; The Extremal Statistical Module; The Monte Carlo Module; and The Multiple Grid Module. These are shown in the flow chart following.



HURWave process and a screenshot of a storm track result during analysis

The NOAA database consists of Atlantic hurricane track positions along with wind and pressure conditions at 6-hour intervals since the late 19th century. For

any specified location within the North Atlantic Basin, HURWave searches this database for tropical storms and hurricanes that have passed within a specified distance from the point of interest. The program produces a number of statistical descriptions for this result.

Several widely used wind and wave models are applied to produce a hindcast dataset of hurricane wave conditions at the point in question. These models include Cooper (1988) and Young (1995).

The Cooper model was developed by statistically analysing the output from numerical wind and wave models for six Gulf of Mexico hurricanes. The storms covered a wide cross-section of hurricane conditions.

In the case of Young, he first developed an extensive synthetic database by running a numerical wave prediction model for a wide range of hurricane parameters. The data from these numerical experiments were then used to clarify the wave generation process within hurricanes and further to develop the parametric model suitable for wave prediction in deep water. This model was further calibrated with over 100 measurements made by the GEOSAT satellite.

With the results of these models, a range of extremal statistical analyses may be carried out in HURWave. The extremal methods applied are based on work published by Yoshima Goda in 1988 for statistically analysing extreme events such as hurricane waves. Distribution functions such as Weibull and Fischer Tippet (Type I) are fitted to the model results and the best fit chosen. The results include the values for wind, wave, and water level conditions for various return periods.

DRAFT

Return Wave Heights and Variations

Refresh

Return Values For The Peak Value Series

	FT - I				Weibull															
					k = 0.75				k = 1.00				k = 1.40				k = 2.00			
Rp	Hs	σ	Hs%	EP	Hs	σ	Hs%	EP	Hs	σ	Hs	EP	Hs	σ	Hs%	EP	Hs	σ	Hs%	EP
2	4.15	0.2	4.4	100.0	3.54	0.2	3.8	100.0	3.81	0.2	4.1	100.0	4.09	0.2	4.4	100.0	4.32	0.2	4.6	100.0
5	5.92	0.3	6.2	100.0	5.52	0.4	5.8	100.0	5.82	0.4	6.1	100.0	6.02	0.4	6.3	100.0	6.11	0.3	6.4	100.0
10	7.14	0.4	7.4	99.5	7.25	0.5	7.5	99.5	7.34	0.6	7.6	99.5	7.29	0.4	7.6	99.5	7.18	0.3	7.5	99.5
20	8.33	0.5	8.6	92.3	9.16	0.7	9.5	92.3	8.87	0.8	9.2	92.3	8.47	0.5	8.8	92.3	8.11	0.4	8.4	92.3
25	8.70	0.5	9.0	87.0	9.80	0.8	10.1	87.0	9.36	0.8	9.6	87.0	8.84	0.6	9.1	87.0	8.39	0.4	8.7	87.0
50	9.87	0.6	10.2	63.6	11.89	1.0	12.2	63.6	10.88	1.0	11.2	63.6	9.93	0.6	10.2	63.6	9.20	0.5	9.5	63.6
100	11.03	0.7	11.3	39.5	14.09	1.2	14.4	39.5	12.40	1.2	12.7	39.5	10.97	0.7	11.3	39.5	9.95	0.5	10.2	39.5
CI =	95	%																		
	Cor=	0.996			Cor=	0.867			Cor=	0.951			Cor=	0.991			Cor=	0.998		

Example of resulting wave conditions for a HURWave analysis

A.2 MIKE 21

Coastal processes along the shoreline and within the nearshore of the site were modelled using coupled hydrodynamic and spectral wave modules within MIKE 21. The MIKE 21 model (developed by the Danish Hydraulic Institute) is a professional engineering software package for the simulation of tides, waves, sediments and ecology in rivers, lakes, estuaries, bays, coastal areas, and seas.

The MIKE 21 model uses various modules to simulate hydrodynamic variances in surface elevation and currents (HD) as well as spectral waves (SW). Coupling of the two modes means that the mutual interaction between waves and currents is simulated and results from one module are passed back and forth to the other module in order to improve the efficiency and accuracy of the simulations. The Spectral Wave (SW) module computes wave conditions throughout the model domain; the Hydrodynamic (HD) module computes water levels and current speeds and directions and is coupled with the SW module so that wave-induced currents are included. Water levels and currents affecting waves are also passed back to the SW module to improve the accuracy of the wave conditions.

Coupled Model FM

MIKE 21/3 Coupled Model FM is a truly dynamic modelling system for application within coastal and estuarine environments. It is composed of following modules:

Hydrodynamic Module

Spectral Wave Module

Transport Module

ECO Lab Module

Mud Transport Module

Sand Transport Module (only 2D simulations)

The Hydrodynamic Module and the Spectral Wave Module are the basic computational components of the MIKE 21/3 Flow Model FM. Using MIKE 21/3 Coupled Model FM it is possible to simulate the mutual interaction between waves and currents using a dynamic coupling between the Hydrodynamic Module and the Spectral Wave Module. The MIKE 21/3 Coupled Model FM also includes a dynamic coupling between the Mud Transport and the Sand Transport models and the Hydrodynamic Module and the Spectral Wave Module. Hence, full feedback of the bed level changes on the waves and flow calculations can be included.

Application Areas

The application areas are generally problems where flow and transport phenomena are important, with emphasis on coastal and marine applications, where the flexibility inherited in the unstructured meshes can be utilized.

MIKE 21/3 Coupled Model FM can be used for investigating the morphological evolution of the nearshore bathymetry due to the imp act of engineering works (coastal structures, dredging works etc.). The engineering works may include breakwaters (surface-piercing and submerged), groins, shoreface nourishment, harbours etc. MIKE 21/3 Coupled Model FM can also be used to study the morphological evolution of tidal inlets.

Computational features

The main features of the MIKE 21 Coupled Model FM are as follows:

- Dynamic coupling of flow and wave calculations
- Full feedback of bed level changes on flow and wave calculations
- Easy switch between 2D and 3D calculations (hydrodynamic module and process modules)

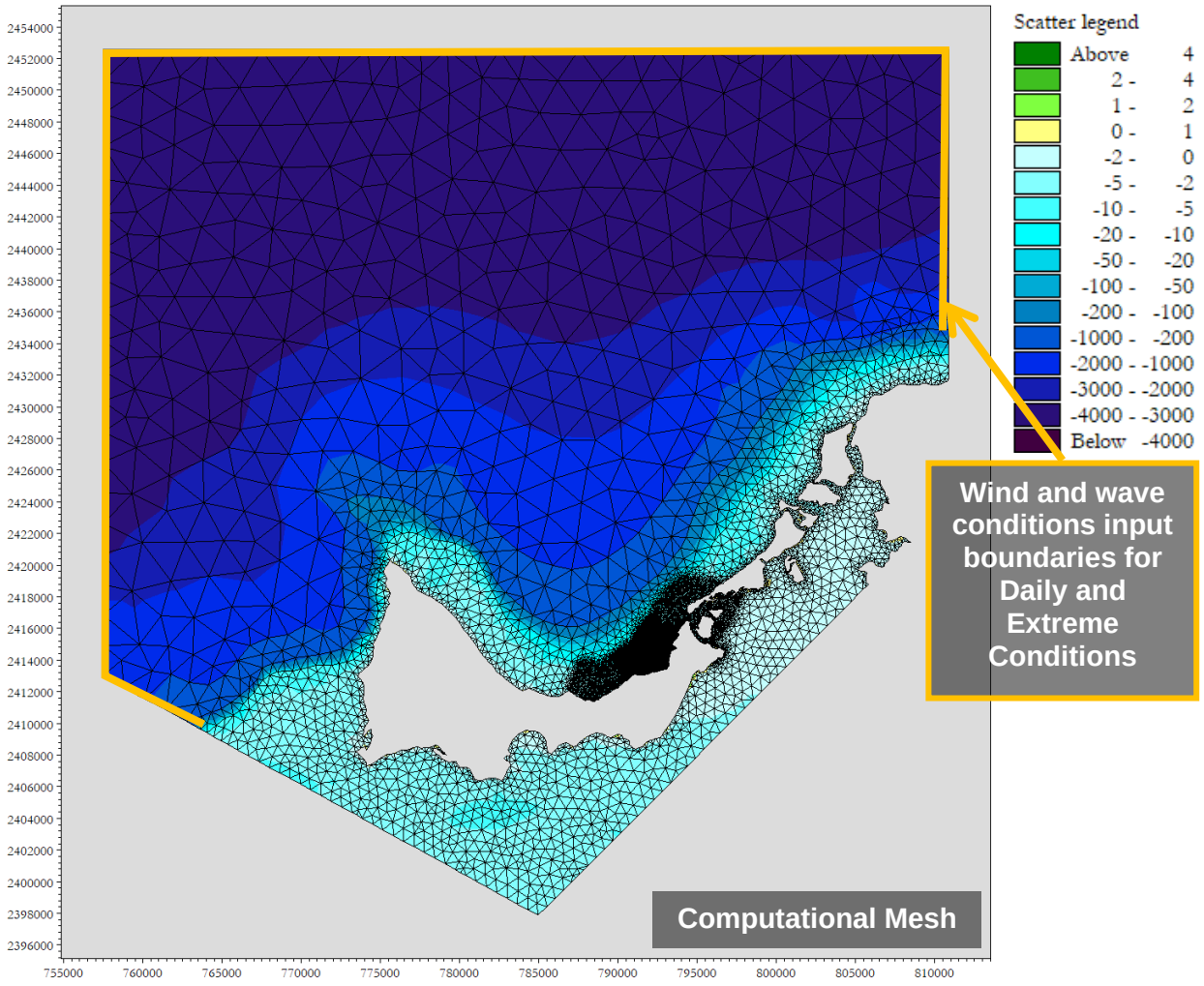
- Optimal degree of flexibility in describing bathymetry and ambient flow and wave conditions
- using depth-adaptive and boundary-fitted unstructured mesh.

Flexible Mesh Development

The fundamental starting point of the model is the creation of a computational mesh where spatial variances can be determined at each simulation time step. MIKE 21 uses a flexible mesh, based on linear triangular elements that represent the seabed and land elevations (bathymetry and topography of the area). The flexible element mesh is particularly well-suited for modelling large complex areas that, at the same time, require a detailed resolution of specific features or areas.

As discussed, all existing bathymetric and topographic data relevant to the area were merged and used as input to the model to define land and seabed elevations. The mesh configuration used for the coastal modelling is presented below. Within the mesh development routine, interpolation methods are used to fill data gaps thereby create a smoothed surface.

DRAFT



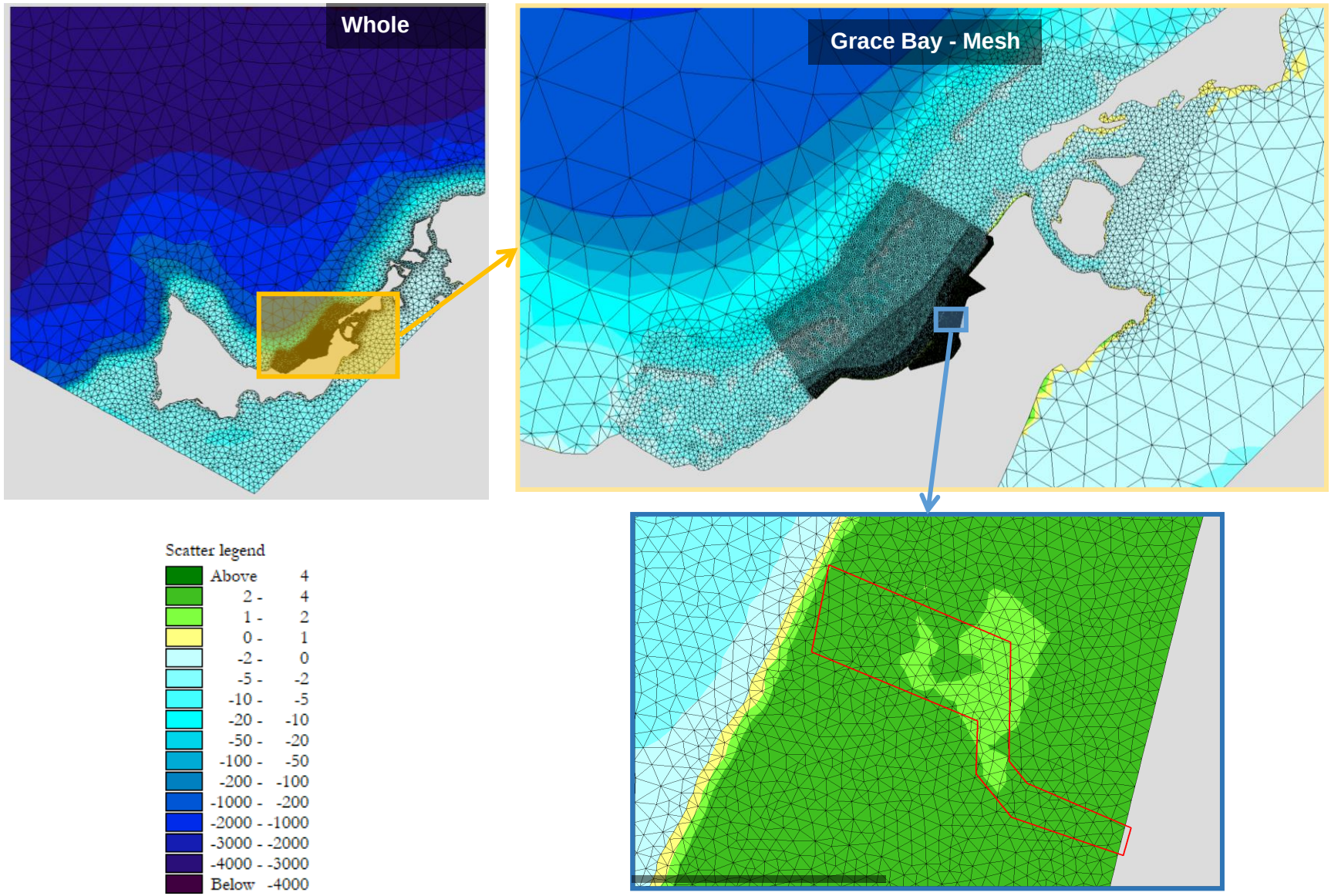
Mesh extents and configurations used in the wave modelling exercise for the Romanza property

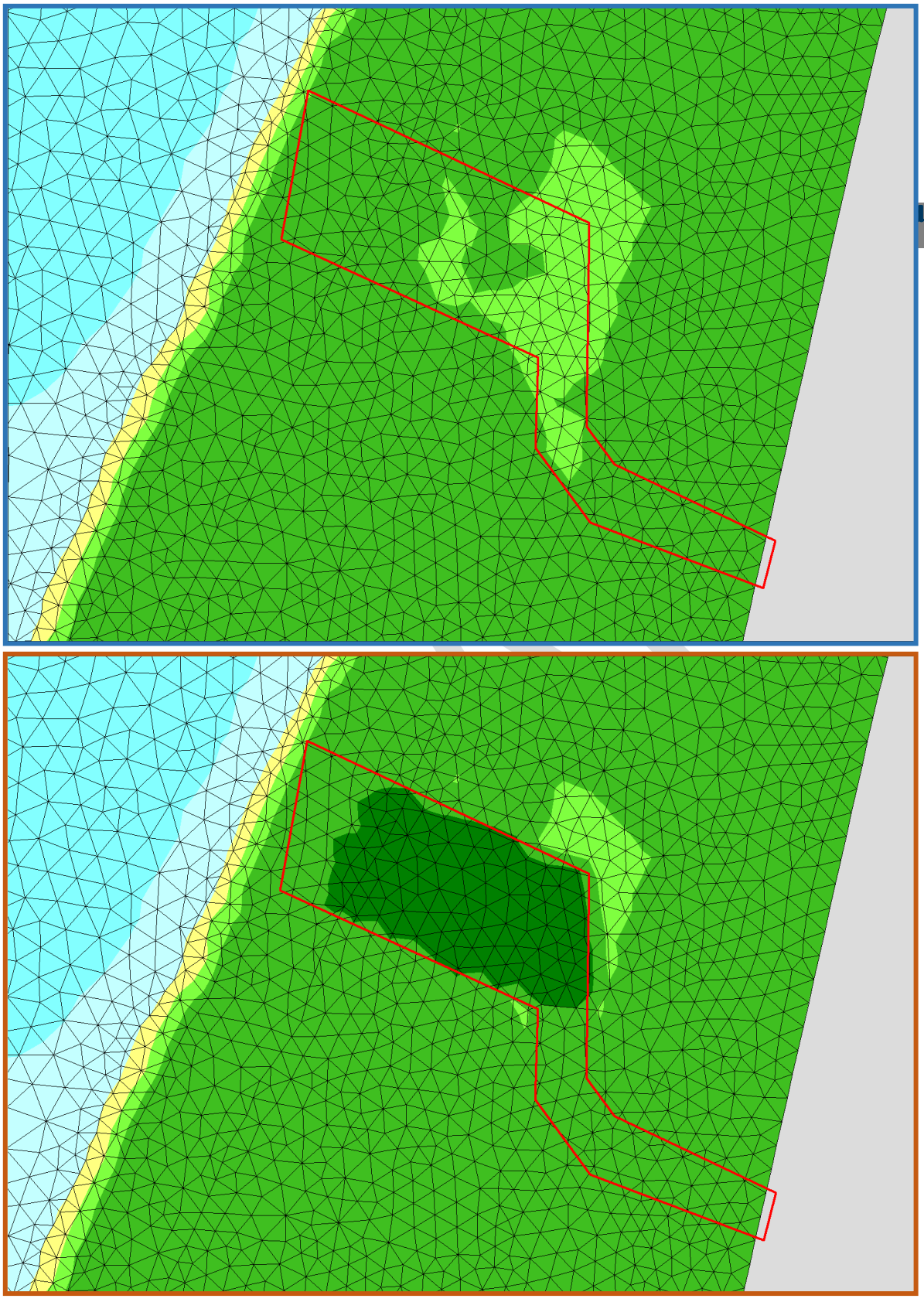
This was then input to the MIKE Zero mesh developer which then created the flexible mesh to represent the existing conditions as shown below. As shown, smaller mesh elements were used in the areas closest to the project area. Additionally, smaller elements were used around the areas of significant contour change to adequately resolve wave movements and accurately represent the bathymetry with higher resolution in these areas. Smaller elements were also used along the reef face to properly capture the steep change in elevation.

The larger mesh triangles were used to represent the deep-water elements. The elements gradually reduced as the water depth decreased. The smallest mesh elements were put between elevation of 5m below mean sea level and 4m above.

This was done to have proper wave transformation at sea and to properly map possible land inundation on the site.

DRAFT


Whole
Grace Bay - Mesh
Scatter legend
Above 4
2 - 4
1 - 2
0 - 1
-2 - 0
-5 - -2
-10 - -5
-20 - -10
-50 - -20
-100 - -50
-200 - -100
-1000 - -200
-2000 - -1000
-3000 - -2000
-4000 - -3000
Below -4000



Grace Bay - Contrs

A.3 XBeach NH+

The XBeach model is an open-source model that has been constantly updating since its original inception in 2005. The program was developed under an US project with a mandate for better water surface predictions following a very devastating hurricane season in 2004. The program was developed over a series of projects published articles to be able to handle many critical coastal processes associated with high energy wave events such as hurricanes.

Some of the processes that can be simulated by XBeach include the short-wave transformation, infragravity wave transformation, wave-induced set-up, overwash and inundation. The processes listed prior are a part of the hydrodynamic model. Morphodynamic processes exist as well such as dune face avalanching however, these model components were generally not used in this research.

The XBeach model has two long wave resolving modes which have differing computational times. The first mode is the hydrostatic mode which incorporates parallel solving of long waves, currents and morphological change with short waves resolved separately. The drawback here is that the phase of the short wave is not included. The second mode is the non-hydrostatic model which couples all processes thereby providing a more realistic water surface. Instinctively, this model requires more resources. A stationary mode is also available, however long waves are not included in calculations.

Following the first major publication in 2009, Smit, et al. (2010) incorporated the processes necessary to developed the non-hydrostatic model. Another major upgrade occurred when the program was validated for the run-up process associated with the generation and dissipation of infragravity waves over coral reefs (Van Dongeren, et al., 2013). Recently the program was validated for wave run-up with laboratory data (Lashley, et al., 2018). The spread of applications of XBeach and its open source nature have led to routines like the BEWARE model (Pearson, et al., 2017) which is based on a plethora of XBeach runs.

Non-hydrostatic Formulations

The non-hydrostatic mode of XBeach is based on the concepts related to the non-linear shallow water (NLSW) equations particularly the non-hydrostatic pressure. In this mode, the pressure is depth averaged from the surface (where zero pressure is assumed) to the bed. The long wave equations are coupled with the depth-averaged

pressure to create a short-wave resolver. The evasive process of wave breaking is induced when a wave exceeds a certain steepness. At this point, the non-hydrostatic pressure term is disabled. The last segment of calculations follows the momentum-conserving shallow water equations. The following subsections detail the formulas used in the non-hydrostatic mode.

Computing the depth-average dynamic pressure (q) is done by first assuming that the advection and diffusive terms are negligible (zero).

$$\frac{\partial w}{\partial t} + \frac{\partial q}{\partial z} = \mathbf{0}$$ Equation A1

Where:

q	Vertical velocity
z	Vertical coordinate

The vertical velocity (ω_b) at the bed is determined by the kinematic boundary condition:

$$\boldsymbol{w_b} = u\frac{\partial(\eta - h)}{\partial x}$$ Equation A2

Where:

u	Cross shore (horizontal) velocity
η	Water surface elevation
h	Water depth

Incorporating the Keller-box method, the dynamic pressure at the bed (q_b) is found by:

$$\boldsymbol{q_b} = -\frac{\mathrm{h}}{2}\left(\frac{\delta q}{\delta z}\Big|_s + \frac{\delta q}{\delta z}\Big|_b\right)$$ Equation A3

Where:

s	Water surface term
b	Sea bed term

Substituting equation A3 in equation A1 produces the vertical momentum balance at the surface ($\frac{\delta w_s}{\delta t}$):

$$\frac{\delta w_s}{\delta t} = 2\frac{q_b}{h} - \frac{\delta w_b}{\delta t}$$ Equation A4

Finally, the dynamic pressure is found by substitution and integration to give:

$$\frac{\delta u}{\delta x} + \frac{w_s - w_b}{h} = 0$$ Equation A5

XBeach Model Benefits and Challenges

Some advantages of the non-hydrostatic model include predicting incident-band run-up and over wash which are critical for steeper slopes. The non-hydrostatic mode is also well suited for diffraction of waves since the wave direction is considered, and ship-induced waves.

The non-hydrostatic mode of XBeach does not incorporate the short-wave action balance. This saves computational time in one sense. On the other hand, however the temporal and spatial resolution required is very high which slows down the model.

XBeach Model Justification

The non-hydrostatic model was chosen in the final XBeach model setup. The justification of its use is grounded in prior validation with the model and the median computation time. The concept of run-up would require proper resolving of the water surface as is done in the non-hydrostatic mode. Additionally, a higher degree of accuracy was introduced in the non-hydrostatic+ switch that has been incorporated in XBeach. This mode allows for better resolving over the water depth and is faster than the original non-hydrostatic mode.

DRAFT

9.12 Appendix L – List of Plant Photos



Photo 1. Plot 1a; View looking west. Date of Photo: March 12, 2024



Photo 2. Plot 1b; View looking west southwest. Date of Photo: March 12, 2024



Photo 3. Plot 1c; View least northeast. Date of Photo: March 12, 2024



Photo 4. Plot 1d; View looking west southwest. Date of Photo: March 12, 2024



Photo 5. Plot 2a; View looking west southwest. Date of Photo: March 12, 2024



Photo 6. Plot 2b; View looking north northeast. Date of Photo: March 12, 2024



Photo 7. Plot 2c; View looking west. Date of Photo: March 12, 2024



Photo 8. Plot 3a; View looking west. Date of Photo: March 12,



Photo 9. Plot 3b; View looking northwest. Date of Photo: March 12, 2024



Photo 10. Plot 3c; View looking northeast. Date of Photo: March 12, 2024



Photo 11. Plot 4b; View looking west southwest. Date of Photo: March 13, 2024



2

Photo 12. Cassytha filiformis infestation on shrubs in north-central Portion of the property. Date of Photo: March 12, 2024



Photo 13. Curly-tailed Lizard. Date of Photo: March 13, 2024



Photo 14.Crablike Spiny Orb Weaver Spider. Date of Photo: March 13, 2024



Photo 15. *Cerion* (peanut) snail. Date of Photo: March 12, 2024



Photo 16. Snake skeleton, likely eaten by ants. Date of Photo: March 14,



Photo 17 *Eulophia graminea* orchid. Date of Photos: March 14, 2024



Photo 18. *Passiflora pectinata,* Wild apricot. Date of Photo: March 14, 2024



Photo 19. Plot 1a; View looking west. Date of Photo: March 12,



Photo 20. Plot 1b; View looking west southwest. Date Of Photo March 12, 2024



Photo 21. Plot 1c; View least northeast. Date of Photo: March 12, 2024



Photo 22. Plot 2b; View looking north northeast. Date of Photo March 12, 2024



Photo 23. Plot 3b; View looking northwest. Date of Photo: March 12, 2024



Photo 24. Plot 4b; View looking west southwest. Date of Photo March 13, 2024

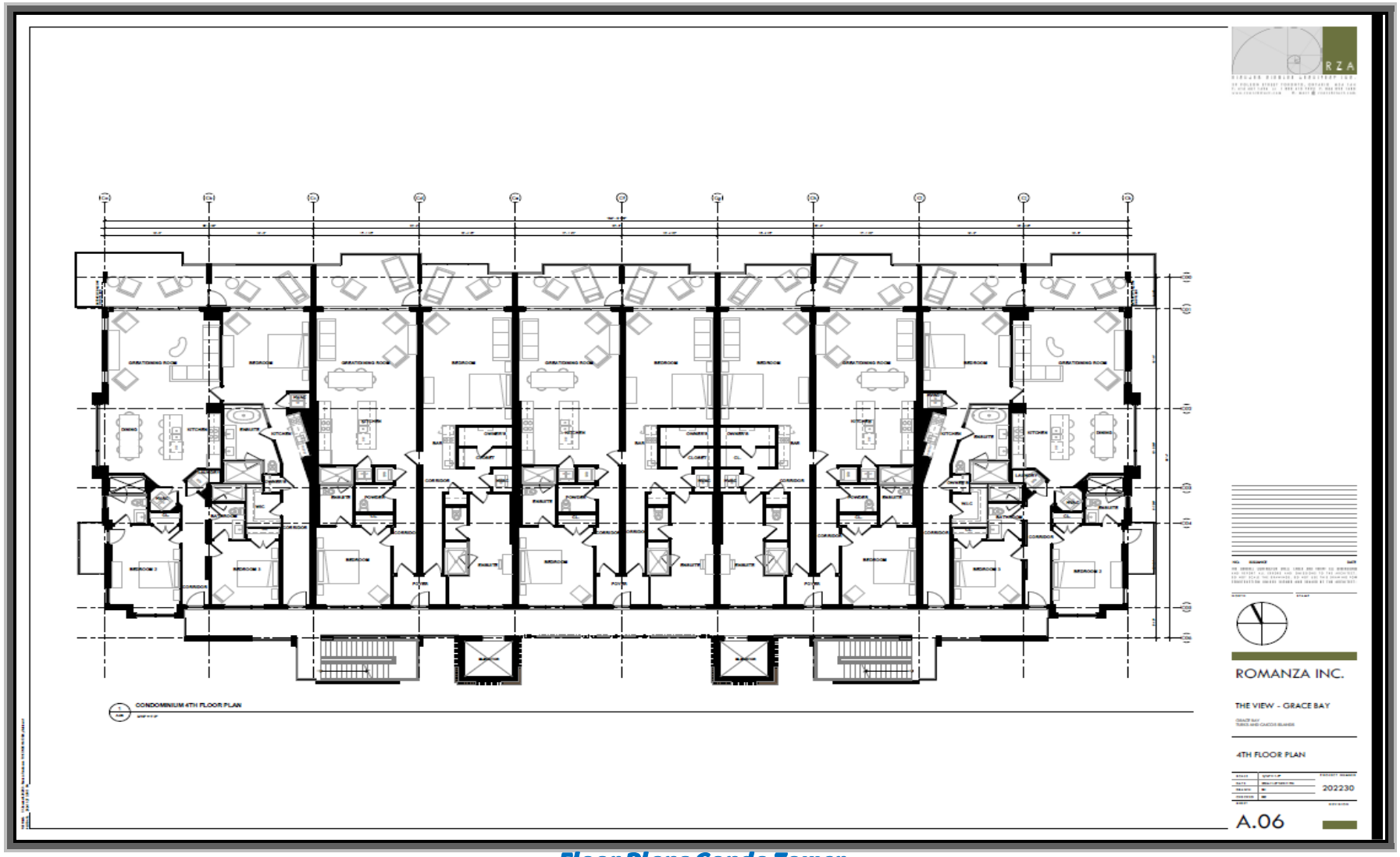


Photo 25. Plot 10c; View looking northeast. Date of Phot March 14, 2024

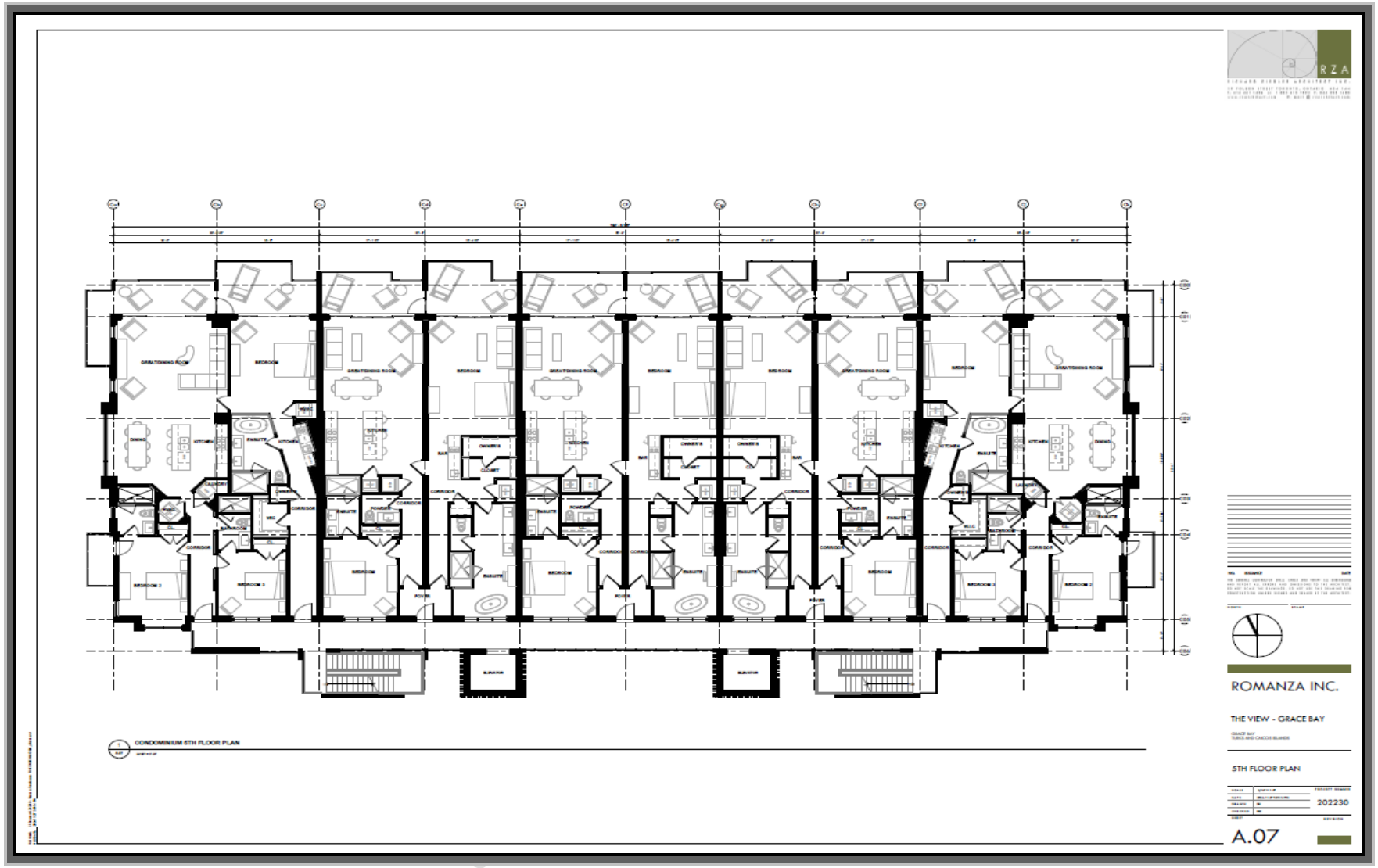


Photo 26. Tillandsia utriculata air plant. Date of Photo: March 14, 2024

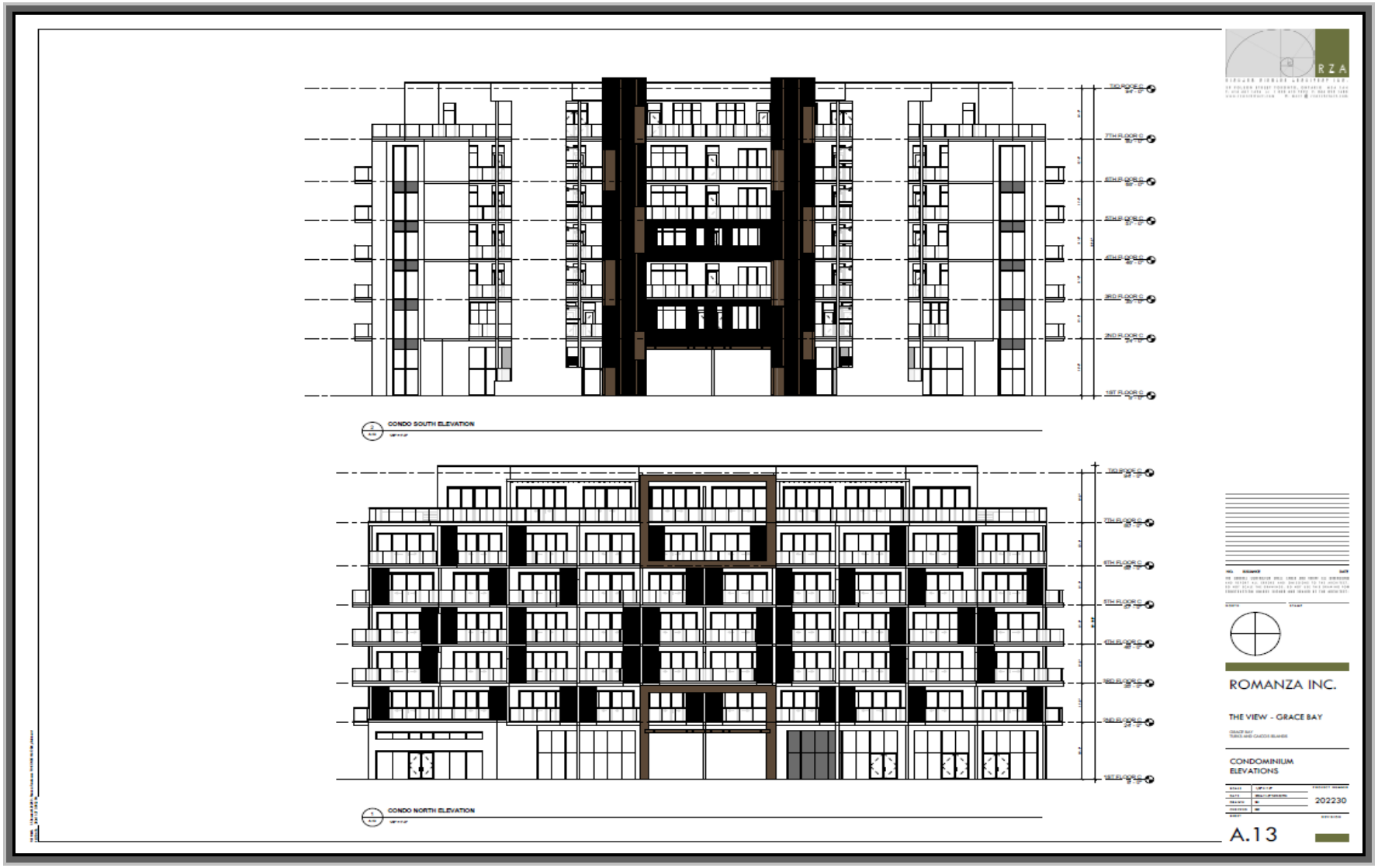
9.13 Appendix M - Plans and Drawings



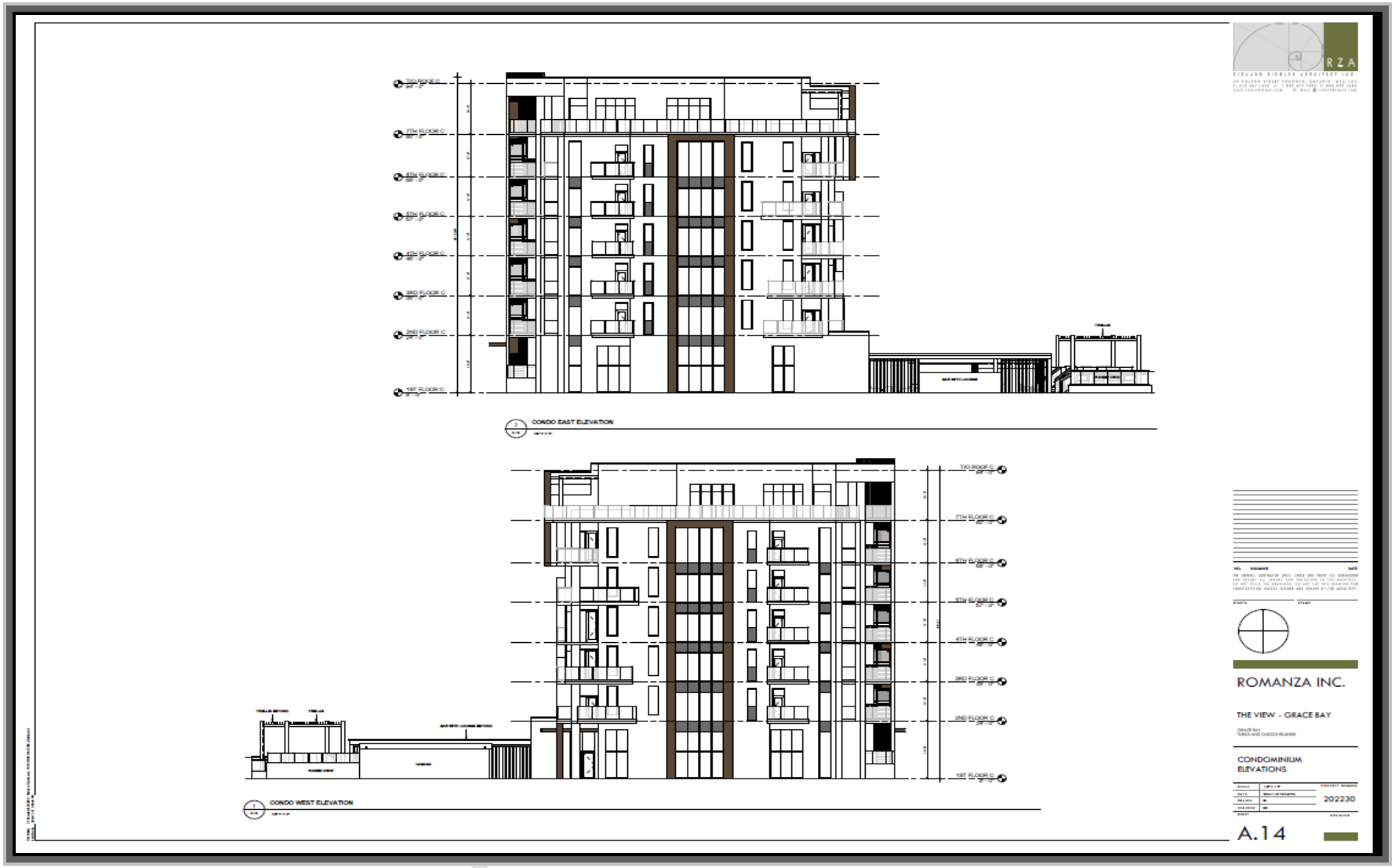
Floor Plans Condo Tower



Floor Plans Condo Tower



Elevation Plans Condo Tower



Elevation Plans Condo Tower

9.14 Appendix N - Resumes

Ezekiel E. Hall, MSc, IAH
Consulting Hydrogeologist – Environmentalist
#6 Flame Tree Circle
Long Bay Hills, Providenciales
Turks and Caicos Islands, B.W.I.
Tel: 649.246.8263
Email: hallenvironment1@gmail.com

Summary

Ezekiel Hall is a practicing environmentalist with over 25 years experience working in Small Oceanic Islands environments in the Bahamas and Turks and Caicos Islands. Mr. Hall's experience includes consultative services for private utility companies, government agencies, property owners and tourism developers who wish to design, construct and manage operation facilities with a focus on protection of natural resources and compliance with applicable Ordinances, Regulations and environmental best practices.

Education

1991 – 1992: Mr. Hall attended the University of Birmingham, UK and obtained a Master of Science Degree in Hydrogeology, specializing in the Hydrogeology of Small Oceanic Islands.

1981 – 1985: Mr. Hall attended St. Lawrence University, Canton, New York, USA and obtained a Bachelor of Science Degree in Geology.

Employment

December 2012 – Present: Operations Manager, Grand Bahama Utility Company[GBPA]

Mr. Hall holds management responsibility for the daily operations of the Water Company including the direct supervision of 21 members of staff, seven water plants and one sewerage plant.

April 2012 – August 2012: Deputy Permanent Secretary, Ministry of Border Control & Labour [Turks and Caicos Islands Government]

Mr. Hall held a leadership role and was responsible for establishing Policy, Guidelines and Procedures for Immigration and Labour enforcement. Mr. Hall had daily responsibility for a staff compliment of 68 Immigration Officers including Senior Officers & Line Staff. A list of responsibilities included work task planning, tracking work progress, performance evaluations, customer service management, budget preparation, public awareness program and report writing.

July 1997 – Present: Hydrogeologist-Environmentalist, EnvironmentALL TCI.

Mr. Hall is the Principal of EnvironmentALL Ltd and provides Environmental and Geotechnical Consulting Services throughout the Bahamas and Turks and Caicos Islands. The scope of services includes Environmental Impact Assessments, Geotechnical Evaluations, Drilling and Well Design, Pump Tests & Injection Well Tests, Groundwater Resources Evaluation, Water & Wastewater Quality Monitoring and Testing, Evaluation of Water & Sewerage Plant Operations, Wellfield Design, Wellfield Construction, Wellfield Management, Sewerage Disposal Well Design/Construction/Management, Stormwater Disposal Well Design/Construction/Management, Terrestrial Assessment, Marine Assessments, Socio-economic & Cultural Assessments, Hydrogeological Assessments, Hydrographic & Bathymetric Surveys, Coastal Processes Evaluation and Building Permit Processing.

1986 - 1997: Assistant Hydrologist, Bahamas Water & Sewerage Corporation, Nassau, New Providence, Bahamas.

Mr. Hall applied his hydrogeological experience and knowledge of the natural environment in support of various freshwater resources evaluations, wellfield designs, Sewerage and Stormwater deep disposal well designs and evaluations, pump tests and water & wastewater quality testing throughout all inhabited islands of the Bahamas.

CERTIFICATIONS & PROFESSIONAL MEMBERSHIP

PADI Certified SCUBA Diver: Dive Master.

Member of the International Association of Hydrogeologists.

NASTeC Certified Major Appliance Repair Technician [B981174]

GCAP Graduate Technician Certified Appliance Technician [Reg #: TC21727]

PUBLICATION(S)

"Saltwater Intrusion in the Bahamas: A case study of the Grand Lucayan Waterway, Grand Bahama, The Commonwealth of the Bahamas." *Proceedings of the AWRA Conference (1989), Puerto Rico.*

"An appraisal of the Application of Surface and Borehole Geophysical Techniques to Groundwater assessment in Wellfields in The Bahamas." *Proceedings of the WMO/IDB Conference (1995), Costa Rica.*

PROJECTS AND STUDIES

1. Water Quality Monitoring: Providenciales Hospital Project, TCI, 2009.
2. Environmental Impact Assessment: The Shore Club, Providenciales, TCI, 2008-09
3. Environmental Impact Assessment: East Bay Resort and Marina, South Caicos, TCI, 2008-09
4. Environmental Impact Assessment: Terrestrial and Hydrogeological Input into EIA for CMK Developments at South Caicos Islands, TCI 2008 to present.
5. Hydrogeological Assessment: Input into the Environmental Impact Assessment for PPC Limited Bulk Fuel Storage Facility, Providenciales, TCI 2008
6. Seawater Quality Monitoring: Carnival Cruise Lines (Grand Turks Cruise Port), Grand Turks Island, TCI 2008-2009.
7. Environmental Impact Assessment: Leeward Lake; Providenciales, TCI, 2008
8. Environmental Impact Assessment: Leeside Canals; Providernciales, TCI 2008
9. Seawater Quality Monitoring: Carnival Cruise Lines (Grand Turks Cruise Port), Grand Turks Island, TCI 2007-2008.
10. Seawater Quality Monitoring: Carnival Cruise Lines (Grand Turks Cruise Port), Grand Turks Island, TCI 2006-2007.
11. Feedwater and Disposal Wells design and construction: Beaches Resort – Italian Village, Providenciales, Turks and Caicos Islands, 2008
12. Environmental Impact Assessment: Bone Fish Point, Providenciales, TCI, 2007

13. Hyrogeological, Terrestrial and Marine Assessments: CMK Tourism Developments, South Caicos Island, Turks and Caicos Islands 2007 – ongoing.
14. Environmental Impact Assessment Update: Ritz-Carlton Hotel, West Caicos Island, TCI, 2006
15. Seawater Quality Monitoring: Carnival Cruise Lines (Grand Turks Cruise Port), Grand Turks Island, TCI 2005-2006.
16. Seawater Quality Monitoring: Leeward Marina (Johnston International Ltd.), Providenciales Island, TCI 2006.
17. Hydrogeological Assessment: EIA for the Albany House Marina [Park Ridge Securities Group], Nassau, Bahamas, 2005
18. Solid Waste Management Project: Project Coordination and Management; Hydrogeological and Legal Assessments, Turks and Caicos Islands Government, Turks and Caicos Islands, 2005.
19. Environment Impact Assessment: Royal Reef Resort, North Caicos Island, TCI, 2005.
20. Marine Assessment (Seagrass Removal for Blue Resort), Blue Hills, TCI, 2005
21. Hydrogeological Evaluation: Mare Bello Tourism Development, East Bay, TCI, 2004.
22. Environmental Impact Assessment: The Tuscany, Providenciales, TCI, 2004
23. Groundwater Resources Evaluation: New Providence Development Co., Nassau, Bahamas, 2004.
24. Environmental Impact Assessment: Ritz-Carlton Hotel, West Caicos, TCI, 2004.
25. Hydrographic Survey: Grand Turk Cruise Ship Facility, Grand Turk, TCI 2004.
26. Bathymetric Survey: Grand Turk Cargo Pier, Grand Turk, TCI, 2004.
27. Environmental Consultant: St James Development, Providenciales, 2003
28. Environmental Consultant [EIA]: Leeward Marina/Condo Development, Providenciales, TCI 2003 – ongoing.
29. Hydrogeological Assessment: Inland Marina Basin for Pericles Maillis' property, Adelaide, New Providence, Bahamas.
30. Environmental Consultant [EIA]: Beach Oasis Development, Providenciales, TCI 2002
31. Environmental Consultant [EIA]: Grand Turk Cruise Port, Grand Turk, TCI, 2002.
32. Environmental Consultant: Sand Mining and Dredging, Sand Pit, Providenciales, TCI 2002.
33. Environmental Consultant: Bahamas Electricity Corporation Cooling Water Wells Project, New Providence, Bahamas, 2002.
34. Consultant for EIA: West Caicos Island-wide Development, West Caicos, TCI, 2001- present.
35. Consultant for EIA: West Caicos Marina, West Caicos, TCI 2000-'01.

36. Consultant for EIA: Hawksbill Marine Basin, Providenciales, TCI, 2001.
37. Consultant for EIA: Somerset Hotel Development, Providenciales, TCI, 2001
38. Consultant for EIA: Leeward Canal Extension, Providenciales, TCI, 2000.
39. Consultant for EIA: Babaloo Beach Resort, Providenciales, TCI, 1999.
40. Consultant for EIA: Cooper Jack Marina, Providenciales, TCI, 1999.
41. Consultant for EIA: Grand View Condominium, Providenciales, TCI, 1999
42. Consultant for EIA: Discovery Beach Club, Providenciales, TCI, 1999
43. Consultant for EIA: Ocean Club West, Providenciales, TCI, 1999.
44. Consultant for EIA: Newport Harbour & Bulk Fuel Storage Facility, Providenciales, TCI, 1998.
45. Implementation of National Parks System: Coastal Resources Management Project/ Chief Park Warden, Providenciales, TCI, 1998-'99.
46. Rehabilitation of Deep Cooling Wells for Power Generation Plant: Bahamas Electricity Corporation, New Providence, Bahamas, 1997.
47. Design, construction and evaluation of feedwater wells for R.O. plant: Half Moon Cay, Bahamas, 1997.
48. Groundwater Resources Exploration for Bahamas Water & Sewerage Corporation: Andros Island Potable Water Supply, 1986-97Groundwater
49. Resources Exploration for Bahamas Water & Sewerage Corporation: Mayaguana Potable Water Supply, Mayaguana, Bahamas, 1997.
50. Groundwater Resources Exploration for Bahamas Water & Sewerage Corporation: Inagua Potable Water Supply, Inagua, Bahamas, 1996.
51. Groundwater Resources Exploration for Bahamas Water & Sewerage Corporation: Abaco Potable Water Supply Expansion, Abaco Bahamas, 1995.
52. Groundwater Resources Exploration for Bahamas Water & Sewerage Corporation: Exuma Potable Water Supply, Exuma, Bahamas,1986-'95
53. Groundwater Resources Exploration for Bahamas Water & Sewerage Corporation: Rehabilitation of Old Southwest Wellfield, New Providence, Bahamas, 1993.
54. Groundwater Resources Exploration for Bahamas Water & Sewerage Corporation: Long Island Potable Water Supply, Long Island, Bahamas, 1986 - '97.
55. Groundwater Resources Exploration for Bahamas Water & Sewerage Corporation: Rehabilitation of Windsor Wellfield, New Providence, Bahamas, 1993 - '97.
56. Groundwater Resources Exploration for Bahamas Water & Sewerage Corporation: Rehabilitation of Government Wellfields, Grand Bahama, Bahamas, 1986-'97.
57. Groundwater Resources Exploration for Bahamas Water & Sewerage

Corporation: Eleuthera Potable Water Supply, Eleuthera, Bahamas, 1986 - '97.

58. Groundwater Resources Exploration for Bahamas Water & Sewerage Corporation: Ragged Island Potable Water Supply, Ragged Island, Bahamas, 1986 - '97.
59. Groundwater Resources Exploration for Bahamas Water & Sewerage Corporation: Black Point, Exuma Potable Water Supply, Exuma, Bahamas, 1986 - '97.
60. Groundwater Resources Exploration for Bahamas Water & Sewerage Corporation: Bimini Water Supply, Bimini, Bahamas, 1986 - '97.
61. Rehabilitation and expansion of the Bogue Wellfield, North Eleuthera for Bahamas Water and Sewerage Corporation: Eleuthera, Bahamas, 1989.
62. Evaluation of New Providence Sewerage Treatment facility, Bahamas Water & Sewerage Corporation !995- 1997
63. Rehabilitation of Deep Sewerage Disposal Well: Pinewood Gardens, Nassau, Bahamas, 1987-'96.
64. Rehabilitation of Deep Sewerage Disposal Well: Flamingo Gardens, Nassau, Bahamas, 1993-'96.
65. Design, Construction and Evaluation of Deep Sewerage Disposal Wells: Yellow Elder Gardens, Nassau, Bahamas, 1990-'92.
66. Design, Construction and Evaluation of Deep Sewerage Disposal Well: Malcolm's Park, Nassau, Bahamas, 1990-'91.
67. Saltwater Encroachment: Grand Lucayan Waterway, Grand Bahama, Bahamas, 1987-'91.
68. Fuel Spill Assessment and Recovery: Bahamas Electricity Corporation, Nassau, Bahamas, 1987-'95.
69. Fuel Spill Assessment: Burma Oil, East End, Grand Bahama, Bahamas/ Water & Sewerage Corporation 1989.
70. Fuel Sill Assessment: Carmichael Road/BEC, Nassau, Bahamas/ Water & Sewerage Corporation, 1995.
71. Fuel Spill Assessment & Recovery: Nassau International Airport, 1988, Water & Sewerage Corporation.
72. Hydrogeological Maps of The Bahamas for inclusion the Hydrogeological Atlas of the Caribbean; UNESCO, 1986-'87.
73. Electro Magnetic Ground Conductivity Profiling: Bahamas Water & Sewerage Corporation / Groundwater Exploration Exercises. All inhabited islands of the Bahamas, 1988-'1997.

JANEEN MARLO BULLARD

Phone: (242) 357-9262
Jmbullard2109@gmail.com

25 Turnquest Alley
Nassau, Bahamas

With over 15 years of experience in the scientific and environmental field I can bring forth a plethora of skill sets that arrange from multi-tasking, planning and coordination, management of personnel and time as well as confidential handling of sensitive information and resources. I am dedicated and hardworking, with a passion for excellence. I possess skills in project management, educational & public outreach and research & development.

EDUCATION

MS Tuskegee University, Biology (Concentration in Plant and soil Science) 2004
Thesis: The Effects of Superoptimal CO2 on the Growth, Yield, Gas Exchange, Stomatal Conductance and Starch of Sweet Potato and Peanut.

BS Tuskegee University, Marine Biology 1999

EXPERIENCE

Environmental Specialist (2011 – Present) Principal of JSS Consulting Ltd (On The Bahamas Department of Planning and Protection approved Environmental Consultant List 2019 - present)

Projects

- Disney Lighthouse Point Cruise Port Development, Eleuthera, Bahamas Environmental Management (EM)
- Adelaide Creek Development Project; Nassau, The Bahamas Environmental Impact Assessment (EIA) and Marine Assessment
- Exuma International Airport Infrastructure Project, Exuma, The Bahamas Environmental & Social Baseline Assessment (ESBA) and Environmental & Social Management Plan (ESMP)
- North Eleuthera International Airport Infrastructure Project ESBA & ESMP
- Community Based Conch Management in the Family Islands, Conch Farm Feasibility Study and Environmental Baseline Assessment (EBA)
- Rose Island Development; Rose Island, The Bahamas Marine Assessment for EIA
- Paradise Island, Royal Caribbean, The Bahamas, Marine Assessment for EIA
- Coco Cay Island Development, Coco Cay, The Bahamas Environmental Management (EM), Botanical, Marine and Avian Assessment EIA, EBA), Environmental Management Services (EMS) and EMP
- Ocean Cay, Bimini, The Bahamas; EMS, Coral Relocation Monitoring, Public Outreach, Rapid Ecological Assessment (REA)
- Big Pond National Park Development, EMP & EMS

- The Harbor View Marina Project, Nassau, The Bahamas EBA, EMP
- The Staniard Creek Bridge and Causeway Replacement Central Andros, The Bahamas, EMP
- Briland Residence and Marina, Harbour Island, The Bahamas, and Marine Assessment for EIA
- South Andros and Cat Island Water Improvement Project, EMP, EMS
- Barbuda Airport, Antigua and Barbuda, Herpetological Assessments for EIA
- North Windermere Island, Eleuthera, The Bahamas; Marine Assessment for EIA
- The Pointe Marina Development: Nassau, The Bahamas; EMP, EMS
- The Big Pond Park Development Project, New Providence, The Bahamas EMS
- Orchid Bay; Abaco, The Bahamas; Marine Assessment for EIA
- Airport Gateway Project, New Providence, The Bahamas; EMS
- White Bay Cay, Exuma Cays, The Bahamas; Marine Assessment
- Stocking Island, Exuma Cays, The Bahamas; Botanical, Avian and Marine Assessment for EIA
- February Point, Exuma, The Bahamas; Avian and Marine Assessments for EIA
- Deep Water Cay, Grand Bahama, The Bahamas; Wetland Assessment
- Matt Lowe Cay, Abaco Cays, The Bahamas; Avian Assessment for EIA
- Governor's Harbour Amy Base, Eleuthera, The Bahamas; Avian for EIA
- Abaco Forestry, Abaco, The Bahamas; Botanical Assessment for EIA
- The Pointe, New Providence, The Bahamas; Marine Assessment for EIA
- Norman's Cay, Exuma Cays, The Bahamas; Botanical and Avian Assessment for EIA
- Ocean Cay, Bimini, The Bahamas, Avian Assessment for EIA & EMS
- LNG Pipeline, New Providence, The Bahamas; Marine Assessment for EIA
- White Bay Cay, Exuma, The Bahamas; Marine Assessment for EIA
- Old Fort Bay Town Center, New Providence, The Bahamas; Avian Assessment, EIA and EMP
- Bimini Bay, Bimini, The Bahamas, Marine Assessment for EIA
- Hurricane Hole Marina, Paradise Island, The Bahamas; Marine and Stakeholder Assessment, EBA, oral relocation and monitoring & EMS
- Sandals, Exuma, The Bahamas, Avian Assessment for EIA
- Finley Cay, New Providence, The Bahamas; Marine Assessment EIA
- Elbow Cay, Abaco, The Bahamas, Marine Assessment for EIA
- Hermitage, Exuma, The Bahamas; Botanical and Avian Assessment for EIA
- Governor's Harbour Army Base, Eleuthera, The Bahamas; Avian Assessment for EIA
- Bahamar Back of House, New Providence, The Bahamas; Botanical Assessment and Protected Trees Survey
- Witches Point, Abaco, The Bahamas, Marine Assessment for EIA
- Buttonwood Reserve, Eleuthera, The Bahamas, Botanical assessment for EIA
- Master Harbor, Exuma, The Bahamas, Botanical Assessment for EIA
- Hog Cay, Exuma, The Bahamas; Botanical and Avian Assessment for EIA
- Exuma Highway, Exuma, The Bahamas; Botanical Assessment for Highway Feasibility Study
- University of the Bahamas, New Providence, The Bahamas, Avian Assessment for EIA and EIA
- Caribbean Global Timber, Abaco and Andros, The Bahamas, EIA

Janeen Bullard - 2

Project Coordinator

- Cane Toad Eradication, Lyford Cay, Nassau, The Bahamas
- Cane Toad Eradication, Marsh Harbour, Abaco, The Bahamas

Parks Planner and Community Liaison Officer (2006-2011) Bahamas National Trust,Nassau, Bahamas Duties

- Develop proposals to government for the establishment of new National Parks.
- Grant writing
- Develop General Management Plans for existing National Parks.
- Work with surrounding communities to gain support for the importance of establishing new National Parks.
- Project Management for the establishment of the Leon Levy Native Plant Preserve, Eleuthera, The Bahamas.
- Manage all daily details and education of staff for educational programs.
- Organize all special events for the Education Department.
- Liaise with corporate sponsors to further fund educational programs.
- Develop marine education lesson plans and activities (on and off site) for grade levels K-12 and college students.
- Attendance and professional presentations at events both locally and abroad.
- Development of the National High School Marine Science Curriculum.

Research Assistant (2001-2004) Tuskegee University, Tuskegee, AL

- Developed and maintained research projects in conjunction with Tuskegee University and NASA.
- Aided in the daily maintenance and running of a greenhouse.
- Organized and taught Environmental and General Biology courses.

Marine Mammal Trainer (1999-2001) Dolphin Encounters, Blue Lagoon, Bahamas

- Trained Atlantic Bottlenose Dolphins in educational and interactive programs.
- Assisted in developing marine conservation and educational programs.

AUTHOR

Conch Farming Feasibility Study (present)

The Bahamas Sixth National Report on Biological Biodiversity to The Convention on Biological Diversity (2019)

Co-Author of the "Andros Sustainable Development Masterplan" (2014)

Author of the "Critical Situation Analysis of Invasive Alien Species for The Bahamas" (2013)

PRESENTATIONS AND INVITED LECTURES

Policies, Strategies and Best Practices for Managing Invasive Alien Species (IAS) in the Insular Caribbean March 31st – April 4th, 2014, Trinidad. Port of Spain, Trinidad & Tobago. The Cane Toad Invasion: Its Origin, Status and The Bahamas' Response to prevent spread.

Policies, Strategies and Best Practices for Managing Invasive Alien Species (IAS) in the Insular Caribbean March 31st – April 4th, 2014, Trinidad. Port of Spain, Trinidad & Tobago. Developing a National IAS Strategy focused on IAS prevention – a case study of the Bahamas' 2003 -2013 experience.

Bahamas Natural History Conference 2016 The Cane Toad Invasion: Its Origin, Status and The Bahamas' Response to prevent spread

Bahamas Natural History Conference 2018 Citizen Science and Community Involvement can help! Invasive Cane Toads (*Rhinella marina*) control in The Bahamas continues.

PROFESSIONAL TRAINING

2019 IDB Principles of the Review of Environmental Impact Assessments

2019 The Perry Institute of Marine Science, AGRRA Benthic Survey Techniques

2018 Georgia Tech Professional Education Center – OSAHA Approved Trainer

2017 Conservation Training Introduction to Resilience for Development

2017 Inter-American Development Bank Project Management Techniques for Development Professionals

2015 IICA, Efficient use of Rainwater and Runoff in Agricultural Activities, Chitre, Panama

2015 IICA, Agro-Eco Tourism Training Workshop

2014 Commercial Training Center of Department of Commerce, Hainan Province, China Climate Change on Tropical Island and Economic Development for Developing Countries

2013 The Nature Conservancy, Coral Reef Restoration

2013 The Nature Conservancy, AGRRA Coral Surveys

2010 The Bahamas National Trust, Business Writing

2010 The Bahamas National Trust, Public Presentation

2009 The Nature Conservancy, Invasive Species Management

2009 College of The Bahamas, Mangrove Forest Ecology, Management and Restoration

2008 International Fund for Animal Welfare, Certificate of Completion for Whale Watch Guide Training

2006 National Association of Interpretation, Certified Interpretive Guide 2006 Tuskegee University, 1st Place Graduate Oral Presentation Sigma Xi 2005 Tuskegee University, Certificate of Effective Leadership

1995 Auburn University, NAUI Scuba Certified

PROFESSIONAL AFFILIATIONS

SEEDS-Ecological Society of America

Sigma Xi Scientific Research Society

Beta Kappa Chi Honor Society

National Association for Interpretation

National Marine Educators Association Name of Organization

REFERENCES

Available upon request

SWIL CVs

Philip S. Warner

Name of firm	Smith Warner International
Project position	Coastal Engineer
Name of person	Philip Warner
Email	philip@smithwarner.com
Profession	Coastal Engineer
Years of professional experience & career summary	Philip is a senior civil engineer with wide experience in coastal engineering design and oceanographic studies. He has design, inspection, and appraisal experience for coastal protection, marine structures and oceanographic studies, in addition to the development and operation of numerous civil, structural, coastal and hydraulic engineering computer programs. He also has field experience in marine structures construction supervision and inspection, hydrographic surveys and the deployment of oceanographic field equipment. His experience includes work done throughout the Caribbean region and internationally.
Date of birth	03 July, 1964
Nationality	Canadian/Jamaican
Education (state from highest achieved and include year of award)	M.Sc. Research thesis in Coastal Engineering, Queen's University at Kingston, Ontario, 1993, Thesis Topic: Measurement and Prediction of Flow Characteristics within the Swash Zone. B.Sc.(Hons) Civil Engineering, First Class Honours, Queen's University at Kingston, Ontario, 1986.
Professional licenses/key qualifications	Professional Engineers Registration Board

Membership in professional societies	Member Jamaica Institution of Engineers, Member of Professional Engineers of Ontario.				
Skills (including software and engineering codes)	MIKE 21 SW by DHI	MIKE 21 HD by DHI	MIKE 21 ST by DHI	MIKE 21 MT by DHI	MIKE 21 SM by DHI
	MIKE 3 HD by DHI				
Period of employment	1995 to Present				
Company name	Smith Warner International				
Location	Kingston, Jamaica				
Position(s)	Executive Director, Coastal Engineer				
Project description & location	Name of assignment: Regional Disaster Vulnerability Reduction Project: Georgetown Sea Defense Coastal Zone Investigations and Feasibility Studies Year: 2013-2016 Location: St Vincent Client: Government of St Vincent and the Grenadines Main Project Features: The shoreline near Georgetown has suffered significant erosion due to recent hurricanes, and severe winter swells and damaging storms exacerbate the problem. The Government of St. Vincent wishes to stabilize the area to mitigate further loss of coastal lands and protect and prepare the area for Commercial zone construction investments. Positions held: Coastal Engineer Activities Performed: Data collection (waves, currents, tides, bathymetry, topography and historical shoreline positions), wave, sediment, and hydrodynamic modeling; identify and evaluate shoreline protection options, erosion				

	control and beach accretion interventions; model and evaluate the performance of the proposed engineering interventions and identify and propose alternatives based on modeled findings and engineering experience; EIA; training of local government engineers in coastal zone analysis and exposure to the technologies and techniques involved; training workshops in coastal zone analysis and data collection, coastal zone modeling, and engineering design and feasibility analysis using modeling tools. Name of assignment or project: Grand Cayman Cruise Berth EIA Year: 2014-2015 Location: Grand Cayman Procuring Entity: Port Authority, Government of Cayman Islands Main project features: Full environmental impact assessment of a proposed cruise ship berth. Data collection, detailed assessment of impacts, including coastal, environmental, and socio-economic as well as extensive stakeholder consultation and presentation of findings to community. Positions held: Coastal Engineer, numerical modeling expert Activities performed: Coordinated data collection including several current/wave recorders, seabed probes, bathymetric and topographic surveys. Detailed analysis of shoreline change trends and positions along Seven Mile Beach using GPS-mapped data. Analysis and validation of various numerical models for waves, currents, sediment and dredging and disposal activities to determine and quantify impacts. Name of assignment or project: North Shore Integrated

	Coastal and Watershed Stabilization Project Year: 2015-2016 Location: British Virgin Islands Procuring Entity: Organization of Eastern Caribbean States Main project features: Data collection, coastal and hydrologic modeling of watersheds leading to engineering designs of shoreline protection structures and water quality improvements. Tendering, evaluation, and construction supervision currently underway. Positions held: Coastal Engineer, numerical modeling expert Activities performed: Analysis of results from wave, hydrodynamic and morphological modeling, which was done to investigate the existing and proposed shoreline. The model results helped in determining the critical spots where protection would be required. Technology transfer to government staff through data collection and modeling procedures. Engineering designs, costs, quantities, and drawings were prepared and presented to stakeholders. Name of assignment: Tsunami and Storm Surge Modeling and Mapping – British Virgin Islands Year: 2011 Location: BVI Client: UNDP R3I Administered Project for European Commission Main Project Features: As part of a wide-reaching Regional Risk Reduction Initiative SWIL and Deltares undertook the storm surge and tsunami modeling of the four main island of BVI. In conjunction with stakeholders an approach and methodology were developed and executed. Data collection activities were required,

	procured, commissioned, evaluated and approved. Results were prepared in GIS compatible formats for on-going use by the Office of Disaster Preparednesss. Positions held: Storm Surge Modeling Expert Activities Performed: Project management, oceanographic and bathymetric data review; preparation of data collection program, including procurement of LiDAR, single and multi-beam bathymetric surveys and GPS-derived topography; numerical model selection, set-up, validation, interpretation and reporting for storm surge components. Name of assignment or project: Studies for the Preparation of the Barbados Coastal Risk Assessment and Management Program Year: 2011 Location: Barbados Procuring Entity: IADB (beneficiary CZMU- Barbados) Main project features: Barbados CZMU was provided with Technical Assistance to prepare for the multi-year CRAMP. Evaluations were completed of institutions, procedures, tools and personnel to determine capabilities and needs. Assessments were done of several investment phase engineering projects. Detailed TOR's written for CRAMP components including Baseline (Coastal Zone LiDAR, Nearshore Waves, Circulation and Water Quality, Sediment Transport Geotechnical Surveys and Shoreline Change) Studies; Integrated Coastal Risk Information Platform. Procurement plans and input for IADB loan documents were also prepared. Positions held: Coastal Engineer Activities performed: Analysis, evaluation and prioritization of engineering designs for Infrastructure Program. Review of data collection monitoring and

	modeling activities; assess and prioritize needs for Baseline Surveys, updated Risk Monitoring Programs, Information Management systems and modeling capabilities. Prepare detailed TOR, budgets and schedules for baseline studies, information management system, and waterfront improvements (including eco-system based approaches).
Five main duties/ responsibilities	(1) Coastal engineering design, (2) computer modeling of waves, currents, and sediments, (3) oceanographic and nearshore data collection and survey procurement, (4) shoreline change monitoring and analysis, (5) report preparation and project management.

Philip will investigate baseline coastal processes and dynamics including currents, tides, Sediment transport and erosion/accretion. Using available information, a numerical model of the project site and environs will be developed in order to understand the existing tides, currents, wave patterns, and sediment movement. This information will be developed for a range of environmental conditions including baseline day-to-day averages as well as extreme storm/hurricane conditions.

Renée McDonald

1	Name of firm	Smith Warner International Limited
2	Project position	Marine Ecologist
3	Name of person	Renée McDonald
7	Email	renee@smithwarner.com
8	Profession	Environmental Specialist & Geologist
9	Years of professional experience & career summary (max 300 words)	5 Years experience in Earth and Marine Sciences. Career began at the Petroleum Corporation of Jamaica in the Special Projects/Oil & gas department. Continued post- graduate school with environmental consulting firms. Current role as Environmental Specialist and Geologist at SWI
10	Date of birth	11/11/1989
11	Nationality	Jamaican

12	Education (state from highest achieved and include year of award)	MSc Marine Environment and Resources (2013) BSc Geology (2010)
13	Professional licenses/key qualifications	Post-graduate diploma in Environmental Management (2016) Certificate in Principles of Project Management (2014) PADI Open Water Diver certification (2014)
14	Membership in professional societies	Geological Society of Jamaica, AAPG, SEG, Jamaica Institute of Environmental Professionals
15	Training (software, FIDIC, etc.)	International Seabed Authority At-Sea training programme (2015)
16	Seminars attended	Caribbean Coastal Conference 2016, Barbados SEG Annual Conference 2013, Houston TX, USA (presenter)
17	Skills (including software and engineering codes)	• Wordpress website development • ArcGIS
18A	Period of employment	2016-present
18B	Company name	Smith Warner International Limited
18C	Location	Kingston, Jamaica
18D	Position(s)	Environmental Specialist and Geologist
18E	Project description & location	Name of Assignment: Royalton Resorts Beach Development (Jamaica, St. Lucia) Year: 2016-2018 Location: Jamaica, St. Lucia Client: Royalton Resorts Main project features: Beach creation and enhancement along rocky and eroding coastal areas Position held: Marine Environmental Specialist Activities Performed: Marine Benthic surveys prior to construction activities. Marine benthic surveys post-construction. Relocation of sensitive organisms (coral &

		seagrass) from construction impact areas. Monitoring of relocated organisms. Supervision of electrification of artificial reef (Biorock) structures and installation of fish havens. Name of Assignment: Falmouth Cruise Ship Pier Dredging Year:2017 Location: Falmouth, Jamaica Client: Port Authority of Jamaica (PAJ) Main Project Features: SWI was contracted by the Port Authority of Jamaica (PAJ) to perform an impact analysis on the widening of the berth pocket and a section of the entrance channel of the Falmouth Cruise Ship East Berth. Of concern were the impacts on the surrounding benthos and the marine and coastal processes in the area. Position held: Marine Environmental Specialist Activities Performed: Survey of the proposed dredge site. Development of relocation plan for coral and other sensitive organisms. Name of Assignment: Magdalena Grand Beach & Golf Resort Year:2017 Location: Tobago Client: Evolving TecKnologies and Enterprise Development Company Ltd. (eTeck) Main Project Features: Project is intended to develop a comprehensive understanding of the coastal processes leading to the erosion of the Magdalena beachfront, as well as the best mechanism for curbing the erosion. Position held: Marine Environmental Specialist Activities Performed: Conducted benthic survey. Assisted with bathymetric survey.

		Name of Assignment: Paradise Found Resort Development- Baseline study and preliminary drainage plan. Year: 2016 Location: Barbuda Client: Paradise Found Development Main Project Features: Waterfront development on 400acre coastal property. The project involved preliminary environmental assessment to integrate master planning and existing ponds and wetlands, climate change risk with respect to storm surge and long term coastal erosion, inland flooding and storm water management. Scope required working with development team of master planners, architects, archeologists and sustainability consultants. Position Held : Environmental Specialist/Geologist Activities performed: Benthic surveys, Geophysical survey, Water Quality sampling, Soil sampling. Data analysis & report preparation.
18F	Five main duties/ responsibilities	• Marine benthic surveys; • Ecological surveys within the coastal zone; • Working with associates and subs in areas of environmental assessments and climate resilience; • Participation in integrated coastal environmental engineering within the coastal zone (ridge to reef); • Geophysical surveys and geological interpretation of findings; • Proposal and report preparation and project coordination

CARIBBEAN ENVIRONMENTAL DESIGN ASSOCIATES
OSWALD R. WILLIAMS, BSc. MA. MRTPI
Osborne Road, East Backsalina, Grand Turk, Turks & Caicos Islands, B.W.I
Telephone: (649) 231 0371
Email: Oswaldwilliams51@gmail.com

PROFESSIONAL PROFILE

Oswald R. Williams is an Architect/Planner and was previously Director of Planning, Turks and Caicos Government. Presently he heads his own Architectural and Planning Consultancy, operating under Caribbean Environmental Design Associates. Mr. Williams holds a bachelor's degree in architectural technology and a Master's Degree in Town Planning. He has been involved in many civic organizations and government boards. He has a passion for environmental quality.

A well tested, goal oriented, determined individual who is committed to ongoing professional development and constantly looking for new life challenges and experiences. Excellent interpersonal skills, accompanied by hands on experience at all levels of the planning, architectural and construction management sectors, as well as the business arena. An outstanding team player, efficient independent worker with a sharp eye for details who is committed to meeting organizational objectives and deadlines. Brings to the team an enthusiastic personality, dedication and leadership skills that allow him to confidently communicate at all levels and to get the task accomplished in a timely manner.

OBJECTIVE

Keenly strives to maximize all skills and experiences to serve both public and private sector clients effectively and efficiently in the areas of Architecture, Planning, Environmental Impact Assessment Studies and Property Appraisals.

EDUCATION/QUALIFICATIONS

Masters in Environmental Planning 1987-1989 - University of Nottingham, Nottingham, UK

BSc. Architectural Technology 1980-1983 – New York Institute of Technology, New York, USA – (Which included Construction Technology, Material Take-Off, Cost Estimating and Property Evaluation).

Certificate in Environmental and Sustainable Development 1992 – The Banff Centre for Management, Barbados, BWI.

Certificate in Environmental Assessment and Management 1991 – Centre for Environmental Management and Planning, University of Aberdeen, Scotland. England.

Certificate in Tourism Planning 1979 – Project Planning Center, University of Bradford, England.

Certificate in Regional Tourism Planning 1978 – Caribbean Tourism Research Center, Barbados, BWI

Diploma in Physical Planning 1972-1974 – United Nations Development Programme, Planning Training Center, Castries, St. Lucia, BWI.

EMPLOYMENT HISTORY/PROFFRDDIONAL EXPERIENCES

- **Coordinator National Physical Sustainable Development Plan for the Turks and Caicos Islands**. Coordinate commence the process of preparation of a 10 year (**2009-2019**) development plan for the Turks and Caicos Islands.

- **Deputy Chairman, Physical Planning Board 2003 – 2005** – A statutory body of the Turks and Caicos Government with sole responsibility for reviewing and approving development applications, Master Development Plans and Environmental Impact Assessment

- **Architect/ Environmental Consultant 1995 – Present.** Operating under Caribbean Environmental Design Associates, a Turks and Caicos based company specializes in Architecture, Environmental Planning and Physical Planning.

- **1989 – 1995, Director of Planning, Turks and Caicos Government**. Responsible for the overall management and direction of Physical Development in the Turks and Caicos Islands, including the formulation of physical development policies. Advise government on development proposals and appropriate conservation policies and measures to ensure sustainable development.
- Supervised and managed a sixteen – men (16) Physical Planning Department, with headquarters in the capital island of Grand Turk and a branch office on Providenciales. Review physical planning applications and carried out periodical building inspection along with the Department's Building Engineer to ensure

compliance with the Physical Planning Ordinance and Regulations, and with the Turks and Caicos Islands Building Code. Carried out financial appraisals of planning applications to ensure that the appropriate application fees were collected.

- **1983 – 1987, Physical Planner, Turks and Caicos Government.** Prior to being appointed to the post of Director of Planning in July of 1989, I held several junior and senior positions within the Department of planning, including:

  1983 - 1985, Secretary Physical Planning Board.
  1984 - 1978, Physical Planning Officer.
  1974 -1976, Physical Planning Technician.

  During these early years a wealth of experience was gained in the wide range of physical planning related areas. This experience has later proven useful during my tenure as Director of Planning.

PROFILE ON CARIBBEAN ENVIRONMENTAL DESIGN ASSOCIATES

Caribbean Environmental Design Associates (**CEDA)** is a consulting firm established in 1995. It offers a wide range of architectural, environmental planning and project appraisal services to the public and private sectors in the Turks and Caicos Islands. The firm is staffed by Oswald R. Williams, the principal employee.

CEDA is owned and operated by a Turks and Caicos Islander. The company engages in work throughout the Turks and Caicos Islands.

PROJECT WORK EXPERIENCE

CEDA has provided architectural design, technical supervision and construction management services on the following recent projects:

Private Sector Projects

- Expansion T & C National Museum, Front Street, Grand Turk
- Two story commercial building, Church Folly, Grand Turk
- Retail stores, car wash and restaurant complex, Lighthouse Road, Grand Turk, under construction.

- Forty-eight (48) room hotel, with central facilities, Cockburn Harbour, South Caicos, under construction.
- Over 50 Dwelling houses – Grand Turk, South Caicos and Providenciales.
- Site Supervision and Management during the construction of Conch World Facility, Materson's Point, Grand Turk.
- Architectural and Construction Management and Supervision Expansion of Conch Farm, Providenciales.
- Special Inspector Leeward Canal Expansion Project - 2015

European Union Micro Projects

- Basketball courts on Grand Turk.
- Basketball court South Caicos
- Basketball Court Providenciales
- Upgrading sports track on North Caicos
- Farmer's assistance Programme North Caicos.

Caribbean Development Bank Basic Needs Trust Fund sub-projects throughout the Turks and Caicos Islands, which included -

- Day Care Center for the Handicapped, Blue Hills, Providenciales.
- Marjorie Basden High School Fencing, South Caicos.
- Repairs and Renovation of Public Library, South Caicos.
- Two-Story Classroom Block Ianthe Pratt Primary School, The Bight, Providenciales.
- Repairs & Renovations Soroptimist Day Care Center, Grand Turk.
- Renovation Disabled Center, South Caicos.
- Five Cays Primary School Fencing, Providenciales.
- Kew Clinic Extension and Renovation, North Caicos.
- Sandy Point Clinic Renovation, North Caicos.
- Multi-Purpose Outdoor Court, Raymond Gardiner High School, Bottle Creek, North Caicos.

- Improvements Christian Academic Primary School, Grand Turk.
- Improvements New Testament Day Care Center, Grand Turk.
- Repairs and renovations Day Care Center, Grand Turk.
- Canteen Building Ona Glinton Primary School, Grand Turk,
- Renovation and Remodeling to Middle Caicos Clinic in Conch Bar, Middle Caicos
- Consultant Early Childhood Center Ona Glinton Primary School, Grand Turk, TCI

- Consultant or contributing consultant on a number of Environmental Impact Assessment studies for tourism related development projects in the Turks and Caicos Islands.

- Commercial and residential property appraisals for lending institutions in the Turks and Caicos.

- Technical inspection reports on commercial and residential projects for lending institutions in the Turks and Caicos Islands.

- Site Supervision and Management during the construction of Conch World Facility, Materson's Point, Grand Turk.

Sub-projects Settlement Upgrade Grand Turk and Salt Cay

During the period 2003 – 2008 performed the role as project officer to Grand Turk Settlement Upgrade Committee, where I designed, prepared contract documents and supervised and managed some three hundred (300) sub-projects throughout settlements in Grand Turk and Salt Cay.

PLANNING AND ENVIRONMENTAL IMPACT ASSESSMENT PROJECT EXPERIENCES

CEDA has been the lead environmental consultant to government and private sector developers on many major projects throughout the Turks and Caicos Islands and ha carried has carried out environmental studies for the following projects:

- Counter Part Physical Planner, National Physical Development Plan, Turks and Caicos Islands, 1985 – 1987.

- Settlement Upgrading Study, Grand Turk, Turks and Caicos Government 1991.

- Settlement Upgrading Study, South Caicos, Turks and Caicos Government 1996.

- Environmental Impact Assessment, Greenwich Beach Development, Grace Bay, Providenciales, 1995.

- Environmental Impact Assessment, Royal Crown Colony Development, Halfway Creek, Middle Caicos, Contributing Consulting Environmental Planner/Coordinator, 1996.
- Environmental Impact Assessment, Crystal Bay Beach Resort, Northwest Point, Providenciales, 1996, Contributing Consultant Environment Planner.

- Environmental Impact Assessment, Point Grace Development, Grace Bay Providenciales, Contributing Consultant, Economic and Social Impact.
- Environmental Impact Assessment, the Sands, Grace Bay, Providenciales, Economic and Social Impact.

- Environmental Impact Assessment, Babula Beach resort and Villas, Cheshire Hall and Richmond Hill, Providenciales, 1999, Contributing Consultant/Coordinator.

- Environmental Impact Assessment, WACO Resort Development, Turtle Cove Marina, Providenciales, 1999, Contributing Consultant/Coordinator.

- Environmental Impact Assessment, Beaches Jetty, Grace Bay, Providenciales, 1999, Contributing Consultant/Coordinator.

- Environmental Impact Assessment, Leeward Temporary Floating Dock, Leeward Marina, Providenciales, 2000, Contributing Consultant/Coordinator.

- Environmental Impact Assessment, Leeward Canal Residential Development, Leeward Development, Providenciales, HallTech 2000, Contributing Consultant, Economic and Social Impact.

- Environmental Impact Assessment, the Somerset on Grace Bay, Grace Bay, Providenciales, 2001, Contributing Consultant/Coordinator.

- Environmental Impact Assessment, Grand View Hotel, Grace Bay, Providenciales, Contributing Consultant, Economic and Social Impact.

- Environmental Impact Assessment, Walkin Marine Dock Project, Leeward Going Through, Providenciales 2001, Contributing Consultant/Coordinator.

- Environmental Impact Assessment, West Caicos Development, HallTech 2001, Contributing Consultant, Economic and Social Impact.

- Environmental impact Assessment, Cruise Ship Dock, Grand Turk, HallTech 2003, Contributing Consultant.

- Environmental Impact Assessment, Cruise Ship Dock Grand Turk, Turks and Caicos Islands, Team Coordinator and Contributing Consultant February 2004.

- Environmental Impact Assessment, Leeward Beach Creation Project, Leeward Marina, Providenciales – April 2005 - Coordinator and Contributing Consultant.

- Environmental Impact Assessment, Leeward Havens Canal Project, Providenciales – December 2005 - Coordinator and Contributing Consultant.

- EIA Turtle Cove Marina Land-Infill/Reclamation Project – 2015

- Consultant/Coordinator – EIA Leeward Going-Through Channel Maintenance Dredging 2015

- Consultant/Coordinator – EIA Ritz Carlton Resort & Residence 2017

NATIONAL PHYSICAL DEVELOPMENT PLANS FOR THE TURKS & CAICOS ISLANDS

Mr. Williams, of CEDA was counterpart planner for the outdated 1987-97 National Physical Development Plans prepared by United National Development Planning for the Turk and Caicos Islands government in 1987. More recently he was coordinator for the Village Habitat Team out of Atlanta that was engaged in the process of preparing the 2010 Revised National Physical Development Plans for the Turks and Caicos Islands prior to the suspension of the constitution and imposition of direct rule by the British Government.

CEDA PROPERTY APPRAISALS AND VALUATIONS

CEDA carried out over 1,000 property appraisals throughout the Turks and Caicos Islands since 1995 for Scotia Bank, First Caribbean International Bank, Turks and Caicos Banking and Turks and Caicos Investment Agency (TCInvest), which includes:

- Residential Domestic
- Land Only Domestic
- Residential/Commercial Development
- Land Only/Commercial Development
- Commercial Office
- Commercial Mixed Use

9.15 Appendix O - Reference and Literature Cited

Applied Technology and Management Inc, 1990**,** - Environmental *Impact Assessment, Leeward Limited.*

Areces-Mallea, A.E., A.S. Weakley, X. Li, R.G. Sayre, J.D. Parrish, C.V. Tipton, and Timothy Boucher. 1999. *A Guide to Caribbean Vegetation Types: Preliminary Classification System and Descriptions*. The Nature Conservancy, Arlington, VA.

Hayward J. Stuart, Gomez H. Vichi and Sterre Wolfgand, 1982, - Bermuda's *Delicate Balance- People and the Environment, The Bermuda National Trust*

Bradley, Patricia. The Birds of the Turks and Caicos Islands- The Official Checklist.24pp.

Bunkart, A. J. and Medlik S., 1975, - The *Management of Tourism, Heinemann London*

Clark, J.R. (1983). "Coastal Ecosystem Management: A Technical **Manual** for theConservation of Coastal Zone Resources." John Wiley & Sons, New York.

Cooper, C.K. (1988). Parametric Model of Hurricane-Generated Winds, waves and Current in Deep Water. *Offshore Technology Conference.* Houston, TX. OTC 5738 pp61-70.

CITES, 2018. List of Endangered Species. Downloaded on August 24, 2018.

Correll, D.S. and H.B. Correll. 1982. *Flora of the Bahama Archipelago*. Straus and Cramer, Germany.

Department of Planning, 1994, - Development *Manual*

Fetter, C. W**.,** Applied Hydrogeology. Second Edition. (1988).

Ground, Richard. 2001. The Birds of the Turks and Caicos Islands. Turks and Caicos National Trust – Publisher. Hong Kong. 94 pp.

Hallett, Bruce, 2006. Birds of the Bahamas and the Turks & Caicos Islands. Macmillan Publishers. 245 pp.

Hall, E.E. (1992). The application of borehole logging, electromagnetic surveying and surface resistivity to the evaluation of groundwater resources on the western half of New Providence, Bahamas. School of Earth Science, Hydrogeology Department, University of Birmingham

International Union for the Conservation of Nature (IUCN) 2018. *The IUCN Red List of*

Threatened Species. Version 2017-3. <http://www.iucnredlist.org>. Downloaded on August 24, 2018.

Mather, J.D., 1971. A Study of the Groundwater Resources of the Turks and Caicos Islands. Institute of Geological Sciences, Hydrogeological Department, London, U.K.

McNary Wood, Kathleen. 2003.Flowers of the Bahamas and the Turks and Caicos Islands. Macmillan-Caribbean. Oxford.

Nellis, David W. 1994. Seashore Plants of South Florida and the Caribbean. Pineapple Press, Inc. Sarasota, Florida, 160 pp.

Oswald R. Williams, 1989, - Planning *for Tourism: Its Environmental Impacts Providenciales.*

Oswald R. Williams, 1974, - A *Guide to Tourism Development in the Turks and Caicos* Islands: United Nations Training Programme, Castries, St. Lucia.

Oswald R. Williams, 1995 - Assessment *of the Environmental Impact of Tourism Resort Development, Grace Bay, Providenciales, TCI*

Pattullo, Polly, 1996 - Last *Resorts - The Cost of Tourism in the Caribbean*

Ralph M. Fields Associates Inc., 1985, - Ecological *Study for the Turks and Caicos Islands*

Raffaele, H.A. and J.W. Wiley. 2014. Wildlife of the Caribbean. 304 pp.

Redfern, Colin. Bahamian Seashells. Bahamianseashells.com, Inc. Publishers, Boca Raton, FL. 501 pp.

Salm, Rodney V. & John R. Clark. 1984. Marine and Coastal Protected Areas: A Guide for Planners and Managers. State Printing Company, Columbia, South Carolina. 302 pages.

Smith, D.A.Y., Warner, P.S. and Banton, J.D., 2002. Long Term Variability of Hurricane Trends and a Monte Carlo Approach to Design, Proceedings of 28th Coastal Engineering Conference, Cardiff (Wales).

Shaw, E.M. (1983). Hydrology in Practice. Second Edition.

Sutty, Lesley. 1990. Seashells of the Caribbean. Macmillan Publishers, 106 pp.

Turks and Caicos Government 1989, - The *Physical Planning Ordinance*

Turks and Caicos Government 1990, - The *Physical Planning Regulations*

White, Anthony W. 1998. A Birders Guide to The Bahama Islands (Including the Turks and Caicos Islands). American Birding Association.

Young, I.R. and G. P. Burchell, 1996: Hurricane generated waves as observed by satellite. Ocean Eng., 23, 761–776

DRAFT